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PREPARING HISTORICAL MAPS FOR PRESENTATION IN A GEOPORTAL[1]

Abstract: This paper discusses the challenges to a wider access to archival cartographic materials. The aim of the study is to present and evaluate the preparation of historical maps for presentation in geoportals. The authors use the example of two maps from the early twentieth century, without information on the spatial relations, to trace the course of their processing into a form that allows them to be published in spatial data structures. The descriptions of subsequent stages include theoretical and practical aspects of the procedure. Particular attention was paid to the factors affecting the accuracy of spatial fit that affects the ability to use them further.

Key words: Historical GIS, geoportal, historical maps, Łódź.

1. Introduction

Archival cartographic materials are a valuable, but not easily accessible, source of information. Maps, plans and projects of this type are not widely available, which is meant to protect them from destruction. The result is that they can be accessed by just a small group of people. These most often include library and archive staff that are tasked with maintaining them. Often, access to historical maps requires special permits and recommendations, and their use is the domain of historical sciences. The result is that many researchers avoid using them in their scientific works. There is no doubt, however, that allowing access to this type of source materials will contribute to their increased use in many scientific disciplines. One possibility to share them with a wider audience in a way that is safe for the archival materials is the Internet and the geoportals. In addition to technical skills, this task

[1] Geoportal means an Internet site or equivalent providing access through electronic means to such spatial data services as: searching, browsing, downloading and processing (EU Directive 2007).

requires knowledge in geoinformation and cartography, as well as the history of the creation of archival materials and the area they represent.

The aim of this article is to present the process of preparing detailed historical maps for presentation in a Geoportal which involves both theoretical and practical issues. The processing of archival cartographic materials using ArcMap 10.2 is shown using the example of two maps from the early twentieth century, containing the sewage system of Łódź and the Geoportal of Łódzkie Region.

2. Geoportals

Currently, access to spatial data[2] and related services is universal and easy. This was fostered by the development of information technologies (mainly Internet) and the initiatives adopted back in the 1990s both in Europe (as part of the EU) and the US aimed at integrating and enhancing the availability of spatial information[3]. The process was initiated as early as 1994 in the United States with the introduction of the National Spatial Data Infrastructure (NSDI) coordinated by The US Federal Geographic Data Committee. The program has received support at the highest political level in the form of an implementing regulation signed by then-President Bill Clinton, but it concerned only at the federal level and did not relate to other government authorities or to the private sector. This meant that the interest in the integration of spatial data was small, and the project was focused on the technical aspect of the issue. However, it formed a solid foundation for the creation in 2002 of second-generation US NSDI as part of the e-government, introduced by President George W. Bush. One of the 24 projects in this program, funded and coordinated by the Office of Management and Budget (OMB) has led to the creation of the Geospatial One-Stop (GOS) portal (now at http://www.data.gov/), which provides federal, state and local authorities, as well as all citizens, with access to geographical information. It also allows for integrating data from multiple sources through a single standard for data sharing, provides consistent collections and better cooperation at different levels of government in terms of data collection (Maguire, Longley 2005; Białousz 2013).

A similar initiative was taken in Europe by the European Union. In 1997, the European Commission launched the GI2000 initiative, meant to contribute to the elimination of barriers in accessing spatial data, their integration at European level and the development of the information society (Bernard, Kanellopoulos, Annoni, Smits 2005; Maguire, Longley 2005; Białousz 2013).

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[2] The data relating directly or indirectly to a specific location or geographic area (EU Directive 2007).

[3] One or more (usually) multi-subject collections of spatial data existing for a given area (Białousz 2013).

The next step of the European Commission was the INSPIRE (Infrastructure for Spatial Information in Europe) initiative launched in 2001, which was to create a legal basis for accessing spatial data for the implementation and evaluation of policies pursued by the EU and the creation of a European Spatial Data Infrastructure (ESDI). This led to the introduction of the European Union Directive of the same name, which came into force in 2007. It obliges EU Member States to introduce a uniform infrastructure for spatial information (ESDI) and the free provision of current data from 34 thematic areas. All available data must be provided with metadata, as well as network services allowing the work on spatial data (searching, processing, viewing, downloading) with a certain minimum capacity. For this reason, one of the priorities of the INSPIRE Directive was the creation of the EU Geoportal (http://inspire-geoportal.ec.europa.eu/) through which all member states have to provide an integrated access to their spatial data infrastructures. This does not, however, oblige them to stop sharing spatial data through other access points (national geoportals), which they decide to use (Dąbkowski, Gugała, Kula 2014; Maguire, Longley 2005; Bernard, Kanellopoulos, Annoni, Smits 2005).

