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THE ROLE OF THE RIVER IN THE DEVELOPMENT OF THE CITY ON THE EXAMPLE OF THE ODRA AND THE CITY OF GŁOGÓW

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ABSTRACT: The authors analysed the role of the river in the city's development using the case study method. The subject of the research was the city of Głogów, situated on the Odra River. The research attention was focused on the city-forming functions of rivers in the light of historical and contemporary analyses. The leading city-forming planes of the Odra River for Głogów and its role in the local economy were identified. The potential of the Odra River for the balanced and sustainable development of the city of Głogów and the conditions for its use have also been indicated. Rivers will play, as they have historically, a significant role in the future development of cities, which implies the need to change strategies for the development of urbanised riverine areas. This is because they are an opportunity for the sustainability of this development, and they are not sufficiently taken into account in these strategies.

KEYWORDS: Odra, Głogów, city-forming functions, balanced and sustainable development

Introduction

Rivers have always played an extremely important role in the history of human civilisation. For primitive man, they were an obstacle in his migrations, but at the same time, they created very attractive ecosystems full of opportunities for obtaining food. For the settled man, the Neolithic rivers guaranteed economic success in the form of agricultural production. In antiquity, the waters of rivers gave rise to potatoes-riverside civilisations (Greek *potamos* – river). This type of civilisation was the Egyptian (Nile), Sumerian-Babylonian (Tigris-Euphrates), Indus (Indus) and Chinese-Shang (Huang-ho) civilisations. The first cities were established on these rivers, such as Jericho on the Jordan, Memphis on the Nile, Babylon, Ur, Uruk, Larsa, Isin, Nineveh, and Asur on the Tigris and Euphrates, Mohenjo-Daro and Harrap on the Indus. In the Middle Ages and modern times, rivers were also an important city-forming factor (Czaja, 2001).

The research problem defined in the study focuses on the role of the river in the development of the city, in light of the experience to date, as well as the national and EU water and environmental policy in the field of inland navigation. The main research hypothesis has the following form: the river played a very important role in the history of the city and its development and maybe the basis for the future development of such a centre. The subject of the analysis contained in the following study is the role of the Odra River in the emergence and development of the city of Głogów. It serves to exemplify the development processes of cities located by watercourses, giving particularly interesting mutual relationships and factors determining these relationships. The idea of balanced and sustainable development at the local level was also referred to. The study uses the concept of balanced and sustainable development, understood as a balance lasting over time between all important orders – economic, social, ecological, spatial and institutional. The research used economic history, economic theory, and economic and natural analyses.

An overview of the literature

The latest Polish literature is not very rich in studies on the city-forming role of rivers. Most of the works that deal with this issue are prepared by urban planners and architects, including landscape architects and researchers dealing with the tourist aspects of socio-economic life in cities (Grzyb, 2020). In the latter case, attention is paid to the tourist attractiveness of the city and riverside areas, their accessibility, the revitalisation of degraded areas and the creation of new public spaces. It is about creating a new urban tissue that is consistent with the genius loci and attractive in terms of tourism and recreation (Bernat, 2007; Trzaski et al., 2010).

The problems of the broad treatment of functions performed by the city and its elements can be found in contemporary research on *smart cities*. This term is understood as a city that uses modern information, information and communication technologies to increase the interactivity and efficiency of urban infrastructure. *The smart city* consists of: (1) information and communication technologies, (2) urban human and social capital, (3) communication infrastructure, (4) ideas and a strategy for balanced and sustainable development, (5) high quality of life, (6) wise management of natural resources, as well as (7) civic participation (Nowakowska et al., 2016). In research and analyses on *smart cities*, we can distinguish three approaches, namely (Dominiak, 2015):

- *smart city* 1.0, inspired by the activity of technology and communication companies,
- *smart city* 2.0, triggered by the actions of city authorities,
- *smart city* 3.0, related to the initiatives of residents.

These approaches also include solutions related to the rivers flowing through the city, but they are not the main subject of consideration.

Rivers are of interest in research into the balanced and sustainable development of riverside cities. It is becoming an important element of such a strategy, both due to the functions performed by the river and riverside areas, as well as the development potential existing in them (Śliwa, 2014; Pancewicz, 2004). Its use, however, requires certain criteria to be met (Jaszek, 2022).

