Problems of Balancing the Urban and Natural Environment on Example of the River Areas of the City of Częstochowa

Nina Solkiewicz-Kos

Częstochowa University of Technology, Faculty of Civil Engineering, ul. H. Dąbrowskiego 69, 42-201 Częstochowa, Poland

ninasolkiewiczkos@gmail.com

Abstract. The paradigm of sustainable development gives a new look at urban planning issues regarding shaping the cultural and natural areas of cities. An important element is the new view on the relationship between the river system and the city and its role in the urban biosystem. The river system was and is the main urban-creating factor, determining to a large extent the dynamics of urban development, as well as maintaining their settlement continuity. In the article, the author presents an example of the development and current problems of riverside zones as significant urban-forming elements, affecting directly the concepts of development of the city of Częstochowa. Starting from the mid-nineteenth century, the processes of anthropopression have accelerated rapidly. This phenomenon was related to the development of heavy industry (mining, metallurgy) and the textile and paper industry. Technological processes related to the extraction of raw materials and the production of industrial products resulted in changes in the urban and functional structure of the urban space. As a consequence, there was an increasing degradation of the natural environment and violation of the ecosystem. At the same time, intensive industrialization had a positive impact on the dynamics of the city's development in the 20th century. Częstochowa has become one of the important industrial and urban centres in Poland. The creation of an area of significant industrial zone and the use of "dirty" technologies led to the degradation of river areas. An attempt to solve problems of biological and cultural regeneration of the riverside zone and river valley areas concerns the reclamation of river areas and revitalization of post-industrial areas. The area of the Warta River is an important link between protected areas - including the valley of the Warta River, as well as natural forest clusters, landscape parks of the Warta river basins (Cracow-Częstochowa Upland, Forests of the village of Herby). Restoration of the riverside zone as a valuable cultural and natural area to the urban organism is an indispensable activity.

1. Introduction

The article presents a new perspective on the relationship between the river system and the city and its role in the urban biosystem. The river areas of the city of Częstochowa are analyzed in terms of their ecological and cultural potential.

The Warta River was an important town-forming element contributing to the location of a medieval settlement (the city of Częstochowa) in the 14th century. In the further stage of the city's development, it was a factor influencing the development of the Old Town and the city center zone of Częstochowa.

The period of industrialization that took place in the 1870s caused the exploitation of riverside areas, using them for industrial purposes. Strong anthropopression was associated with the whole period of development of the industrial city, which was a development paradigm throughout the 19th century.
and most of the 20th century. During this period, the river was an important source of energy. It enabled production processes and technological processes related to the production of industrial products. The expansion of industry resulted in the creation of an autonomous industrial zone, located along the river grounds. This blocked the development of residential areas and resulted in the town being cut off from areas of high natural and environmental value (Cracow-Częstochowa Upland). "Withdrawal" of river areas from the city and their progressive separation resulted in a deterioration of sanitary conditions within the city. The described areas underwent a biological degradation process. This made it difficult to use the extremely rich natural, environmental and cultural resources of the Cracow-Częstochowa Upland areas close to the city of Częstochowa.

These urban problems have caused interest in riverside areas in recent years as valuable urban areas affecting the quality of city life. The author of the article tries to describe the possibilities of the future use of the city's river areas, analysing and evaluating the resources of the Warta River, which is one of the two most important Polish rivers.

2. The role of the Warta River in the ecosystem of the South Polish Region

Częstochowa located in the southern region of Poland is an extremely important element for the ecosystem of this area. It includes vegetation, a specific microclimate, animal species living here. The morphology of the terrain along with the water network ensure the maintenance of the biodiversity of the natural environment.

River network in the urban layout of the city creates ecological corridors, the existence of which is crucial for ensuring the balance of the ecosystem. The ecological corridors within the city are the elements connecting two key ecological areas of the region: the Kraków-Częstochowa Upland with its unique resources of the natural and cultural environment and the complexes of the Herbskie Forests surrounding Częstochowa from the west [1] (figure 1).

![Figure 1. Warta River within the suburban areas of Częstochowa. The river connects the city with the buffer zone which is the complex of Jurassic Landscape Parks. The location along the river network of ecological corridors will ensure the possibility of using natural conditions.](image)

The section of the Warta River flowing through the Częstochowa area is an extremely sensitive narrow "isthmus". Its neglect would cause irreversible negative effects in terms of maintaining the environmental balance of the entire region. That is why it is so important to preserve the values of the Warta River - flowing through the city and being (beside the Vistula) one of the two key rivers most
important for the ethnic core of Poland. Maintaining the resources of the Warta River in all aspects: environmental, social, economic, cultural and even geopolitical is an indispensable condition.

Below there are selected planning and design problems relating to the connection of the structure of the city of Częstochowa with the river system. The need to take steps to combine these two systems extremely valuable for the ecosystem of the southern part of Poland is presented.