The introduction of the INSPIRE Directive has become the basis for changes in the laws of the Member States of the EU and the introduction of its requirements into national law. In Poland, the transposition of the Directive of the European Parliament and Council 2007/2/EC of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) was made using the Law of 4 March 2010 on spatial information infrastructure, which sets out the rules for creation and use of spatial information infrastructure. This law also (in Art. 13 pt. 1) establishes a geoportal of spatial information infrastructure as a central point of access to spatial data services and entrusted its creation and maintenance of the Chief Land Surveyor (Białousz 2013).

However, the geportal was created much earlier, in 2005, after Poland joined the European Union, when the Head Office of Geodesy and Cartography started GEOPORTAL.GOV.PL (2004–2008). In the course of its implementation, an infrastructure of nodes for the National Spatial Data Infrastructure (KIIP) was formed, based on three levels: central, provincial and district, working together and providing search, sharing and data analysis services (Dygaszewicz 2006; Preuss, Dygaszewicz 2006; Kwoczyńska, Borowiecki 2010; Head Office of Geodesy and Cartography 2013).

This project was continued in GEOPORTAL2 (http://geoportal.gov.pl/), whose scope concentrates on the implementation and maintenance of the national geoportal according to the guidelines set out in the INSPIRE directive. Owing to this, the services of the spatial information infrastructure are accessible electronically for everyone, not only for selected governmental and local administration units (Head Office of Geodesy and Cartography 2013).

Actions aimed at promoting access to spatial information and the development of the information society proved to be effective, as evidenced by the growing number of portals serving such data in recent years. In addition to these national and international portals, there are also regional portals created not only by the public administration: provinces (e.g. geoportal of Lodzkie region, http://geoportal.lodzkie.pl/imap/) counties, cities (e.g. Lodz, http://www.mapa.lodz.pl/), or even small municipalities (e.g. the Ostrówek Municipality Spatial Information System in Lublin province, http://ostrowek.maps.arcgis.com/home/webmap), but also institutions (Provincial Inspectorate of Environmental Protection – Ecoportal of Lodz Province, http://www.ekoportal.wios.lodz.pl) or thematic geoportals concerning a given topic, such as tourism or education (e.g. the Bory Tucholskie National Park, http://gis.pnbt.com.pl) (Dukaczewski, Bielecka 2009; Dukaczewski, Ciołkosz-Styk, Sochacki 2012).

Although the the goal of geoportals is to share the most up-to date information, portals containing historical spatial data are also created. The importance of this issue is demonstrated by the existence of a number of national geoportals presenting the data in the field of Historical GIS[4] (HGIS). The United States, there is the National Historical Geographic Information System (NHGIS), founded and run by The Minnesota Population Center, University of Minnesota (https://www.nhgis.org/). It offers free access to statistical data from censuses and the corresponding administrative borders from 1790. Selected data can be downloaded from the website or included in custom statistical charts using a mapping portal. Maps of Europe with presented historical data concerning politics, economy and transport dating back to 1500 (http://www.ieg-maps.uni-mainz.de/) are made available by the European Historical Institute in Mainz. They are digital maps that can be viewed online or downloaded in PDF format.

One of the most complex HGIS projects was created and is maintained by the University of Portsmouth in the UK as part of the Great Britain Historical Geographical Information System (GBHGIS). It allows access to data from resources of such institutions as National Statistical Office, State Archives and the British Library. At "A Vision of Britain through Time" (http://www.visionofbritain.org.uk), one can remotely access historical maps of Great Britain, census data since the beginning of the 19th century, election results and collections of travel journals.

Also noteworthy is the Belgian Historical GIS developed at the Modern History Faculty of the University of Ghent. It provides access to statistical information for the population, agriculture and industry in the years 1800–1961 and digitized (vector format in Lambert 72 mapping) maps of the administrative boundary changes in the years 1800–2000. This allows visualization of statistical data for a selected time period at various administrative levels.

In Poland, there is no unified national HGIS system, but there are portals that provide historical data and cartographic materials. A rich collection of maps and geographic materials issued by the Military Geographical Institute (WIG) from

[4] GIS (Geographical Information System) department allows displaying, sharing, storage and analysis of historical maps and data with reference to actual space.

1919 to 1939 and maps showing the area of Central and Eastern Europe since the late nineteenth century to 1945 are available in the Map Archive of the Military Geographic Institute (http://polski.mapywig.org/news.php). The site allows you to browse maps and download files in JPG format.

A very interesting geoportal can be found in the Atlas of sources and materials for history of old Poland (http://hgis.kul.lublin.pl/azm/pmapper-4.2.0/) created and maintained by the Historical Atlas Section of the Tadeusz Manteuffel Institute of History of the Polish Academy of Sciences and the Historical Geoinformation Laboratory Institute of History KUL which collects and shares information and sources for research on historical geography of Poland before 1772. Also noteworthy is a regional geoportal, currently in development, “Historical GIS for the Lublin region” (http://histmap.pl/kwatermistrzostwo/), also managed by Historical Geoinformation Laboratory Institute of History KUL, which is meant to reconstruct the borders of state and church administration in the Lublin province.