There are also studies devoted to purely hydrological aspects of the river's functioning in urbanised areas, and therefore, as a source of drinking water, a wastewater reservoir, as well as the flood factor and the site of ecological threats. They took on a completely new meaning due to the ecological

disaster that hit Odra at the beginning of August 2022. The catastrophe evokes a lot of emotions, especially political ones. One should rather consider the unprofessional nature of the services involved in controlling the quality of the natural environment, insufficient infrastructure, such as the lack of well-equipped laboratories, and the actual sources of pollution. They can be on, for example, direct discharges of poisons to watercourses in the Odra basin or leakage of poisons from previous deposition, such as sunken barrels or other containers with such substances. Or with the uncontrolled growth of algae and cyanobacteria, lowering the oxygen level in river water.

Some problems are also taken up by ecologists who study urban ecological systems (Czaja & Fiedor, 2002). Studies devoted to other functions fulfilled by rivers in urbanised areas are much rarer. In works of this type, there is a certain specific relationship for contemporary cities located by rivers. Wiśniewski (2010) formulated it as follows: *“The city is currently developing independently of its river, leaving cut-off and dead urban structures in its immediate vicinity. The city’s development takes place in isolation from the river, and new urbanisation processes concern mainly areas located in the suburbs of Poznań. The economic and social factors dominate (including unclear ownership situations), while the factor of urban composition and social factors have been pushed to the background”*. This process is called “the city turning away from the river”. In the literature, you can find the term development-rejection-return, which refers to the process of relations between the city and the river flowing through it (Adamiczka & Adamiczka, 2016).

Summing up, it can be noted that the Polish literature lacks interdisciplinary and comprehensive research on the role or functions of rivers and riverside areas in urbanised areas. These problems are most often undertaken by urban planners and landscape designers, less often by ecologists, naturalists and hydrologists. They are microscale in nature. The contribution of research conducted by economists, sociologists and representatives of economic history is relatively small. The following study is an attempt to combine different approaches in the research on the relationship between the city and rivers. A study case was Głogów, one of the oldest Polish cities situated on the Odra River.

Research methods

The research methodology used in the article was complex and eclectic in nature, given the topic and objectives of the research. It consisted of the following:

- critical studies of the historical evolution of river functions in the operation of cities, including Glogow, and in urbanised areas,
- analysis based on the desktop research method, especially in the field of contemporary river functions in urbanised areas,
- analysis of economic, social, and ecological relations of Glogow with the Oder River, using empirical and statistical information,
- studies of a design nature on the role of the Oder River in the sustainable development of the city of Glogow.

This type of research methodology made it possible to combine the previous experience of the city of Glogow, with a history of more than a thousand years, from the relationship with the Oder River, and to design (identify) future desired directions for the evolution of these relationships, especially from the perspective of sustainable development of the city and its space.

Results of the research discussion – City-forming functions of rivers and their evolution in the light of historical and contemporary analyses

In connection with the functions of rivers in cities, interesting research and conceptual proposals in this area have appeared in recent years. They are concerned with both the historical evolution of the roles (functions) played by rivers and the identification of their contemporary counterparts (Table 1). Researchers of cities and urban areas noticed the initiation stage when the proximity of the river was the basic condition for establishing cities. This is confirmed by numerous historical facts indicating water, apart from defensive values, as the most important condition for establishing cities in ancient and medieval times. The further development of such centres also depended on the func-

tions performed by rivers, but defence issues decreased, and economic (e.g. transport), social (e.g. sanitary and hygienic) and environmental (e.g. water supply) issues grew. The Industrial Revolution of the eighteenth and nineteenth centuries quite radically changed the relationship between cities and rivers, clearly emphasising the following functions: industrial (water supply or discharge of post-production and household sewage), energy and transport. The process of spatial departure of cities from rivers and the emergence of a situation of “separate” functioning of urbanised and riverside areas has also begun. Only port installations and sewage discharge points remained at the water-courses. No projects were undertaken to protect riverside and water ecosystems or to create recreation and relaxation zones. On the other hand, activities related to the sewage system and regulation of rivers, as well as drainage of former polders, were frequent.

Table 1. Evolution of the importance and functions of urban riverside areas

Evolution stage	Initiation	Progress	Degradation	Integration
	Antiquity – Middle Ages	Middle Ages – Industrialization	Industrialization – Postmodernism	Postmodernism (present)
The role of the river in the city	The river shapes the city.	The river determines the city's development.	The river is a factor of industrialization.	The river integrates the city again.
Functions of the river and riverside areas in the city	<ul style="list-style-type: none"> – city-forming – agricultural and irrigation, hygienic and sanitary – transport, communication, commercial – defensive, territorial, political – representative, culture-forming – mystical, compositional 	<ul style="list-style-type: none"> – transport, communication, trade – engineering – city-forming, indicative – defensive, territorial, political – agricultural, irrigation, hygienic and sanitary – representative, culture-forming – mystical, compositional 	<ul style="list-style-type: none"> – industrial – energy – engineering – hygienic and sanitary – transport, commercial, communication – territorial, political 	<ul style="list-style-type: none"> – center-forming – representative – culture-forming, – tourist – recreational – identification – compositional – communication

Source: authors' work based on Jaszek (2022).

