Functional and spatial aspects of the riverside areas development in cities of the Silesian Voivodeship

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Abstract. The subject of the article are rivers in urbanized areas with a particular role of introducing functional and spatial changes in areas adjacent to rivers. The research concerns the contemporary ways of transforming and introducing new development in the urban riverside areas of the Silesian Voivodeship. The experiences of recent years have shown the diversity of creative activities leading to the shaping of the new image and landscape identity of the cities. This diversity results from the changing economic, political, social, cultural or natural conditions. The new directions of development of areas located along the rivers also play a significant role. Research presents selected activities undertaken on a local and regional scale. They reflect ways to search roads towards sustainable cities. Improving the quality of riverside public spaces is associated with the desire to improve the living conditions of urban communities. This process depends on the financial, legal and organizational possibilities as well as the willingness of the municipal authorities. Some of the undertaken activities are a reflection of the aspirations of local communities for whom a well and safely developed riverside space becomes a place of the nearest recreation and leisure. The article objective is to show the possibilities and limitations of the riverside areas development and the use of river potentials in the cities of the Silesian Voivodeship. It is also an attempt to answer the questions whether these activities are sufficient to create riverside public spaces, if they meet the needs of residents, to complete the functional and spatial urban structure, and whether the effect of these activities is visible in the cities landscape of the Silesian Voivodeship.

1. Introduction

Rivers are an important element of urban space. For some cities they mean a source of problems and threats, for others they provide diverse benefits. The constant process of riverside areas transformation should be considered in terms of transitions and trends in the development processes of cities located on rivers. The era of industrialization and progressive urbanization caused that the impact of rivers on the spatial-functional structure and landscape of urbanized areas became negligible, and the river areas themselves have degraded. A number of phenomena caused, among others, by anthropogenic human activity contributed to this. At the end of the 20th century, riverside areas once again became strategically important for urban areas development. A few them were given a repeated opportunity to be integrated into the system of public spaces or natural structures. Increasing environmental awareness, as well as awareness of the riverside areas potential value led to the undertaking of activities in the field of planning, protection, rehabilitation and conscious management of riverside areas. They were aimed at improving the quality of the natural environment, the quality of urban space
and the city dwellers’ quality of life. This is illustrated by the revitalisation activities carried out in riverside areas, in the last several dozen years, in various corners of the world. It is enough to list just the examples implemented in Hamburg, Leeds, Berlin, Amsterdam, Bilbao and several other cities. Although most of them took place at different times and with different intensity, in all cases these actions have become key to balancing the development and spatial order of riverside cities. They have contributed to stimulating economic, spatial and functional development and increasing the attractiveness of the urban landscape [2,3,11].

The Silesian Voivodeship provides an example of a region which several dozen different rivers flow through. These are mountain rivers, lowland rivers marked by industrial activities or constituting the beauty of urban riverside landscapes. A consequence of the diversity of rivers and cities located by them is also the diversity of approaches to regeneration processes. The diversity stems from economic, political, social, cultural or natural conditions which are changed over time. New directions of development of riverside areas, available planning and strategic tools, as well as financial, organisational and legal possibilities play an important role in this process. The aim of the article is to show the ways and the associated possibilities and limitations of riverside land development and the use of river potentials in the cities of the Silesian Voivodeship. The article is also an attempt to answer the question whether these actions are sufficient for the riverside public spaces to satisfy the needs of the inhabitants, to become key to urban functional-spatial structures, and the effect of these actions be visible in the landscape of the cities of the Silesian Voivodeship.