It should also be noted that archival cartographic materials are increasingly often made available in geoportals included in the National Spatial Data Infrastructure, at the county level. Historical maps are often made available in geoportals of county cities, such as Łódź (http://www.mapa.lodz.pl/), Warsaw (http://www.mapa.um.warszawa.pl), or Cracow (http://msip.um.krakow.pl).

At the provincial level, such initiative has been taken only by the Łódź region. In the Geoportal for Łódzkie Region (http://geoportal.lodzkie.pl/imap/), the thematic sites include the module: Historical Maps of the Łódź Region, which presents historical data from the current area of Łódź region. The earliest published materials date back to the beginning of the 20th century and include the maps listed below, whose preparation for the geoportal became the foundation of this study.

3. Source materials

The study used two archival maps taken from the Library of the University of Łódź, presenting the water and sewage infrastructure from 1909 designed by William Lindley. At the turn of the nineteenth and twentieth centuries Łódź experienced rapid economic and spatial development, with urban infrastructure lagging behind. With 300 thousand residents, it was equipped with electric trams, power plant, telegraph, cinemas and theatres, while at the same time, until the beginning of the 20th century, it lacked water suppy or sewage systems. Works on the water and sewage network started when the Łódź Water and Sewage Commission was started in 1900. It was built between 1907 and 1911 and designed in a Frankfurt studio of W. Lindley. The main objective of the project was to channel sewage using the valleys of two local rivers: Łódka and Jasień. The main challenge to sewage disposal was the fact that the city is located at 190–230 m above sea level, in direct vicinity of two watersheds crossing the range of the projected system. The concept fit the hypsometry of the city – it included a water treatment plant in the lowest point of the area, in the valley of Ner river. Apart from numerous drawings and sketches showing the technical solutions for canals and collectors, the project also included maps of elements of the installations overlaid on Łódź and its vicinity at the time (Water and Sewage Company in Łódź 2010; Bartnik 2011; Jaskulski, Łukasiewicz, Nalej 2013).

One of the maps is the Situational Map of the Planned Water Treatment Plant in Lublinek, which shows the concept for locating the plant, along with settling tanks in the Ner valley in the scale of 1:5 000 (Fig. 1). The map covers an area of almost 650 hectares, located in the south-western part of the city (Fig. 2). It does not have any markings of the geodetic network. The most characteristic object included is the railway leading to Łódź Kaliska station, which still exists in the same place. The map, set against the background of contemporary topography, shows the locations of collectors and canals for the proposed sewage treatment plant.

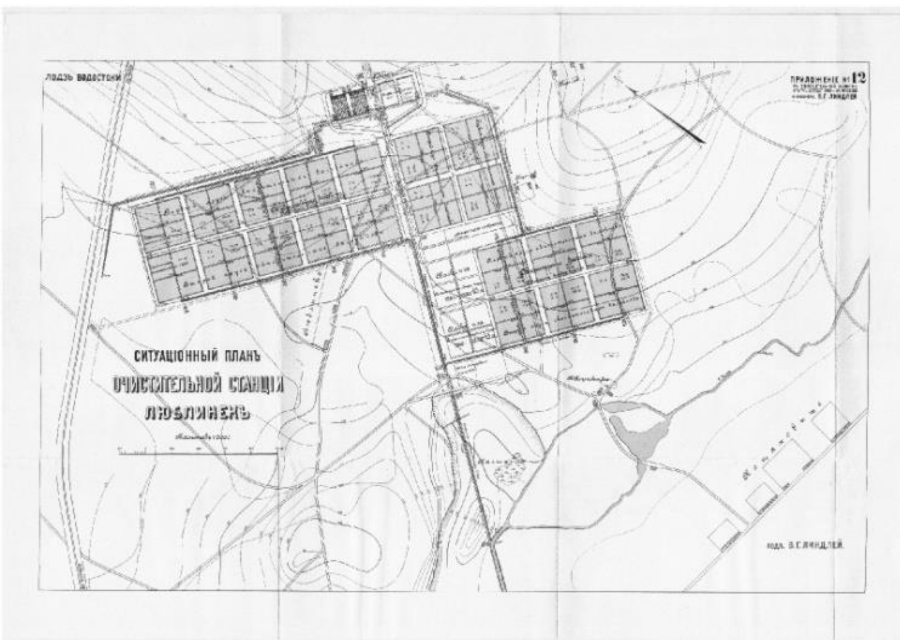


Fig. 1. Location map of the projected sewage treatment plant Lublinek, scale 1:5 000 from 1909

Source: Library of the Lodz University

The second map shows Łódź and the surrounding area with proposed facilities and a water supply and sewage network in 1:25 000 scale, drawn by engineer William Lindley (Fig. 2). Covering an area of about 30,000 ha, it shows Łódź and its surrounding at the time. This map does not include any geodetic network markings. The maps shows the course of the main elements of water supply and sewage network, as well as the approximate location of the proposed sewage treatment plant. It includes the contemporary administrative city limits, watershed and the division into zones: central, external, suburban and rural. Two forest areas are distinguished within the external area. The whole map is set against the topography at the time.