In the last three decades, there has been a change in the interpretation of mutual relations between cities and the rivers intersecting them, at the same time formulating new functions of riverside areas (Jaszek, 2022; Śliwa, 2014; Pancewicz, 2004). This is especially visible in urban and landscape architecture works (Table 2).

Table 2. Contemporary functions of riverside areas in urbanised areas

Function	Description
Center-forming	<ul style="list-style-type: none"> – new, multifunctional development – reconstruction and revitalization of the existing buildings – enhancing the functional and aesthetic values of riverside areas and spaces
Representative	<ul style="list-style-type: none"> – location of important buildings in riverside areas – organizing important events and public events in the riverside space
Culturalheritage	<ul style="list-style-type: none"> – locating cultural heritage sites in the riverside area – organization of cultural events by the river
Identification	<ul style="list-style-type: none"> – treating the riverside space as an element connecting the river and the city – location by the river of exceptional objects identified with a given city
Tourist	<ul style="list-style-type: none"> – location of the objects and spaces of historical and tourist value by the river – increasing the tourist and historical values of riverside areas – development of tourist infrastructure on the river – development of the tourist service offer in the riverside areas
Communication	<ul style="list-style-type: none"> – development and modernization of communication networks (bridges, footbridges, boulevards, pedestrian and bicycle paths) – development of various forms of river navigation

Function	Description
Recreational	<ul style="list-style-type: none"> – creating space for active and passive rest by the river – creating infrastructure for the sports use of riverside areas and the river
Natural	<ul style="list-style-type: none"> – preservation of riverside and water ecosystems, their biodiversity and aesthetic values – making it easier for residents to interact with nature – maintaining the value of riverside and river ecosystem services for the local climate, city ventilation or temperature regulation
Compositional	<ul style="list-style-type: none"> – maintaining the existing unique character of the riverside development – composing future original solutions at the city-river interface
Economic	<ul style="list-style-type: none"> – development of commercial river transport – transportation of goods and supply materials by water – use of the river for energy purposes
Hygienic	<ul style="list-style-type: none"> – keeping the sackcloth clean – limiting the runoff of municipal and industrial as well as service pollutants to the river waters

Source: authors' work based on Jaszek (2022), Śliwa (2014) and Pancewicz (2004).

The discussion on the functions of riverside areas in cities in the aforementioned context of balanced and sustainable development is of particular importance. It can be assumed that it is impossible to implement such a development strategy for any riverside urban centre without a proper definition of the functions of the river and the city-river relationship.

Individual researchers propose many criteria that should be followed in order to shape a sustainable environment in the city. For example, on the basis of American experiences, Jaszek (2022) proposes the following set of them (Table 3).

Table 3. Criteria for shaping a sustainable environment in urbanised riverside areas

Criterion	Description
Landscape and climate	<ul style="list-style-type: none"> – protection of the local landscape – integration of the anthropogenic environment with the landscape – functional and spatial solutions adapted to local climatic, topographic and geographical conditions
Cultural heritage	<ul style="list-style-type: none"> – the architecture of the place adapted to the culture, tradition, history and needs of the inhabitants – strengthening the identity and identification of place on various scales, from local to international – return to the tradition of the place
Urban structure	<ul style="list-style-type: none"> – design from micro to macro scale – using the spatial, social, economic, cultural and natural potential in creating urban development – space management optimization – creation of so-called compact cities – revitalization of the existing urban tissue – raising the standards of space by developing its multi-functionality – creating new city centers – the use of so-called linking point investments
Communication and connectivity	<ul style="list-style-type: none"> – low-emission transport in the city – accessibility of public space – network of connections integrating cities – reduction of environmentally burdensome transport in favor of its other types – development of river navigation – a widely available network of modern interpersonal and social communication (Internet)
Greenery and nature	<ul style="list-style-type: none"> – preservation of ecosystems and biodiversity, including riverside and water ecosystems – introducing pre-culture – nature protection in urban and riverside areas – greening the city in various forms and forms

Criterion	Description
Ecological construction	<ul style="list-style-type: none"> – construction integrated with nature, using environmentally friendly materials – increasing the energy efficiency of buildings and passive construction – reducing emissions of pollutants into the air, including greenhouse gases – reduction and use of waste, including municipal and household waste – reducing sewage emissions to the river – use of alternative (renewable) energy – reduction of thermal pollution – optimization of energy and heating systems
Quality of life	<ul style="list-style-type: none"> – shaping the aesthetic values of space, implementing harmony and spatial order – meeting the needs of residents through access to work, education, housing, recreation, transport, culture, functional diversity, green areas – creation of safe urban spaces

Source: authors' work based on Jaszek (2022).