2. Rivers of the Silesian Voivodeship
The Silesian Voivodeship is a region located in the southern part of Poland, in the basins of the upper flow of the three largest Polish rivers: the Vistula, the Odra and the Warta. River basin districts are divided into water regions for water management purposes. There are fragments of as many as seven water regions in the area of the Silesian Voivodeship: the Czadeczka, the Upper Vistula, the Small Vistula, the Middle Vistula, the Upper Odra, the Middle Odra and the Warta. The surface water resources of the Silesian Voivodeship are highly diversified. On the one hand, it is a derivative of the characteristic location in an area of very diversified geological structure, relief and climatic conditions. On the other hand, these factors are compounded by the effects of human activity. Three zones can be distinguished within the voivodeship, each of which is characterised by a different degree of density of the river network and the size and variability of efficiency of individual watercourses:

- hydrological region I - covers the northern part of the Silesian Voivodeship, is characterised by low productivity, low degree of diversification and the lowest density of the river network on the scale of the whole voivodeship (Liswarta catchment);
- hydrological region II - covers the central part of the voivodeship, including the post-industrial area of the cities of the Upper Silesian agglomeration, is characterised by a low density of river network, the vast majority of which are short, narrow rivers with small drops and small water resources (the catchment area of the Biała Przemsza and the Rawa);
- hydrological region III – includes the main surface water resources of the voivodeship, with the highest density of river network, mountainous catchment area and resources, which are characterised by high variability in the annual cycle (the catchment of the upper Vistula - the Small Vistula and the Soła) [8].

Each river is different, and each has its own characteristics that give a unique character to urban space. The Liswarta is considered to be the most interesting river in central Poland to organize canoeing trips. All-Poland canoeing trips are organized in the Mała Panew and one of the routes is considered to be the most beautiful in the Silesian Voivodeship. A fragment of the river Ruda won the competition for the „River of the Year 2015” organized by the ecological and cultural association Klub Gaja. The Kłodnica, the Brynica or the Czarna Przemsza related to the history of medieval urban settlement. There are many such examples of the positive river impact and the ability to use river
values. In many cities, however, the impact of rivers on the landscape is negligible. This is particularly noticeable in post-industrial areas, where hard coal mining has contributed to many changes in the hydrographic network, including: continuous regulation, alterations in course, relocation, alteration, lifting, sealing, high dike enclosure, as well as partial or total coverage of river channels. In areas adjacent to rivers, the shape of the surface has changed, the quality of surface water has deteriorated, plant communities have been damaged, and the land has been excluded from their current use. Despite numerous transformations, many river valleys are still one of the most valuable natural resources of the cities of the voivodeship, acting as ecological corridors of regional and local importance. Numerous rivers flow through areas of high and very high environmental values covered by legal forms of nature protection or included in the ecological system of the region (the Warta, the Przemsza, the Pilica, the Liswarta and others). Their natural and cultural value depends on the degree of development of areas adjacent to rivers and the systemic connection with other elements of the urban structure. As numerous examples show, in many cases the natural, cultural and social potential of rivers in the cities of the Silesian Voivodeship has already been discovered, in others it is still awaiting rediscovery or relevant use.

3. Renewal of riverside areas

For decades, the Silesian rivers were perceived as a source of problems rather than benefits. The environmental, economic and social problems revealed in the riverside areas, but also a significant number of elements and areas degraded by human activity, imposed the necessity to undertake various, multi-direction actions. In most cases, their aim is to improve environmental and landscape conditions, enrich habitats, raise the inhabitants’ living standard in areas adjacent to the rivers and moreover develop public spaces inscribed in the system of areas with natural, landscape and recreation functions. In some cases, the renovation process involves the need to change the image of cities, in others the necessity to give or regain landscape identity. However, it is obligatory for all activities to balance the needs for the protection of natural values with a sociological and ecological impulse for the development of urban areas [15].

In the Silesian Voivodeship cities, attempts to determine the directions of riverside areas development have already been made many times with greater or lesser success. Most of the measures taken are of protective or revitalisation nature which define individual tasks on a local scale and are based on reclamation and, to a lesser extent, on the complex re-development of riverside areas [1]. Their success depends on the ability to select the right tools, strategies and principles to support activities aimed at shaping and protecting the river landscape. The objectives of the undertaken activities are set out in regional and local planning documents. Among the directions of the riverside areas transformation defined in the strategic documents of the Silesian Voivodeship, the riverside areas are referred to by the provisions concerning the renaturalisation of rivers and river valleys in urban and rural areas, including restoration of free access to water banks. One of the undertakings of the Strategy for the Protection of Nature of the Silesian Voivodeship planned to be implemented by 2030 has been entitled: „River valleys - corridors of life”. Its aim is to develop and implement a renaturalization program for selected sections of the Silesian Voivodeship watercourses, which consists in selecting sections that require restoration of their natural character, taking into account the need to restore the purity of watercourses, the need to unblock watercourses, the need to perform the function of a living space and the need to maintain flood safety. Among the tasks of the Development Strategy for the Silesian Voivodeship, the need to implement actions in the field of flood protection, modernisation and construction of new infrastructure and non-technical actions is also being listed [4].

