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Lodz – Metamorphosis of the River System

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Abstract. Political transformations which affected Central and Eastern Europe at the end of the 20th century opened up new transformation opportunities before its towns and cities. Poland, burdened with its geopolitical baggage, tries to keep up with contemporary trends in urban planning, which are the domain not only of Western European countries, but which are dictated by the need to secure the quality of living in towns and cities of the entire developing world. Transformations in riverside towns and cities, strongly connected with the development of the environmental policy, are particularly interesting. The growing significance attached to the co-existence of a natural ecosystem and an urban structure becomes one of the crucial factors deciding about the quality of life in the city, and consequently about its competitiveness. Amongst complex and broad topics concerning riverside areas in cities, the topic that becomes one of the most important ones is the recovery of lost watercourses. An analysis of relevant examples all over the world clearly points to a high level of impact of projects connected with the reconstruction or renaturalisation of urban sections of rivers. The paper is divided into two analytical parts. The first one presents the topic of recovering watercourses in the perspective of contemporary urban planning solutions and an attempt to identify crucial elements that influence the attractiveness of the city. The second part focuses on an analysis of the development, decline, and reconstruction of rivers in Łódź. This analysis is to lead to an attempt to define a new image of Łódź as an eco-city, based on its reconstructed river system.

1. Introduction

Climatic changes and the burden of threats resulting from intensified urbanisation processes affecting the natural environment have become an undisputable fact. The array of these negative aspects conditions what today we refer to as competitiveness of the city. Consequently, the perception of what we recognise as a city offering favourable living conditions changes accordingly [1]. Ecological issues stemming from this trend, perceived in an extremely diversified way, become the domain of the global urban planning. Water management becomes one of its burning issues, as it is one of the most pivotal items in strategies developed so as to secure safe and healthy functioning of cities of the future. Basing water management forms within urbanistic structures on hard regulation as applied so far has become insufficient. This fact becomes obvious when one considers the logic of the evolution of sanitary systems of cities.

Chad Staddon [2] divides the history of the evolution into three basic periods, the foundation of which is the transformation of the sanitary model:

1. 3000 B.C. – 1850: early sanitary systems.
2. 1850 – 1950: great awakening and new sanitary systems.
3. After 1950: wastewater treatment, recycling, and reuse.



Thus the era commenced in 1950 opens up a period of renaissance for rediscovering rivers and watercourses in cities. However, the new positioning of the meaning of this framegenic element of the city is provided with new foundations. Watercourses become a significant element of the entire ecosystem, which in turn becomes a key and pivotal aspect in the future functioning of the structure of the city [3]. It is necessary to include “soft” elements in this system, which becomes a feature of an actively operating ecosystem. Vladimir Novotny and Paul Brown [4] describe the evolution of the relationship along the line city – water in five models. The fifth model constitutes a certain vision of the future, where “hard” elements of the water management system in the city, such as the sewerage system, regulation of watercourses, are simultaneously accompanied by “soft” elements, facilitating dynamic responses to variable water levels. These are predominantly elements of the urban water and greenery system. In the context of such pursuits, the so-called EU Water Framework Directive is developed, regulating new principles of creating the global water system of the European Union.

2. River – Reclaimed Resources

The relation along the line city-river was subjected to deep metamorphoses over centuries. The significance of accessibility of watercourses evolved from transport-related and defensive purposes, through requirements relating to industry, to the rank of natural resources deciding on a high quality of the living environment of city inhabitants. The turn of the 20th century opened up another way of perceiving the river in the city structure. One might refer to it as humanisation of this relation, where the river becomes the subject in the urban structure, and its relation with the user takes place according to the principles of “partnership”, which compels a high quality of its ecosystem. The return of rivers to cities stands not only for reclaiming their accessibility, but even their recreation or renaturalisation.

When perceiving the city as an ecosystem, one could venture a thesis that the most crucial goods are energy and water [1]. One of the fundamental factors determining the biggest differences between contemporary cities which determine their quality is access to water. The water locked in rivers and water bodies, as well as the rainwater. Thus the rainwater and groundwater management policy becomes one of the key aspects of contemporary urban planning.

A particular type of cities associated with water are riverside cities. In this case issues of the water management policy in terms of water retention are very strongly associated with an immense load of the city identity carried by the river. Therefore, both these issues, stemming from contemporary ecological recommendations, could be divided into several groups of problems. These are:

- environmental effect,
- economic effect,
- cultural and social effect.

Considering the issues referred to above through the prism of contemporary urbanistic projects, one comes to notice a more and more consistent policy of multifaceted inclusion of rivers and watercourses in city structures [5, 6, 7].