Other authors also highlight similar sets of criteria that are often debatable but not devoid of rationality, logic and, last but not least, practical implementation. Such criteria were used in the analysis of the relationship between the city of Głogów and the Odra River.

Results of the research discussion – Głogów and its historical connections with the Oder

The Odra River, from the moment the city was founded, which was to take place around 985, played a fundamental role in the functioning of Głogów (Rokaszewicz, 2010). A significant reason for the location of the Głogów stronghold was the existence of an important passage across the Oder in this very place. This increased the military values of the city itself, giving it importance not only in the region but also in the entire country. As a result, military expeditions against the Polish rulers – Bolesław the Brave or Bolesław the Wrymouth – headed towards the stronghold. In 1017, the expedition of Emperor Henry II was prepared and carried out. An attempt to capture the city and cross the Oder under the castle failed. In 1109, a German and Czech expedition unsuccessfully besieged Głogów (Obrona Głogowa 1109-2009, 2009). The use of hostages as human shields (“Głogów children”) did not help. Gall Anonymous describes these events in his chronicle.

Rivers, as already mentioned, have always played an important city-forming role (Figure 1). It manifested itself in several dimensions. **Firstly**, the river provided the inhabitants with clean drinking water, which was essential for human and animal life. Moreover, due to the lack of a sewage system, the river had significant hygienic qualities, and its water was used for bathing, washing or discharging municipal sewage, which reduced the risk of disease epidemics. **Secondly**, the problem of all cities was the cramped, often wooden buildings and the accumulation of large amounts of flammable materials in a small space. Fires were one of the most common and greatest disasters in cities. The history of Głogów is also full of such events. Access to water was one of the basic conditions for preventing the spread of fires. The fire resistance of the rivers also played an important role in creating a city. **Thirdly**, rivers provided economic benefits to their inhabitants in terms of fishing and the shipping of goods. Individual centres tried to use them, taking into account the poorly developed network of land roads, which are additionally dangerous for merchant and commercial traffic. **Fourthly**, some cities have used their riverside location to obtain certain resources, especially gold, silver, and precious stones. The rivers also supplied building materials. **Fifthly**, the military and defence values of rivers were extremely important. In the case of Głogów, it is particularly important. The oldest part of the city was located on an island, additionally near the river crossing (ford). If people crossed to the other side, the quickest and most convenient solution was to cross the town (town). **Sixthly**, recreational values were also important, and they were used during breeding works (grazing animals) on riverside pastures, which are often Opole, i.e., common goods of the entire city community. It should be remembered that in ancient and medieval cities, the fertile riverside soil was an important resource for food production, a dominant part of the local economy alongside crafts and

trade. Moreover, **seventhly**, watercourses were routes of human exploration into new, undeveloped spaces, such as an ecumene (Czaja, 2001). The areas around Głogów, the Dalkowskie Hills and the Pradolina Głogowska were developed in a similar way.

The city developed thanks to its location on the Odra River. It is also a kind of barrier, especially for the spatial development of the city. Its oldest part was on the Ostrów Tumski island. It was situated at the mouth of the Barycz River to the Oder River. The current location of both rivers is fundamentally different due to hydromorphological changes (flood waves and river erosion) and human interference (regulatory work and economic use of the river) (Czechowicz & Konopnicka, 2010).

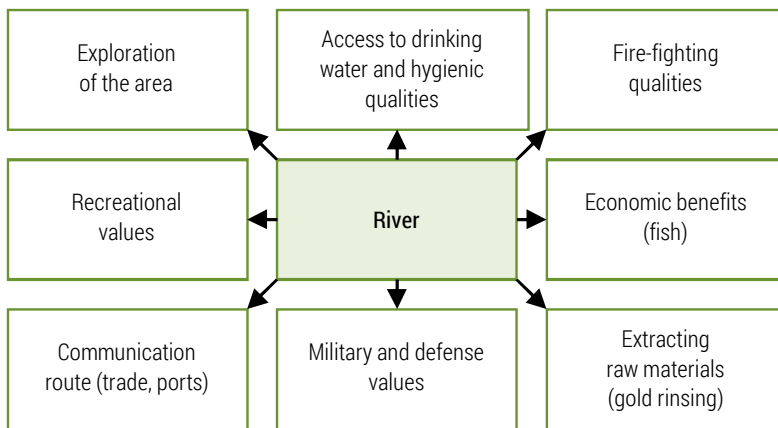


Figure 1. Town-forming role of the river – main dimensions

Source: authors' work based on Adamiczka and Adamiczka (2016), Czaja (2001), Czechowicz and Konopnicka (2010), Jaszek (2022), Grzyb (2020), Pancewicz (2004), Śliwa (2014) and Dominiak (2015).