Renovation of riverside space in cities is a long-term and costly undertaking. Due to the complexity of the problems, it requires a multifaceted and interdisciplinary approach to solving social, economic, environmental and spatial problems. It furthermore requires the development of coherent strategies to link the activation of riverside areas with the concepts of their development, as well as appropriate
planning methods and tools, which will allow for the implementation of planned and undertaken activities. The aim of the renovation is to extract the potential of riverside sites, improve or protect natural and landscape conditions, enrich habitats, facilitate access to riverside areas, give rivers and areas adjacent to them new functions, introduce new development conducive to the improvement of living conditions of the inhabitants and include riverside areas in the system of urban natural and landscape areas and recreational areas. A prerequisite for successful transformation of riverside areas is their regulation, flood protection and restoration of the cleanliness of rivers and their tributaries. These measures have become priorities for spatial planning of urbanised areas. Such an approach determines further actions, including shaping new functional and spatial systems, creating public spaces, restoring the natural character of riverside areas, defining a new quality of urban and architectural space, as well as integration and connection of riverside areas with the adjacent urban structure. In many cases, this requires reconciling the public interest with the expectations of private owners, the needs of external users and the requirements of the natural environment. Economic, environmental, social and legal barriers are an obstacle to the implementation of riverside renewal processes in the cities of the Silesian Voivodeship. Overcoming them can be achieved both through protection of existing natural and cultural values, protection against investments or the introduction of new values and management methods stimulating the development of riverside areas [2].

4. Activities taken at riverside areas - case studies
In the cities of the Silesian Voivodeship attempts to restore the riverside areas have been taken many a time. The selected examples have been selected to highlight the differences in approaches, methods and measures to address the problems of riverside areas.

4.1. Zagłębie Linear Park
The most important example of action taken on a regional scale is the „Zagłębie Linear Park - revitalization of the functional area of the Przemsza and Brynica rivers valley” project initiated in 2013, implemented in the central part of the Silesian Voivodeship. Its aim is to create a multifunctional system connecting green areas and areas of natural value, their functional, natural, social and cultural connection with neighbouring natural systems and integration of dispersed, multifunctional urban structures. The axis connecting the seven local government units participating in the project is the green belt (ecological corridor) along the Przemsza river and its tributaries (www.parklinearny.pl). The linear park is to create revitalized green areas located in the valley of the Przemsza and Brynica rivers, which together form a system of complementary, attractively developed public spaces, giving the inhabitants of the entire region the opportunity to spend their free time in contact with nature in various ways. The essence of the project, based on the idea of „turning the city front to the river”, is also the assessment of the natural values of river valleys, recreation of ecological functions of river valleys and stimulation of the development of services in their surroundings. The whole system is to be connected by a network of natural and didactic paths, bicycle, pedestrian and water routes, which are places of activation and integration of local communities. All project partners, in cooperation with the public, non-governmental, economic and scientific sectors, have established cooperation within the framework of the Dąbrowa Basin Municipalities Partnership. The source of financing was initially the Regional Programme implemented under the Financial Mechanism of the European Economic Area 2009-2014. The financial share of municipalities involved 15%. Currently, the Zagłębie Linear Park has become a key project for the development of the Silesian Voivodeship. It is implemented within the framework of the “Regional Operational Programme of the Silesian Voivodeship for 2014-2020”, and the next stages of activities are planned for 2017-2021 [12].