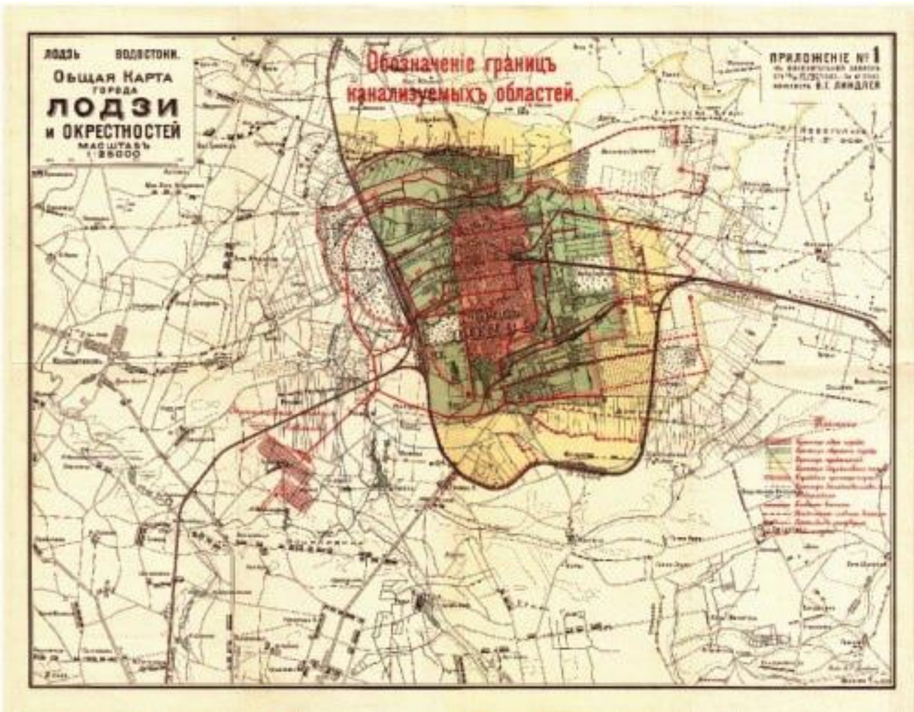


Fig. 2. Map of the City of Lodz and the surrounding areas on a scale of 1:25 000 from 1909

Source: Library of the Lodz University

The maps we used contain a wealth of valuable data of historic significance. The engineering principles of the proposed water supply and sewage networks they show were partially realised in 1925. A network of canals and water supply pipework was created, which is now part of the modern infrastructure of the city (Water supply and sewage company in Lodz, 2010). The maps date back to the era of Russian rule, so all descriptions included in them use Cyrillic script.

4. Preparing archival cartographic materials

The preparation of historical maps for presentation in a geoportal requires the collection of information on their origin, the area they cover, as well as obtaining consent to its processing and sharing from persons or institutions, in accordance with applicable law. Then they have to be converter into digital form (bitmap) and appropriately aligned into the modern cartographic materials with highest possible precision. Additionally, all data included in them should be shareable as attributes. Archival materials must be adapted to the requirements of the portal where they are to be shared. This applies to both the spatial reference system, which is usually different from the one used now or undefined, as well as the precision of the alignment. The technical parameters that must be met by the processed map should be determined through consultation with portal administrators and be a compromise between technical standards applicable to modern cartographic materials and the possibilities of processing archival materials without deteriorating their quality. In the case of the Geoportal of Lodzkie Region, it was determined that, according to the Regulation of the Council of Ministers of October 15, 2012 concerning the national spatial reference system, the maps would be presented in a flat rectangular coordinate system PL-1992. The values of absolute calibration errors[5] and the differences in location between the objects in archival and reference maps, with maximum vales of 10 m and 5 m, respectively, were used to measure the precision of alignment.

Three main stages were distinguished during the proceedings: scanning, graphic correction, calibration and additional activities: vectorisation[6].