Results of the research discussion – Connections between the economy of Głogów and the Oder

Contrary to popular belief, the Odra River has never been a very important waterway, both nationally and internationally. As it is quite a large watercourse, it has always been a geomorphological challenge. There is no historical evidence of how early peoples inhabiting the Oder region used the river for communication, transport and economic purposes. On the basis of archaeological research in the area of Dziadoszany near Głogów, one can see many traces of connecting their life with the flowing rivers. On the other side of the main riverbed, there was an old Dziadoszan tribal stronghold from the 9th and 10th centuries.

After the annexation of Głogów to the Polish state, the role of the hillfort itself grew. It became an important centre defending access to the new country, especially in the direction of Lower Silesia with Wrocław, Małopolska with Kraków and Greater Poland with Poznań and Gniezno. The problem for the hillfort, which grew in importance, was the hydrographic changes associated with changes in the course of individual rivers and their legs. Ostrów Tumski lost its importance relatively quickly, and the city moved to the upper left bank of the Oder. In this situation, the Odra River and its oxbow lake (Stara Odra) constituted the northern border of the city. This situation has remained until now.

In the early Middle Ages, the Oder became a secondary trade route in Silesia and Pomerania. These lands belonged to the Polish state, which favoured the development of trade contacts; the more that between Lower and Upper Silesia and Pomerania lay an important and well-organized Greater Poland, the land of the Polan tribe. Other Slavs lived to the west – Serbo-Lusatians, Wieleci and Milczanie, with whom some commercial contacts were also maintained. The oldest information about sailing on the Odra River in Głogów comes from 1263 and was included in the document of Prince Konrad I.

From the thirteenth century on, the importance of the Odra River declined. The division into districts in Poland and the growing importance and expansion of Czech kings and German rulers,

especially the Marches of Meissen and the Marches of Lusatia, contributed to the loss of importance of this river. Numerous political and customs boundaries appeared, which made it difficult or even discouraging to undertake commercial and mercantile activity. Additionally, the accelerated development of Lower and Upper Silesia absorbed the product surpluses produced here. It was also not conducive to the development of trade with the use of the Odra River.

In the 15th century, there was an improvement in the economic situation for grain and other agricultural (cattle), forest (wood) and mining (salt, ores) products from Eastern Europe. These were bulk goods, which were largely transported by waterways (floated). Under these conditions, the interest in transport on the Odra and Warta rivers increased. An additional factor supporting such activity was the political stabilisation in Poland (Greater Poland), the Czech Republic (Lower Silesia) and Brandenburg (Pomerania). The importance of cities along the Odra River has increased, especially those that could function as commercial ports. Głogów was also such a port.

The next century brought the Reformation and numerous religious wars. The Odra River lost its importance as a water route again. There was a certain revival in 1618. Under the Polish-Brandenburg treaty with Trzebieziew, Polish nobility and merchants were granted the privilege of free navigation on the Oder and shipping goods. More numerous barges, mainly from Wielkopolska, appeared on the river. The heyday, however, lasted very briefly, as soon the extremely dramatic and numerous negative consequences of the Thirty Years' War broke out, which led to a very deep economic and socio-demographic decline in the Oder region.

The Odra River navigation was revived after the Silesian Wars, and almost the entire Odra River was included in the Prussian state. This situation lasted practically until the end of World War II. The Prussian authorities, and later the German authorities, undertook numerous activities aimed at creating a uniform social and economic space. In 1812, the construction of the Kłodnica Canal, leading from Gliwice to Koźle (44 km), was completed. It improved the transport of coal from Upper Silesian mines, allowing barges with a displacement of up to 400 tons to run. In 1838, steam navigation was started on the Odra River, on the Wrocław-Hamburg route. In 1939, the Gliwice Canal was put into use, which could be used by barges with a displacement of up to 1000 tons.

The role of Głogów as a river port increased, especially at the end of the 19th century, when work was undertaken to regulate the Oder and to organise the communication of the Odra River. In the 19th and 20th centuries, the river port in Głogów was expanded. The Collegial Bay was used for port installations, where the so-called cathedral port and the Bay of Neptune, where a winter port was launched. The river was used to float barges with mass products, including coal from Upper Silesia, and passenger ships, carrying mainly tourists and cruisers.