4.2. River revitalisation in the southern subregion
Activities undertaken in the southern part of the Silesian Voivodeship focus on revitalisation of the coastal areas of rivers, streams and water reservoirs. The preliminary concept for the entire southern subregion of the voivodeship assumed the implementation of 34 infrastructural projects by 29 local
government units within the framework of the „Strategy of Regional Territorial Investments of the Southern Subregion of the Silesian Voivodeship 2014-2020”. The idea of the planned activities undertaken within the framework of the key project titled „Development of tourism infrastructure of the Southern Subregion” was to restore access to rivers through development of coastal areas with tourism and recreation infrastructure, while emphasizing natural values. However, in the final version of the „Regional Operational Programme of the Silesian Voivodeship for 2014-2020”, the tourism management function was removed, which resulted in the fact that the only area where it was possible to revitalise coastal areas with the help of the Regional Operational Programme became a biodiversity protection measure. Therefore, the planned undertakings have been transformed from infrastructure projects into natural activities (with emphasis on active protection), with elements of counteracting anthropopression and the possibility of implementing the plans related to the creation of pedestrian and bicycle routes channeling tourist traffic along watercourses. Finally, in the sub-regional key project there were more than 20 projects of various entities, which related to biodiversity protection. Eight projects were positively evaluated in terms of form and content, the evaluation of several other projects has not yet been completed. The projects are to be implemented in 2017-2021. Among them, the following projects dominate: „Development of areas adjacent to the Żylica stream together with the construction of a didactic path in the Buczkowice commune”, „Construction of an educational and ecological complex in the Vistula commune”, „Development of the Soła river banks and the Żabniczka stream along natural-ecological and didactic routes”, etc. The largest project within the sub-regional key project is implemented in the main centre of the subregion - in Bielsko-Biała. It concerns the „Revitalization of urban coastal systems with the establishment of the Centre for Ecological Education in the city of Bielsko-Biała”. The preliminary feasibility study of the 2013 project assumed that it would be carried out only in riverside areas: Biała and Wapienica as well as the Straconka stream (Straceńskie Boulevards). The planned boulevards were to serve as recreational areas, while highlighting the natural heritage and hydrotechnical art. The change in the scope of the projects contributed to the fact that it was not possible to qualify a part of typically recreational and tourist expenses. Finally, the city revitalised the Straceńskie Boulevards in 2016 from its own resources as a recreational area with an emphasis on a more sustainable final scope of investment: many trees originally planned for felling were preserved, elements of ecological and natural education were created, such as: educational boards at alleys and natural elements of playgrounds [9,10].

4.3. Reclamation of the area on the Bytomka in Zabrze

The initiative, which was undertaken in 2012 within the framework of the Operational Programme Infrastructure and Environment 2007-2013, concerned the reclamation of areas in the area of the Bytomka river in the area of the city of Zabrze. The whole project covered the reclamation of ten large-area areas and wastelands located by the river and degraded by industrial activities, with a total area of 183.22 ha. The project had an environmental, social and educational dimension. First, it concerned the restoration of the utility value of devastated riverside areas. It covered such activities as: bioremediation, soil exchange, removal of wild waste dumps, maintenance, planting and construction, reconstruction or demolition of buildings located on the indicated areas. An important part of the project was the protection of valuable natural areas occurring in riverside areas. Secondly, it was important to make the areas available to the residents and to develop them in such a way as to fully utilise the educational and recreational potential. It is planned to establish walking and cycling trails, ecological trails based on the habitat values of the area (bird species, habitats, succession of flora, local biotope) and the construction of observation stands, information boards, didactic stations and viewpoints. Activities involving the development of riverside areas are gradually being implemented [16].