2.1. Relations of the cultural and natural area: the city of Częstochowa and the Warta river
The origins of the urban structure of the city of Częstochowa date back to the 14th century. In this period, the so-called “raw” location of the Częstochowa castle was made near the Warta River. The urban structure of this setting had the form typical of medieval cities, located on German law. It was a regular checker plan, with a centrally located market square with a town hall and scales. In the neighbourhood of the market, a Gothic church of St. Zygmunt with monastic buildings.

The Warta River in this arrangement was a border element of the city, ensuring its defense. The trade route with neighbouring settlements was facilitated by two bridges: on the Warta River and on Stradomka (the Warta River tributary). The Warta's economic importance was used in the Middle Ages in the milling and tanning industry. At that time, the city had two mills powered by the river. The settlement of the Pauline monastery on the nearby Bright Hill settled the further development of Częstochowa. The development of the Bright Hill monastery caused an increase in the significance of the market settlement adjacent to the hill [2]. The consequence of the development of two independent urban organisms was the communication axis (Saint Mary’s Avenues) connecting the medieval Old Town and the church of St. Zygmunt with the Bright Hill monastery (1820s) [2]. The plan of combining two urban organisms, developed in the 19th century, is an important compositional and functional element of the city to this day. Unfortunately, further stages in the development of the urban structure led to the marginalization of the importance of the river system. The river is intensified for production and industrial purposes, which causes its degradation, both structural and biological. The river was polluted with municipal and industrial sewage. The availability of various raw materials - iron ore, limestone, clay and water resources of the Warta River increase the importance of industry in the city's economy (turn of the 19th and 20th centuries).

Further intensification of industrialization in the period after World War II and the location of factory and industrial zones (including the extension of the Częstochowa Steelworks) caused the river to be cut off from the city. Structural displacement of water areas from urban areas took place. The riverside zone was designated for purely industrial purposes [2], (figure 2). In addition, excessive exploitation of water resources has significantly reduced the water quality of the Warta River and negatively affected the processes of biological balance in the river valley areas.

Attempts to solve the described ecological and planning problems require a coherent, long-term strategy of multidisciplinary activities.

2.2. Contemporary problem conditions - integration of the city with the structure of the river network
The paradigm of "sustainable development" in Polish conditions meant drawing attention to the disastrous state of the environment within industrial zones in Polish cities, especially in industrial cities. Częstochowa belongs to this type of cities. Repair of unfavorable phenomena related to technological processes of heavy industry, including mining, metallurgical, textile etc. started in the 90s of the twentieth century. Its program included the restructuring of the industry and the introduction of new energy-saving, environmentally friendly technologies.

However, the new realities of the free market economy led to the collapse of some industrial plants and even whole industries (e.g. light industry). Low profitability of industrial plants caused their closure. The significant surface of the industrial zone within the boundaries of the contemporary structure of the city of Częstochowa required a new concept of spatial development taking into account contemporary environmental, social and cultural realities.
Repairing unfavourable phenomena in the long term means a higher quality of life in an urbanized environment. However, it is associated with high socio-economic, economic and political costs. The adaptation possibilities of river areas taking into account contemporary environmental protection requirements are the result of a properly conducted industrial restructuring policy. There appeared the possibility of proper functioning of the river zone and the adjacent industrial areas. There is also the possibility of continuing the traditional development of the city based on the river and its water and environmental resources. Network of the Warta River together with its tributaries (within the city of Częstochowa) currently has a third class of purity, which means water of satisfactory quality. [4]

2.3. Revitalization of river areas: protection and way of revitalization of the historic areas of the Old Town
The revitalization of the historic substance within the Old Town concerns the problems of preserving the urban network of the complex from the 14th century. Revitalization also concerns the maintenance of construction resources in a poor technical condition, which originate from the 18th century (a small number), as well as from the 19th and early 20th century (most). The oldest monument of the Old Town is the complex of the church of the St. Zygmunt together with post-monastery buildings. Due to its importance for establishing a city, as well as the historical, cultural and religious importance of its maintenance, it was a significant challenge for designers, archaeologists, historians and local government authorities.

The location of historic buildings within the Old Town, due to the vicinity of the Warta River and its long-term impact (including flooding) causes the foundation walls and the ground floor to soak. The building structure of objects characterized by the use of local building material - limestone -
additionally causes the occurrence of specific phenomena within the described buildings. These phenomena have the form of capillary water pull up to the level of the higher floors of the building. This results in the formation of continuous zones of wetness and humidity inside the buildings. As a consequence, it causes the formation of carcinogenic types of fungi that affect the reduction in the hygienic and health and technical quality of the described resources.