The end of the nineteenth century and the first half of the twentieth century were the period of the greatest prosperity of shipping on the Oder, as well as the port in Głogów, which was the result of both the convenient location of the city on the Oder and the policy of the German authorities towards inland navigation at that time (Głogów through the centuries, 2003).

After World War II, steps were taken to restore the importance of inland navigation on the Oder. The Polish authorities undertook projects aimed at activating the transport of bulk materials – coal, construction sand, rock raw materials, grain, cement, etc. Attempts were also made, although to a limited extent, to develop passenger navigation somewhat similar to this type of navigation on the Vistula, especially in Warsaw. The former river shipyard in Głogów was taken over in 1946 by the State Enterprise “Polska Żegluga na Odrze” in Wrocław. Initially, sunken barges were excavated from the bottom of the Oder and renovated, and later, new barges and tugs were built. The main job was to repair ships.

The Cathedral Port in Głogów is located at 393 km. It has a swimming pool with an area of 1.2 ha, a quay length of 400 meters and storage yards with an area of 4,000 m². Its annual throughput capacity is estimated at approximately 180,000 tons per year. The Winter Harbor is located at 395 km. It has a swimming pool and reloading capacity of 50,000 tons per year. This port is used mainly for minor and occasional renovation works. Both ports are owned by the Głogów City Hall. The Cathedral Port was leased to the Konpasz company, which extracts aggregate from the bottom of the Odra River. At present, the shipping and service offer of the port is negligible and is limited to the poorly used river port of Głogów A.A. Kulik, Marina Głogów and cruises on the Odra river on the Laguna ship.

Results of the research discussion – The current role of the Odra in the development and functioning of Głogów

Assessing the role of the Oder in the functioning and development of the contemporary Głogów is not easy. As already mentioned, the city was strongly associated with the river. At the same time, the following centuries of an urban centre that is over a thousand years old show the changing role of this watercourse. For the modern city, several important influences of the Oder can be distinguished (Figure 2).

Firstly, the river remained the northern border of the city, inhibiting the expansion of buildings in this direction. There are no major housing estates or urban buildings on the right bank of the Oder. **Secondly**, the river generates serious communication difficulties for the city due to the fact that the city has only one road bridge and one railway bridge. During peak traffic periods, it causes congestion on the roads leading out of the city. **Thirdly**, the Odra River generates serious flood risks. It concerns mainly the areas on the right bank, not the city itself, situated on the upper left bank. Improperly conducted flood protection policy over the last 25 years has led to neglect of flood protection installations (polders, flood embankments, “relief” canals, flood protection reservoirs – permanent and temporary), which in turn has increased the flood risk.

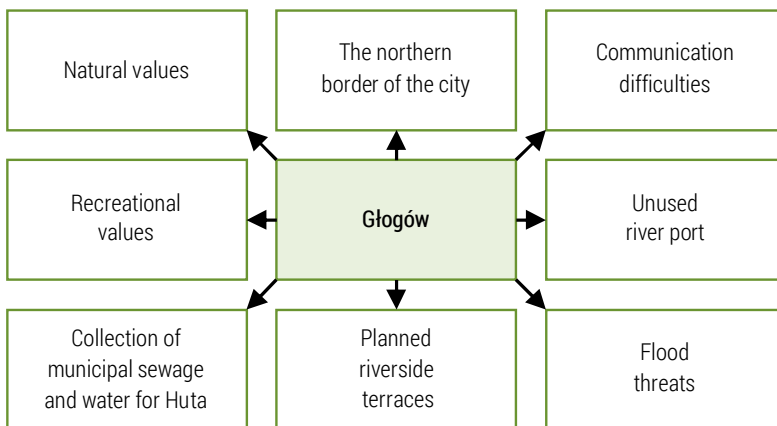


Figure 2. Significance of the Odra River for contemporary Głogów

Source: authors' work based on Czaja and Fiedor (2002), Czaja (2001), Czechowicz and Konopnicka (2010) and Głogów through the centuries (2003).

Fourthly, the river port is a challenge for the city, which requires significant financial outlays for its cleaning. In order to launch its effective operation, a much wider national program for the activation of river navigation in Poland is needed. **Fifthly**, the river and the green areas above it have significant recreational and natural values that can be properly used in accordance with the criteria of sustainable development.

Before the war, Głogów had well-developed riverside terraces with the Neptun sailing and canoeing club, a restaurant with a nice viewing terrace and a canoeing marina. During the warfare in the spring of 1945, the port installations were destroyed, as well as the entire city, and remained, in principle, not rebuilt.