Projects raising the problems connected with the relation between the city and the river could be divided into three basic categories. Authors propose following one:

- renaturalisation (recovering the natural state and condition of the watercourse)
- reconstruction (reclaiming the watercourse for the level of the city perimeter, reopening watercourses locked in underground systems)
- metamorphosis (providing watercourses with new qualities and new forms of use).

The first category constitutes a certain foundation for the two categories referred to below. Each activity undertaken within the river system contains elements that refer to attempts to recover or improve the condition of the natural river ecosystem. A classic representative of this category is the project of transformation of the Besos river in Barcelona, cited numerous times in the subject literature [6]. Its undisputable success changed the appearance of the eastern suburbs of the city. Restoring the natural course of the river had an enormous effect on the flood control. At the same time, the natural flood park

created there became an economic advantage stimulating the increase of the real estate values in the surrounding area, constituting the main pillar in building the social space for local residents.

The second category consisting in restoring watercourses at the level of the public space of the city is an issue broadly implemented at the end of the 20th century. The renaissance associated with the re-discovery of the values offered by the presence of the river for the identity of the city determined a number of projects, implemented in Europe as well as worldwide. Already minor investments consisting in uncovering parts of canals in Breda, Holland, or Birmingham, England, illustrated an enormous potential for creating a new quality of the city. New projects had an immense effect on improving economic values of the surrounding grounds. They also much improved the value of the social space of the city. Undoubtedly, one of the biggest projects of the kind is the project of uncovering the Cheonggyecheon river in Seoul. Restoration of the watercourse was associated with the elimination of the motorway canal and transforming it into a linear water and greenery sequence. Besides undisputable economic and social effects, this projects are extremely important in ecological terms. Introduction of a new watercourse accompanied by greenery in the dense urban structure is a crucial element in the attempts to decrease the effect of the urban heat island, as well as it has its effect on the improvement of the air quality.

The third category, defined as metamorphosis, is perhaps the one with the highest potential influence, albeit the most difficult to classify. It assumes assigning new meanings to initial watercourses. This is how the results of the transformation of the old river bed of the Spree in Berlin are forecast. Organisation of a public swimming pool in the natural river bed forces the city to transform the sewerage system so that the water transported to the canal does not transport any waste. At the same time, this fact opens up an opportunity to take advantage of the river water freely by individual recipients in any way they choose. It breaks the previous dominance of industry and collective entities as the main users of the canal of the river, making it available to city residents.

3. Case Study: Łódź – Metamorphosis of the Water System as a Hidden Potential of the City

Currently, a number of cities in Central and Eastern Europe grapple with problems of transformation – the political one, and subsequently the structural and spatial one. One of such cities is Łódź, situated in Central Poland. Once dominated by numerous watercourses constituting the foundation of its existence, today it faces the need to rebuild its devastated ecosystem.

The Łódź of today is a relatively young city. It is classified as one of the youngest big cities in Europe. The rapid development of the small settlement it was at the beginning of the 19th century was decided not only by its favourable location on the routes Cracow-Gdańsk and Kalisz-Łowicz (and further on to Warsaw and Poznań), but to a great extent it was its rich hydrological system. In 1812, within the scheme of the industrialisation of the country, under a decision of the authorities of the Kingdom of Poland, a location of a new textile settlement was determined in the territories adjacent to a historic town, which at the time was the property of the state [8].

The abundance of small watercourses covering the territory of the growing town was not particularly useful for transport purposes, but it was a rich source of material and energy for the developing industry. Simultaneously, these watercourses constituted parts of rich drainage basins of two rivers surrounding Łódź: the Bzura river, and the Ner river. Thanks to this situation, Łódź has a great potential of water connections to this day: through the Ner, which enters the Warta river together with the waters of the Oder river, and through the Bzura river with the Vistula river. At the same time, the characteristics of watercourses intersecting the town, dominated by streams settled in deep valleys, allowed to build numerous dams and water storage reservoirs, which gradually built the image and identity of this young town. The rapid development of Łódź can be confirmed by the fact that in the period 1820-1864 its population increased 44 times, and the dominating source of income for town inhabitants was the industrial function. Its further dynamic development contributed to enormous changes in the ecosystem of the town. Even a cursory analysis of the surface water condition points to striking changes between the town at the beginning of the 20th century and the city of Łódź today. Excessive exploitation of the water ecosystem led to its degradation. Most watercourses previously responsible for the livelihood

needs of the city simply disappeared. Small watercourses, predominantly tributaries of the Ner river, disappeared or were mostly canalised. As a result of overexploitation and excessive use of water, the level of underground rivers decreased. It is estimated that it got several to more than ten metres lower. Therefore, Łódź enters the 21st century in a nearly drastic condition in terms of the quality and quantity of water within the perimeter of its urban ecosystem.