4.4. Revitalization of the Ślepiotka in Katowice

The essence of the international Revitalisation of Urban River Spaces (REURIS) project implemented in 2008-2011 was the implementation of strategies and actions aimed at revitalisation of urban
riverside spaces, including the restoration of natural resources and cultural heritage elements, as well as sustainable management of revitalised space. One of the pilot projects covered the valley of the small Ślepiotka river in Katowice. The aim of the actions taken was to reconstruct in the urbanised part of the river corridor an open space for nature and river and rainwater retention. The revitalized section was to meet the expectations of the community living in the neighbouring residential areas. The inhabitants’ expectations were dominated by the need to increase access to the river, to enable free movement along it, to increase the attractiveness of the area, including its aesthetic values, and to establish “soft” forms of recreation. The activities carried out to restore the natural and landscape values of a fragment of the Ślepiotka valley were the result of cooperation between the Central Mining Institute, city authorities and residents. The agreement of the local community and decision-makers, expressed through a new land use plan, has contributed to the fact that, in addition to environmental activities including partial restoration of the river bed and a comprehensive approach to rainwater retention, the emphasis has been placed on new development, including the provision of recreational facilities such as playgrounds, „green amphitheatre”, educational and walking paths, valley floor descents, bridges, educational playgrounds and viewing points. Currently, this area is an attractive place for meetings and recreation of the local residents [6].

4.5. Boulevards over the Nacyna in Rybnik
In Rybnik at the Nacyna a new development of riverside boulevards and adjacent areas is gradually being implemented. The main focus was on the implementation of pedestrian and bicycle infrastructure as well as sports and recreation functions. In addition to the theme park on the river, one of the last activities is the implementation in 2017 of a 2.5-kilometre long pedestrian and bicycle route along the river. The cycling route is part of the cycling system in the city and connects the riverside boulevards with residential areas, the city centre and other recreational areas. The route is equipped with a system of small architecture elements: benches, bicycle racks and lighting points. In order to achieve the effect of aesthetic cohesion and spatial order along the boulevards, only architectural furniture from the city catalogue was installed. In the coming years, new investments are planned related to the implementation of greenery, construction of catering facilities, terraces and viewpoints. Completion of further stages of riverside boulevards is planned for 2020 [7].

4.6. The Rawa on the Katowice market
The regulation of the Rawa River in the first half of the 20th century completely changed its natural character. Significant stretches of the riverbed have been concreted, while others have been completely covered, reducing the role of the river to a sewer. As a result, the Rawa in the centre of the city, on a large section flows a few meters below the ground. During the second stage of the redevelopment of the city centre of Katowice in 2013, an analysis of the possibility of discovering the Rawa River showed that the water level in the riverbed is too low and the difference between the water level and the trough is too large. In addition, lowering the trough height would pose a flood hazard. The final measures taken contributed only to the reconstruction of the Rawa riverbed, i.e. the demolition of the existing riverbed cover, the construction of a new riverbed, the construction of road bridges and the recovery of the river. Eventually, only an artificial watercourse reminds us of the presence of the Rawa under the market square. „Artificial Rawa”, built in 2017 on the trail flowing under the river market square, has a wide and shallow riverbed. Alongside, concrete deckchairs covered with wood were built, greenery, a playground and benches were built. These activities stimulated residents to spend their free time in public space, where water became a substitute for the river in the city [13].

4.7. Riverside space on the Oder in Racibórz
In 2002 an idea appeared to organize a public space in Racibórz on the Oder River, which would contain a city beach and a place for concerts and would serve as a recreational and sports function. In 2007, a competition for the development of the concept of boulevards along the Oder River was announced. The competition included the construction of a marina on the Oder together with the
necessary infrastructure and the creation of compositional links between the riverside green areas. The competition resulted in the implementation in 2010-2011 of new sections of pedestrian and bicycle paths together with park lighting. In the second stage, in 2013-2014, a marina with a stage was built, designed in the form of a reinforced concrete box with canoe platforms adapted to varying levels of river waters, slipways for leaving canoes and boats on the water. The task was co-financed by the European Regional Development Fund. In 2015 another fragment of the cycle path along the Oder was completed, and in 2016 the boulevards around the marina were developed. As a result, a city beach, stairs on the flood bank as a passage to the marina from the castle park, a playground, street workout park and a bicycle station were built. The lighting of the area was also made and container facilities for the catering function were introduced. In 2017, an unmanned climbing complex for children and advanced climbers was also implemented within the framework of the citizens' budget. All these actions have shown that single actions in the river space can become a catalyst for further transformations. Subsequent stages of works in the riverside area are to concern the development of the other bank of the Oder [5].