At present, the wharf and the facilities and spaces existing here do not perform any more important utility functions. They are used to a limited extent and in a rather episodic way. This concerns the old quay of the steamboat harbour, situated in a 1.2-hectare basin. The wharf is 103 meters long and is connected with paved storage yards with the already mentioned area of 4,000 m². Until 1982, the port had three cranes. Later it had the RDK-160-2 (16T) mobile crane. The port's reloading capacity reached 180,000 tons per year. In the years 1980-1983, a major overhaul of the port installations was carried out, but the port itself was used less and less.

In 2007, the idea of revitalising the Cathedral Port was born. Renovation and modernisation work on the quay were carried out, as well as works transforming the port into a marina and a passenger shipping harbour. The marina was finally opened in April 2016. However, the swimming pool of the former shipyard was not renovated. It had two parts: (1) a pool with the slope of the former slipway and (2) a pool with an outfitting wharf. There were three slipways on the slope, two of which were adapted to the construction of 1000-ton barges, and one was adapted to the construction of steam tugs. The equipment pool was 480 meters long and 70 meters wide. These installations prove that the river port in Głogów was a significant facility with a wide range of services, from reloading through renovation to production and construction.

At the beginning of the 21st century, there were also ideas for organizing the riverside terraces. They were to become a place of rest and recreation for both residents and tourists. Unfortunately, this project has not been implemented so far. If the project had been carried out, the city would move closer to the river in accordance with contemporary criteria of balanced and sustainable development.

From the very beginning of the city's existence, the river was a drinking water reservoir and a place for municipal and household waste, as well as industrial and service waste. The water supply and sewage network of Głogów has always been connected with the Oder (Czaja & Fiedor, 2002). In addition, the Odra River still remains a reservoir for sewage discharged from the Głogów area, as well as the main source of water for the city and the Copper Smelter.

Since the beginning of the 21st century, sewage from the city and the neighbouring towns of Serbów, Jaczowa and Ruszowice has been directed to the Municipal Sewage Treatment Plant in Głogów, located at Łakowa Street. It is a mechanical-biological installation with a capacity of 21,000 cubic meters per day. Rainwater of more than 1,500 cubic meters per hour is discharged into the retention tank and pumped to the treatment plant. It uses dense grates in the mechanical part, an aerated sand trap and preliminary settling tanks, and then in the biological part, an activated sludge chamber and secondary sedimentation tanks. The treated wastewater is directed to the Odra River. Therefore, the river remains the main recipient of wastewater. Drinking water for the city is currently drawn from the intakes of "Serby". They were put into operation together with a water treatment plant in 1984. It is an underground, deep water intake located within the Głogowska ice-marginal valley. Water is drawn from 18 deep wells from the level of the Quaternary aquifer lying at a depth of 40 to 60 m. The city's drinking water supply needs are growing faster and faster, which will generate the need to look for new water intakes.

The problem that hinders the more effective use of the values of the Odra is the level of pollution in its waters. From the chemical and bacteriological point of view, the Oder river has excessively polluted waters. Chemical out-of-class waters account for nearly thirty percent of the weight of the turned, bacteriologically over sixty percent. In such conditions, the recreational value of the river is limited. Changing the situation in this respect is also one of the most important challenges for the city and the entire Oder basin.

Results of the research discussion – The Odra River in the balanced and sustainable development of Głogów

The strategy of balanced and sustainable development poses new challenges in terms of the role of the river and riverside areas and also exposes new functions in the river-city relationship. Using the solutions proposed in this study, it is possible to identify and analyse the main needs that need to be met in Głogów. They can be summarised as follows:

1. developing the riverside boulevards while maintaining recreational, ecological and social functions, which has not yet found an appropriate solution,
2. preservation, displaying the values and protection of riverside and water ecosystems poorly known by the general public of the city,
3. displaying urban architecture in relation to the river, such as Ostrów Tumski and the high bank of the river, presented in most of the city's tourist materials,

4. reconstruction and revitalisation of the river port with all its functions as part of the Odra Waterway, which requires greater investment outlays from EU funds and a correct national policy in this area,
5. development of river navigation and river transport with the use of Głogów, which also exceeds the economic and financial capacity of the city and local authorities and, therefore, must be combined with the programs and strategies of the European Union and the Polish state,
6. reconstruction of the remaining objects destroyed during World War II, which is possible with the participation of private capital but must be combined with archaeological research,
7. deepening the information society and local economy based on knowledge (wisdom) in addition to traditional raw materials and industrial economy. An appropriate strategy in this regard is being implemented in Głogów,
8. creating a highly efficient and structurally diverse local economy, taking into account the perspective of depletion of copper deposits,
9. strengthening the functions of the local administrative, social, economic and service centres along with the development of higher education and local universities,
10. further, systematic greening of urban space along with riverside areas, which is the case in the work of local government, but requires a longer period of time,
11. expanding energy-saving, environmentally friendly construction in Głogów and further promotion of alternative energy, which can be combined with the appropriate social climate in this regard, but requiring support from the state's energy, environmental and housing policies,
12. reduction of air pollution, surface and ground waters and soil, especially greenhouse gases, solid plastic waste, heavy metals and arsenic compounds, which is an element of particular importance due to the geological and geographical location of the city,
13. building ecologically friendly communication solutions using the second road bridge, the lack of which is one of the most serious challenges for the city and local authorities.