5. The process

Scanning is the process of coverting archival materials into digital form, which yields raster maps. Source materials were scanned with a resolution of 400 dpi in RGB and saved in a bitmap format: *.tif. Scanning was performed using a roller scanner in order to avoid the need to fold individual fragments, which would cause additional deformations and decrease the precision of further processes performed on the maps. Scanning parameters were chosen according the G-5 Technical Manual (Surowiec, Hopfer, Lasota, Zaremba, Jaworski 2003)

[5] Calibration of raster images, also called georeferencing, spatial alignment or registration in a coordinate system, involves the removal of any deformations and errors in the raster caused by scanning and deformations in the paper map, as well as the alignment with a geodetic system using different models of transformation. The quality of spatial adjustment is measured using the RMS (Root Mean Square). It is a root of the sum of the squares of all residual errors, i.e. the differences between the actual location of an alignment point post-transformation and the location it should have. Total RMS is calculated as the sum of all other errors (Mierzwa 2002; Tomlinson 2007; Kosiński 2010; Osada, Sergieieva 2010; Jaskulski, Łukasiewicz, Nalej 2013).

[6] Vectorisation is the process of converting raster data to vector data, which is stored in the form of structured coordinates representing the different parts of an object, such axis characteristic point, range (Gaździcki 2001; Gotlib, Iwaniak, Olszewski 2007; Urbański 2008).

After the scanning was completed, raster images have undergone correction involving the removal of elements that are not their content: cartouche, legends, descriptions, title, which were distorted during calibration (Fig. 3).

Fig. 3. A fragment of a map of the City of Lodz and surrounding areas on a scale of 1:25 000 from 1909 transformed using spline transformation before and after correction involving the removal of the legend

Source: own study, Library of the Lodz University

This allowed the next step, namely calibration. This step was performed using ArcMap 10.2. It should be noted, however, that the project is possible using other types of GIS software (Mierzwa 2002; Tomlinson 2007; Kosinski 2010; Jaskulski, Łukasiewicz, Nalej 2013).

The first issue during calibration was the selection of reference map used as spatial reference for the archival materials. Considering the technical parameters of the Geoportal of Lodzkie Region, we modified the documented process of calibrating historical maps that lack the information on the spatial reference system used by using a reference map created at a similar time as the calibrated one and applying low level (such as 1st stage affine) transformation (Chang 2010; Affek 2012; Wolski 2012; Zachwatowicz 2012).

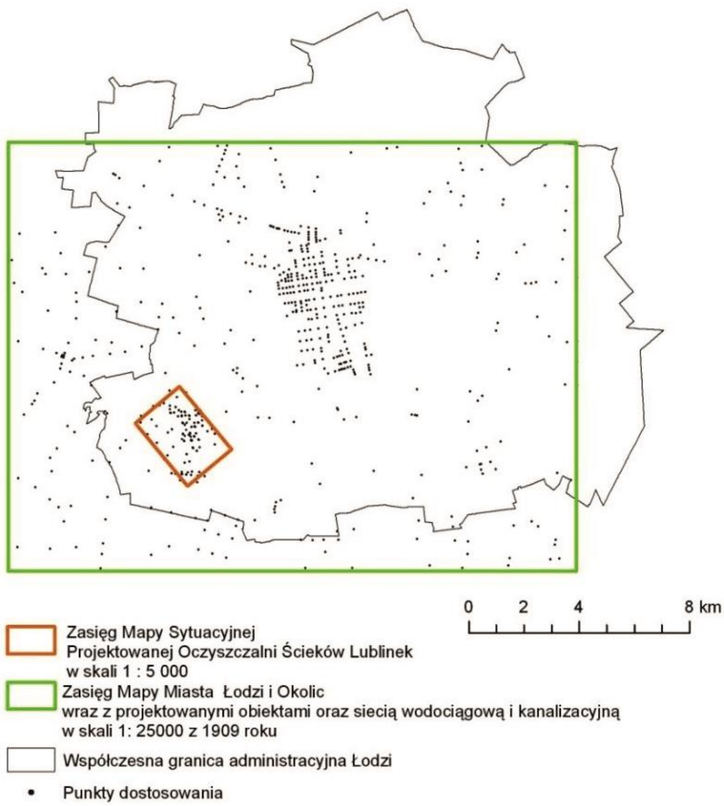
Due to this, a 2012 orthophoto with a resolution of 0.05 m available in the Geoportal of Lodzkie Region was used (http://geoportal.lodzkie.pl/imap/). This has some influence on the selection of ground control points[7] (GCP).

Due to the timespan of over a century between the archival maps and the reference map, there were challenges to identifying numerous pints due to severe anthropogenic transformation of the terrain. Road intersections, as well as land

[7] Ground control points (GCP) are common points for the archival map being calibrated and the reference map.

development elements chosen for their unambiguous location were used as GCP. In parts of the city centre where there have been no major work that changed the street layout, even distribution of many GCP was possible. In areas where the existing urban fabric was rebuilt and the historical maps lacked information, the location of control points was less precise and even.