4.8. Riverside gardens in Siemianowice Śląskie
In 2011, residents of the Bańgów district in Siemianowice Śląskie initiated the transformation of the riverside areas adjacent to a small, 3-kilometre-long watercourse called the Michałkowicki Trench. A group of enthusiasts created riverside gardens on one of the banks of the river in the immediate vicinity of residential blocks. At a distance of several hundred meters, the local residents, in agreement with the owner of the land, separated the plots of land and assigned a landlord to each of them. They have also laid down simple rules for the use of gardens: each landlord must take care of his or her area, no tall fences must be used, free access for everyone must be provided and order must be maintained. Despite the pollution of the river waters, recreationally managed riverside gardens give the residents a sense of belonging to the place, pride in their own achievements and the opportunity to spend their free time communing with nature [14].

5. Results and discussions
The management of urban riverside spaces of the Silesian Voivodeship requires the development of an approach to revitalisation that works well for different cities and rivers, contains a repetitive set of methods and procedures for the coordinated work of specialists in different fields and to ensure effective social participation. Activities undertaken in the riverside areas of the cities of the Silesian Voivodeship most often concern individual aspects of the entire regeneration process. They more often refer to the scale of a city district or district than to the regional scale. Initiatives on a sub-regional scale, undertaken in cooperation with self-government authorities, non-governmental organisations and scientific institutions, are few. The initiators of the activities are often associations consisting of the local community. The projects mostly concern fragments of riverside areas, but not the river itself. Measures to improve the ecological status/potential of rivers shall be treated as secondary. In the planning of projects often happens only traditional approach, in accordance with the canon of „hard” hydro technology. The planned revitalisation activities are often of an industry-specific nature. They concern the development of sewage infrastructure, greenery management or the creation of conditions for recreation. The spatial aspects of revitalisation are rather seen as a complement to them. In general, no separate expert analyses are carried out. When planning an investment, it is based solely on the records of local planning documents.

An opportunity for a change in the natural and cultural landscape of the urban riverside areas of the Silesian Voivodeship is a comprehensive approach to the regeneration process, which would integrate environmental, social, economic and planning issues. The actions taken to transform riverside areas should be carried out with the cooperation and cooperation of many equal partners: municipal authorities, public investors and private capital, specialist organisations, expert groups, and in particular the inhabitants, who are the most important users of the new urban riverside space. What is
needed is both a vision and a general direction of the expected development, an intellectual promoter of the project (person or institution) involved emotionally, as well as appropriate financial and organizational instruments. Relevant coordination of the whole renewal process with individual actions and proper management seem crucial. An important part of the whole process are participatory, educational and promotional activities as well as gaining public acceptance and support at each stage of the planned investments. Identification of needs and generation of ideas together with the inhabitants, allow project promoters not only to develop an optimal concept, but also lead to raising awareness of local communities about the importance of rivers in urban space, their role in the spatial-functional structure of cities, and contribute to successful implementation as well. No less important element of the riverside restoration process is the monitoring of the achieved results and the ability to respond to the changing needs of the local community and the conditions of the natural and cultural environment.

In addition to a comprehensive vision of the regeneration process, it is also important to undertake individual projects in the riverside space, which activate subsequent activities, build characteristic and unique landscape accents, and change the way the local community thinks about the place. The definition of such activities opens the way to the search for balance between the built environment and the natural environment and to the shaping of the landscape identity of riverside cities.

The effect of changes in the riverside areas of the cities of the Silesian Voivodeship is to obtain urban spaces that are attractive to live in, with high quality natural and cultural environment, accessible, well-connected and connected with the structure of the cities. The definition of priorities for individual areas related to the development, rehabilitation and protection of river areas, an innovative approach to solutions aimed at the needs of the modern user and a view of river issues at different scales and spatial ranges, provides an opportunity for a balanced approach to activities in river valleys and political and social acceptance.

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