The fulfilment of the above needs is a necessary factor for the effective implementation of the strategy of balanced and sustainable development at the local level, with the determination of the proper place of the Odra River. However, it requires the fulfilment of several conditions, namely: (1) detailed analyses of the feasibility of achieving the assumptions of balanced and sustainable development in the perspective of 10-15 years; (2) preparation of a comprehensive strategy and accompanying programs to return Głogów to the Odra River; (3) long-term securing of financial and economic resources and executive possibilities, using the city's own resources and external power supply; (4) consistent implementation of the adopted undertakings, regardless of the dominant political option, following the example of German social agreements; (5) creating an appropriate social climate for the city's return to the river strategy.

Conclusion/Future perspectives

The present city lies almost entirely on the left bank of the Oder, although initially, its main core was located in Ostrów Tumski, surrounded by the arms of the river. The areas along the Oder are biologically active complexes and are a refuge for waterfowl. Głogów area on the Oder river is a place worth adapting for residents and visitors in order to improve the values of our city. In addition to the interesting history and cultural heritage of the city and the region, it is the natural values of the surrounding riverside areas and the Dalkow Hills that may constitute the non-economic values of Głogów. However, this requires the development of appropriate technical infrastructure (in the immediate riverside areas) and service infrastructure. Currently, no such activities are undertaken in Głogów to the extent appropriate.

Currently, the river is of little importance in international transport. The main user of this waterway – the Czech Republic – now uses the better-maintained and organised German routes through the Elbe. Also, for domestic transport, the port in Głogów does not play any significant role. In order for Głogów to benefit from the positive effects of inland navigation, it is necessary to effectively prepare and implement a national program for its development. On a local scale, no activities are undertaken that would allow for the development of recreational and leisure values of the terraces, passenger navigation on the Oder or interest in canoeing.

Better use of the values of the Odra River in Głogów also requires a change in the flood prevention situation. The Odra River and its tributaries have an insufficiently regulated flood situation. This creates systematic threats to riverside areas (ecosystems). It also makes it difficult to undertake investment projects in the riverside areas, which would be most endangered in the event of a flood.

Observation of the current practices in the analysed area of activity allows us to see some basic barriers to water management in Poland. **Firstly**, water management requires action on a national scale, or at least in a catchment area. **Secondly**, the ineffectiveness of the central and provincial authorities in the implementation of flood protection measures or the activation of inland navigation is exceptional. An example is the “Odra 2006” program. **Thirdly**, there is often a lack of cooperation between communes on a powiat or subregion scale. Such a lack can be seen in the example of the city of Głogów and the Głogów powiat. **Fourthly**, at the commune level, there are often no good ideas or economic and financial opportunities for the economic and non-economic activation of riverside areas. In other cases, the city of Głogów will not return to the Odra River and will not use its development potential.

The contribution of the authors

The authors' contribution is the same for all elements of the article.

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ROLA RZEKI W ROZWOJU MIASTA NA PRZYKŁADZIE ODRY I GŁOGOWA

STRESZCZENIE: Autorzy przeanalizowali rolę rzeki w rozwoju miasta, wykorzystując metodę studium przypadku. Przedmiotem badań było miasto Głogów, położone nad rzeką Odram. Uwagę badawczą skoncentrowano na funkcjach miastotwórczych rzek w świetle analiz historycznych i współczesnych. Zidentyfikowano wiodące płaszczyzny miastotwórcze Odry dla Głogowa oraz jej rolę w lokalnej gospodarce. Wskazano również potencjał Odry dla zrównoważonego i trwałego rozwoju miasta Głogowa oraz uwarunkowania jego wykorzystania. Rzeki będą odgrywały, podobnie jak historycznie, znaczącą rolę w przyszłym rozwoju miast, co implikuje konieczność zmiany strategii rozwoju zurbanizowanych obszarów nadrzecznych. Są one bowiem szansą na zrównoważony rozwój, a nie są w tych strategiach wystarczająco uwzględniane.

SŁOWA KLUCZOWE: Odra, Głogów, funkcje miastotwórcze, zrównoważony i trwały rozwój