In the case of location map of the projected sewage treatment plant Lublinek, scale 1:5 000 from 1909, 148 points were chosen, while in the case of the map of the city of Lodz and the surrounding areas, scale 1:25 000 from 1909, 627 points were located (Fig. 4).



– The range of the 1:5 000 location map of the planned sewage treatment plant Lublinek from 1909
– The range of the 1:25 000 map of the city of Lodz and surrounding areas from 1909
– Modern administrative limit of Lodz
– Ground control points

Fig. 4. Distribution of ground control points for the 1:5 000 location map of the planned sewage treatment plant Lublinek from 1909 and the 1:25 000 map of the city of Lodz and surrounding areas from 1909

Source: own study

Finding control points requires the knowledge of the area included in the study, especially the history of topographic changes in the city. Over the past 100 years, Lodz underwent numerous land cover transformations: river engineering, demolition of buildings, changes to street layout, new housing estates replacing the old urban tissue. Examples of such changes include the channelling of Jasień river in the south-western part of the city and the construction of Nowe Rokicie housing estate in its direct vicinity (Fig. 5).

Fig. 5. An example of land transformation in the area covered by the 1:25 000 map of the city of Lodz and the surrounding area from 1909 by Nowe Rokicie housing estate with channelled Jasień river

Source: own study, Library of the Lodz University, Geoportal of Lodzkie Region

Fortunately, elements of the old land cover are still recognisable even in many highly transformed areas. One example of this is the former city forest, whose northern part is still a wooded area used as a park, while its southern portion was first occupied by industrial structures and currently by commercial buildings ("Tulipan" shopping centre) (Fig. 6).

Selected ground control points were saved in a text file (*.txt), then used to calibrate the archival map using the Georeferencing function in ArcMap.

The next stage of work included the selection of the type of transformation used in the calibration process. For each source map, 6 types of transformations (available in ArcMap) were tested. The resulting materials were compared in terms of the total RMS errors (Tab. 1) and the errors at individual control points.

Fig. 6. Example of partial land cover transformation in the area covered by the 1:25 000 map of the city of Lodz and the surrounding area from 1909 showing the former city forest first taken by industrial buildings and now transformed into a shopping centre („Tulipan"). The northern park is now the May 3 Park

Source: own study, Library of the Lodz University, Geoportal of Lodzkie Region

Table 1

The obtained values of total RMS errors for different types of transformations of source materials

Transformation	Map	
	1:5 000 location map of the planned sewage treatment plant Lublinek from 1909 (in m)	1:25 000 map of the city of Lodz and the surrounding area from 1909 (in m)
1st-level affine	34.567	131.682
2nd-level affine	25.728	111.131
3rd-level affine	20.572	100.817
Projective	34.099	126.632
Spline	0.000	0.001
Adjust	5.999	7.981

Source: own study.

Two types of geometric correction met the assumed precision conditions: spline and adjust. Based on the analysis of the results and the distortion of the map, adjust was chosen as a better option, as it is based on a multinomial transformation with TIN (*triangulated irregular network*) interpolation, which allows for achieving both local and global precision with only slight distortion of the map. Archival map files underwent this chosen geometric correction and saved as *.geotiff files. (ArcGIS Resource Center 2013; Jaskulski, Łukasiewicz, Nalej 2013).

Calibrated maps were visually checked for any distortions. The inspection also included the precision of adjustment of the elements of the map's contents that are present in an unchanged form on the reference map, such as the colinearity of streets or fragments of railway tracks (Fig. 7).

Fig. 7. Example of alignment accuracy and distortion of selected fragments of the 1:5 000 location map of the planned sewage treatment plant Lublinek from 1909

Source: own study, Library of the Lodz University

Possible additional works in order to fully use the opportunities given by the geoportal involve the vectorisation of the contents of the map. This is especially useful when performing various kinds of comparisons or analyses, as it allows the imposition of selected archival map content on the modern cartographic materials.

In the case of archival maps used in this study, contents related to the planned sewage network was used. Vectorization began by grouping objects into thematic layers and assigning each layer with the correct geometric type, e.g. linear elements such as planned canals on a linear layer according to OGC organisation standards[8] (Tomlinson 2007).

Three types of thematic layers were created using ArcCatalog application (*shape*[9] files): point, linear and surface in the PL-1992 coordinate system. Then, descriptive attributes were obtained for each vectorised object. These attributes included object's name and function that may be displayed as additional information or labels (Fig. 8).