An attempt to solve these problems was included in the methodology of conducting research and design works. In the post-monastery complex revitalization project, new techniques and technologies have been implemented modern solutions in the field of protecting the walls of buildings against groundwater and potential flooding and moisture. Due to the specific soil and water conditions associated with the operation of surface waters, specialized equipment eliminating the capillary water pull-up was used, as well as composite materials insulating the ground zone [5], [6].

3. Green spaces of the city - new opportunities
Częstochowa is a city strongly associated with the system of the Warta River. In the city, the river connects to three tributaries (Stradomka, Konopka and Kucelinka) creating a complicated water node. Green spaces along river banks are a natural consequence of local conditions in Częstochowa. These spaces have a chance to create optimal conditions for rest, recreation and meeting places. This task requires a correct interpretation of the place itself and the community that uses it.

The actions taken so far have been point measures. An example is the development of riverside areas within the Old Town. In this section of the Warta, a modest pedestrian route was created to allow residents to walk along the water (figure 3). The walking area was connected by a footbridge with a hospital park, thus increasing the recreation area. The continuation of these recreation areas along the river was undertaken in the direction of Mstów through the construction of a walking and cycling path. The new boulevard zone is an example of using river areas and transforming them into an attractive place for recreation and green areas [7]. The place has started to be popular among the city's residents. It offers access to the recreation area on the water within the city zone.

![Figure 3. Example of development of riverside areas within the Old Town. In this section of the Warta, a modest pedestrian route was created to allow residents to walk along the water. The area needs revitalization activities.](image)
Another point action is related to the revitalization of post-industrial areas and development of the so-called Köhn island. The island of Köhn was founded in the 1850s by digging a canal supplying water from the Warta River to power mills in the paper mill. The degraded area has been developed by introducing a large-space facility with a retail and service function. The multi-functional architecture of the facility, implemented on post-industrial areas, has become a new urban space. In this case, the search for a solution for neglected and degraded land did not give fully satisfactory results. The Köhn Canal (which was a branch regulating the Warta River stream) was covered and a large-scale shopping center building was constructed. This object has mentally cut off the river from the areas of the Old Town and the consciousness of the inhabitants. Despite the development of coastal areas on this section of the Warta, they are not frequented (figure 4). The commercial gallery's resolution as well as its location is controversial as far as such design decisions are concerned. There is no doubt, however, that the multi-functional facility contributed to the revitalization of the Old Town area.

![Figure 4](image.png)

**Figure 4.** A section of the Warta River within the Zawodzie district. The picture presents a walking path in the direction of the Köhn Island. In the perspective of the visible volume of the Shopping Center. Despite the development of coastal areas on this section of the Warta, they are not frequented.

The area of the strict historical center, closely related to river areas, should take into account the spatial concept of the entire historic urban layout (the precinct of the Old Town). The interpenetrating historical areas in connection with the river network have then the chance to create a cohesive urban space with a rich functional program encouraging residents to spend their free time in it. Due to the value of riverside areas within the Old Town, there is a need to include administrative protection of them and establish the conditions for the development of this sensitive zone.

The ongoing point measures regarding river development are not a holistic solution. An important problem is the lack of a general spatial solutions concerning the direction of development of riverside areas in the urban zone as well as outside the urban zone. Park places, squares and riverside boulevards improve the quality of urban space, while providing corridors to ventilate the city [8]. The combination of riverside areas with a continuous system of ecological corridors would give the possibility to create an ecosystem of green band that can fulfil the functions of public space of a tourist and recreational character [9]. Such ecological corridors would have a significant impact on the protection of the natural and cultural environment and improvement of the quality of life in the city.

It should be added that only a comprehensive approach to the modernization of river areas on a macro scale will ensure effective revitalization of existing and new green areas located in the city. Such coordinated activities have a chance to obtain appropriate parameters that will be consistent with
the needs and preferences of the local community (proper ventilation of the city center, appropriate air quality and humidity) [10].

4. Conclusions
Thanks to the presence of the river within the city, rapid industrialization and development of construction was possible. The city has become a large industrial center. As a result of this development, air quality and water quality deteriorated. The bad condition of the water, and the barrier in the form of Riverside industrial zones, isolated the river from the city. River areas along with the bank areas have ceased to function in the minds of the city's residents as a recreational space. At the turn of recent years there has been a noticeable development of urban green spaces. There is a growing interest in the potential of a river in urban areas.

In Częstochowa, the issue of green areas in the context of the development of river areas located within the city zone has become an important factor taken into account in urban planning. This is particularly visible in the context of maintaining and modernizing the existing park places, squares and boulevards as well as creating new green public spaces. The connection of the urban zone with the river network zone means not only increasing the quality of space, but also extending the program offer for residents. The river connects the city with the buffer zone which is the complex of Jurassic Landscape Parks. The ecological corridors along the river network provide the opportunity to use natural conditions. Such solutions guarantee a new quality of living conditions for the residents of the city of Częstochowa.

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