Comprehensiveness of the transformations and the disturbing phenomena which affected Łódź in recent years have contributed to a considerable drop of its position in terms of competitiveness of cities. It is influenced by economic as well as environmental factors. These issues have had a significant impact on considerable outflow of city residents. In the years 1989-2004 the population of Łódź dropped from 848 to 774 thousand, which constitutes 8.7% of the overall population [9]. An attempt to restore the position of Łódź as a competitive city is based not only on its economic status. Significant effects are sought in the improvement of the quality of its ecosystem. The foundation of these measures is the reconstruction of the water and greenery system of the city as the base for its image as an eco-city. It also constitutes an attempt at the reconstruction of the basic and indigenous elements of its identity.

At the beginning of the 21st century, just like at the time of its incorporation, Łódź derives its future potential from its natural and geographical context. The proposal of inscribing the city in the region anew is to be based on the “blue and green network” [10] [Figure 1]. This network, once constituting the foundation of industry, now is to become a new formula for balancing the spatial development of the city and linking it with the open landscape. This project is submitted to the Study of Spatial Development Conditions and Directions of the City of Łódź in 2010 [Figure 2]. Adopting it as one of the three parts of the Strategy of Sustainable Development of the City of Łódź 2020+ in 2012 becomes a great success. These provisions result in the launch of the first pilot project. It is the revitalisation of the Sokołówka river valley. The project consists in the recultivation and reconstruction of the natural river ecosystem and creation of natural water storage reservoirs. The course of the Sokołówka river, located in the northern part of the city, is largely associated with green areas. It considerably facilitated the implementation of these plans, completed with a water storage reservoir in the vicinity of the Władysław Strzemiński Fine Arts Academy. The water reservoir connected with the watercourse of the Sokołówka, located in a park, brought about a more beneficial situation in terms of rainwater management, as well as contributed to the improvement of the quality of the public space in this area. Rivers located in the inner city, such as the Jasień river and the Łódka river, remain particularly interesting for the space of the city. These watercourses intersect, or rather used to intersect, the historic part of the city, together with Piotrkowska street, and they are fully canalised in this area. Uncovering them could contribute to a deep metamorphosis of the entire appearance of the inner city of Łódź. While the transformation of the Sokołówka river contributes to the improvement of the condition of the green buffer zone of the central part of the city, transformation of the rivers located within its limits would become a foundation for the improvement and extension of the public space in the city centre, and most of all for its introduction into the water and greenery system [11].

4. Conclusions

Transformation of watercourses in Łódź is slowly becoming a fact. Relevant provisions of plans and the first implemented projects allow to predict that the next watercourses will be released and revitalised. Reconstruction of the water and greenery network may become a leverage for the shrinking city, improving the quality of its space, and in doing so its competitiveness, as well.

Implementation of the plan of the “Blue and Green Network” in Łódź constitutes an embodiment of the statement of the World Commission on Environment and Development, which in 1978 defined the term “sustainable development” as follows: “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their needs.” [12] J.M. Levy, analysing the phenomenon of sustainable development, points out that it should solve conflicts which result not only from environmental issues, but also from social ones. In this context he emphasises the significance of “equity” as a key to the sustainable development policy [12]. In this respect,

providing broadly understood access to watercourses for city residents becomes a manifestation of building of a new vision of an eco-city [13].

So far, transformation of watercourses in Łódź falls into the first category (renaturalisation) and the second one (reconstruction). The predicted, albeit rather futuristic, transformations of rivers within the inner city, such as the Jasiień river or the Łódka river, running through the dense structure of the heart of the city, would have the potential of the third category – metamorphosis – building a new image of this part of the city, as well as opening up new possibilities of utilising this enriched public space. There is no doubt that one of the crucial aspects of this project is the restoration of the continuity of the entire ecosystem of the city and linking the inner city directly with the open landscape.

Preservation, reconstruction, and providing new quality to watercourses in Łódź addresses the challenges of sustainable development. Their reintroduction on the map of the city has three basic aspects:

1. Environmental aspect: reconstruction of the natural ecosystem of the city, improvement of the air quality, retaining rainwater necessary for the municipal greenery to thrive;
2. Economic aspect: improvement of retention capacities, improvement of the quality of the ecosystem of the city, reduction of the costs of use of sanitary systems, reduction of the risk of flooding;

Cultural and social aspect: restoration of the indigenous framegenic elements as a foundation for the reconstruction of the identity of the city, improvement of the quality of the public space, increase of the share of the social space in the city.