During the vectorisation process, special attention should be paid to the maintenance of logical locations of vectorised objects in relation to the modern cartographic materials made available through the geoportal that are much more precise that e.g. orthophotos. One good example of this are the planned sewage canals, included in the 1:25 000 map of the city of Lodz and the surrounding area from 1909. In the city centre, where the street layout has not significantly changed, the line, meaning the vector symbolising the sewers should be congruent with the street layout on the orthophoto, as canals are located along the streets, not beneath buildings. Therefore, during the vectorisation of archival materials, whose precision does not match modern standard (Fig. 9), we have to use our knowledge instead of strict rules of vectorisation, such as always marking the axis.

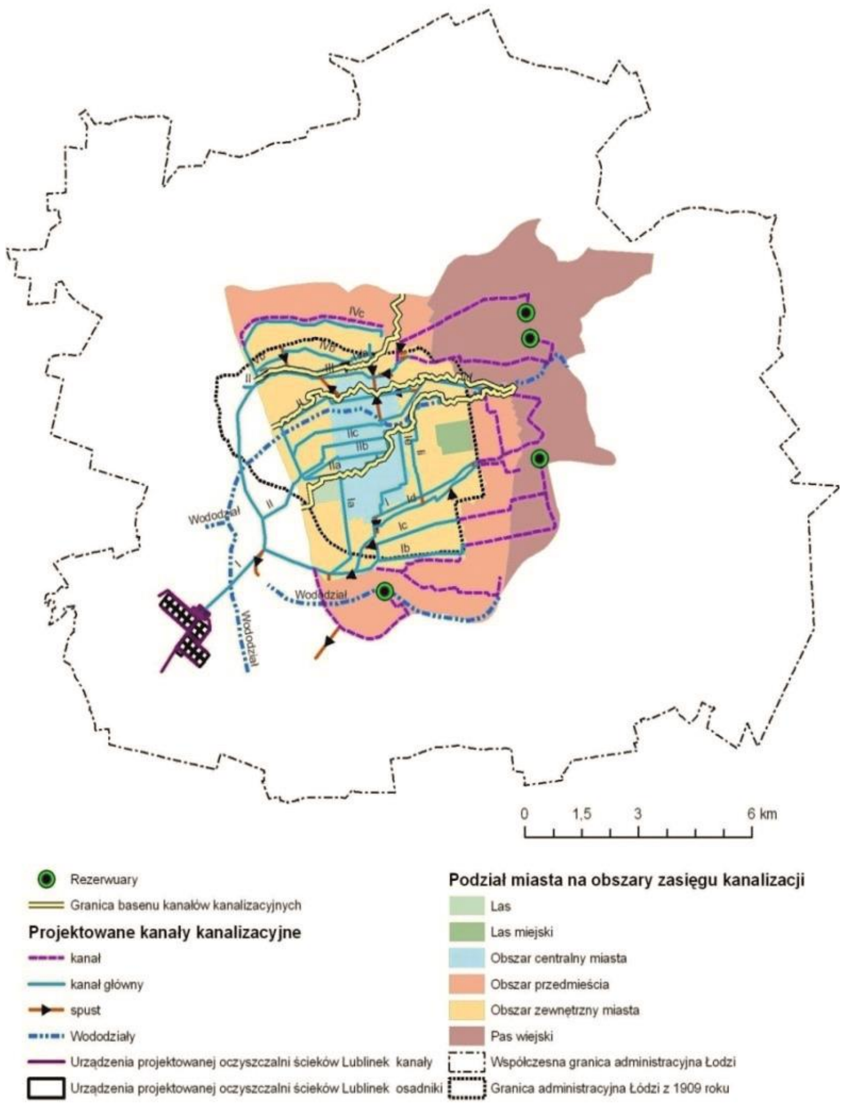
6. Summary

The above process of preparing two archival maps from the beginning of the 20th century that lacked spatial reference information for presentation in the Geoportal of the Lodzkie Region allowed us to formulate the following conclusions:

1. The works on preparing historical maps for presentation in a geoportal should be preceded by a preparatory stage involving the collection of information concerning archival materials and the technical requirements of the geoportal to be used.
2. The technical parameters to be met by the processed map should be a compromise between technical standards for modern cartographic materials and the capability to process archival materials without any quality losses.

[8] OGC – Open Geospatial Consortium, international consortium currently consisting 505 members from around the world: commercial organisations, government agencies, non-profits and universities, whose mission is to develop agreed and approved specifications concerning the issues of interoperability of spatial data or the ability to cooperate on geoinformation (http://www.opengeospatial.org/).

[9] Shapefile (*.shp) – vector graphics file format for geospatial data, created and developed by ESRI based on an open standard (ESRI 1998).