Figure 1. Blue and Green Network in Łódź. Author: M. Zalewski

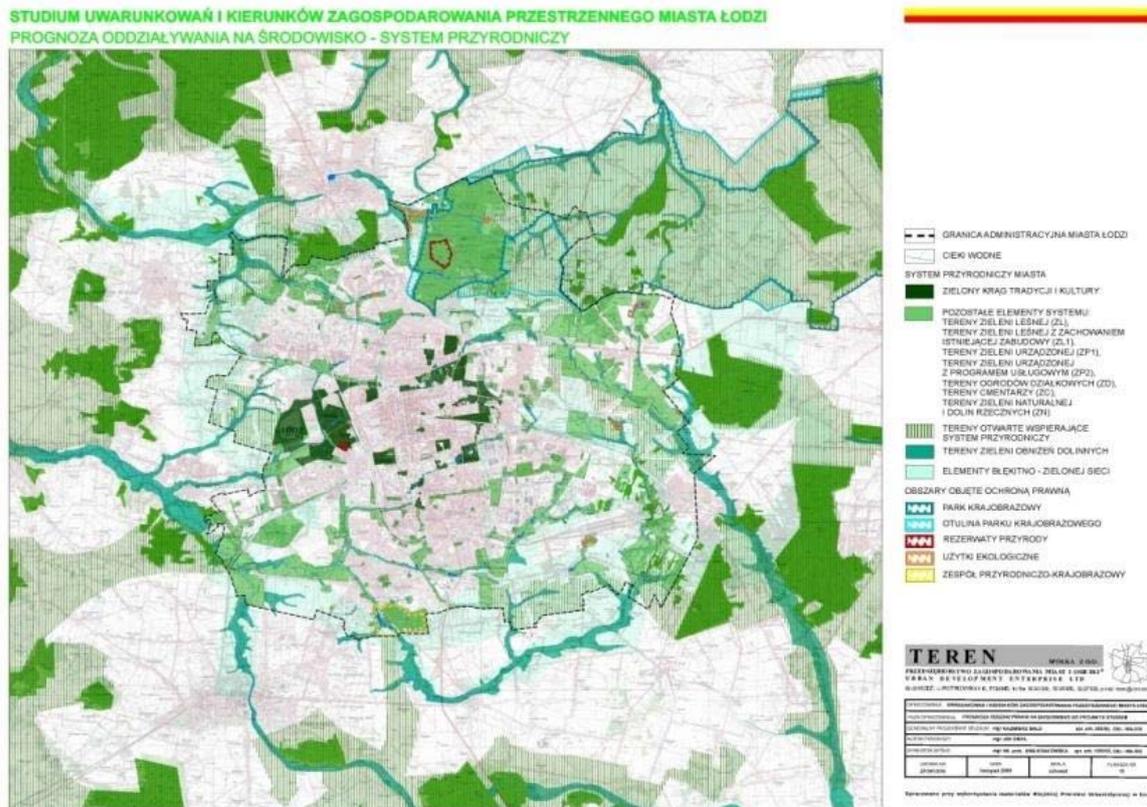


Figure 2. Study on Spatial Development Conditions and Directions for the City of Łódź. Natural Conditions. Source: Municipal Urban Planning Lab, Łódź 2010.

References

- [1] L. Benton – Short, J. R. Short, “Cities and Nature”, Reutledge, 2008.
- [2] Ch. Staddon, “Managing Europe’s Water Resources. Twenty – First Century Challenges”, Ashgate Publishing Company, 2010.
- [3] S. Castonguay, M. Evenden, (ed.), “Urban rivers. Remaking Rivers, Cities and Space in Europe and North America”, University of Pittsburgh Press, Pittsburgh 2012.
- [4] V. Novotny, P. Brown (ed.), “Cities of the Future. Towards integrated sustainable water and landscape management”, IWA Publishing, London 2007.
- [5] L. Fabian, P. Viganò (ed.), "Extreme city. Climate change and the transformation of the waterscape", Università Iuav di Venezia, Venezia 2010.
- [6] A. Matusik, “River Valley as a hydrological/urban dynamic system in the structure of the contemporary city”, Technical Transactions, vol. 115, iss.2, pp. 57 – 66, Cracow 2018.
- [7] L. Nyka, "Architecture and water – crossing borders", Publishing House of the Gdańsk University of Technology, Gdańsk 2013.
- [8] W. Zin (ed.), "Monuments of urban planning and architecture in Poland. Reconstruction and maintenance" Volume 1, Arkady, Warsaw 1986.
- [9] P. Oswald, T. Rieniets (ed.), “Atlas of Shrinking Cities”, Hatje Cantz, Ostfildern, 2004.
- [10] I. Wagner, K. Krauze, M. Zalewski, “Blue aspects of green infrastructure”, Sustainable Development – issue 4, 2013.
- [11] Study on Spatial Development Conditions and Directions for the City of Łódź, 2017 - made available for public review.
- [12] J. M. Levy, “Contemporary Urban Planning”, Routledge, New York, 2017
- [13] K. Solarek, E. D. Ryńska, M. Mirecka, "Urbanism and architecture in integrated water management", Publishing House of the Warsaw University of Technology, Warsaw 2016.