– Reservoirs
– The limit of sewers basin

Planned sewers

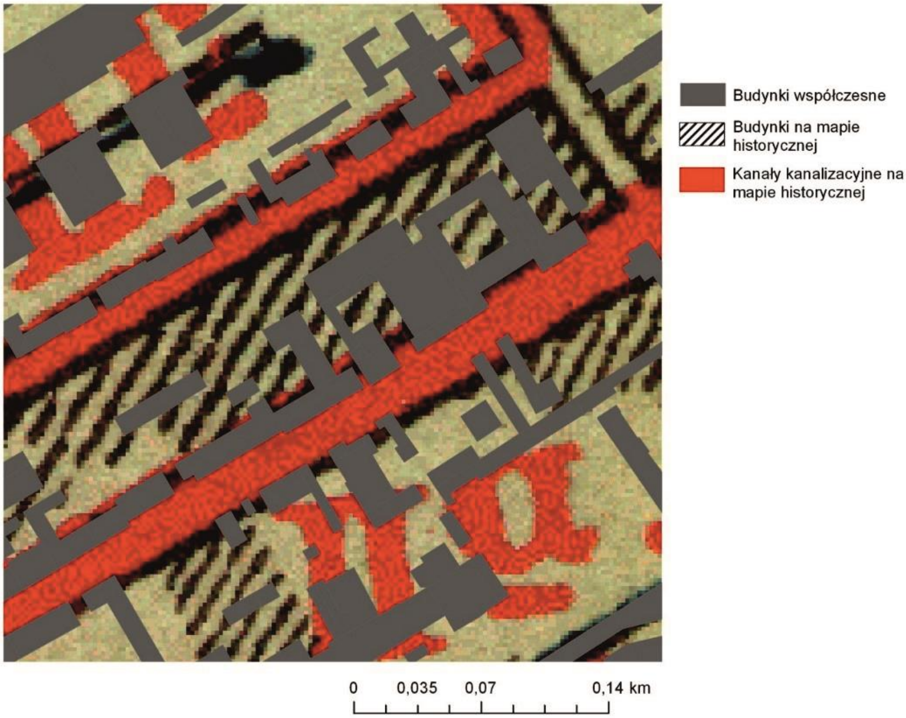
– Sewer
– Main sewer
– Drain
– Watersheds
– Canals in the planned sewage treatment plant Lublinek
– Sediment tanks in the planned sewage treatment plant Lublinek

Division into sewerage range areas

– Forest
– City forest
– Central area
– Suburban area
– External area
– Rural area
– Modern administrative limits of Lodz
– Administrative limits in 1909

Fig. 8. Vectorised content of archival cartographic materials superimposed over modern administrative borders of Lodz

Source: own study, Library of the Lodz University



– Modern buildings
– Buildings on historical map
– Sewers on historical map

Fig. 9. Examples of inaccurate markings of the proposed sewers on the 1:25 000 map of Lodz and the surrounding area from 1909 in relation to contemporary buildings

Source: own study, Library of the Lodz University

3. The preparation process consists of three main steps: scanning, graphic corrections and calibration.
4. The key stage for the correct and precise spatial alignment of archival maps is the calibration. The authors recommend using the latest orthophoto or other base map available in the geoportal as the reference for calibration, as well as using the "adjust" transformation, which yield optimal local and global precision with minimal distortion of the processed map.
5. Additional actions, i.e. the vectorisation of selected contents of historical maps in order to fully utilise the geoportal, are also recommended.
6. Archival cartographic materials processed for the purposes of presentation in a geoportal are less accurate than modern materials, which should be considered when they are used for various purposes and studies.

The above conclusions are the result of the practical execution of the process of preparing two historical maps for presentation in a geoportal. It is worth noting that this work initiated the creation of a new thematic website, the Goportal of the Lodzkie Region dedicated to regional archival cartographic materials (http://geoportal.lodzkie.pl/imap/?locale=pl&gui=new&sessionID=101909).

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PRZYGOTOWANIE MAP HISTORYCZNYCH DO PREZENTACJI W GEOPORTALU

Zarys treści: Artykuł odnosi się do trudności w szerokim dostępie do archiwalnych materiałów kartograficznych. Celem opracowania jest przedstawienie i ocena przygotowania map historycznych do prezentacji w geoportalu. Autorzy na przykładzie dwóch map z początku XX wieku, nieposiadających informacji o odniesieniu przestrzennym, prześledzili proces ich przetworzenia do postaci umożliwiającej udostępnienie w strukturach danych przestrzennych. W opisie kolejnych etapów uwzględniono aspekty teoretyczne, jak i praktyczne postępowania. Szczególną uwagę zwrócono na czynniki wpływające na dokładność wpasowania przestrzennego rzutującego na możliwości dalszego ich wykorzystania.

Słowa kluczowe: HGIS, geoportal, mapy historyczne, Łódź.

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