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## Landscape engineering and aesthetics approaches to design a community garden: Social activity zones appraisal in the envisaged Drwinka River Park (Kraków, Poland)

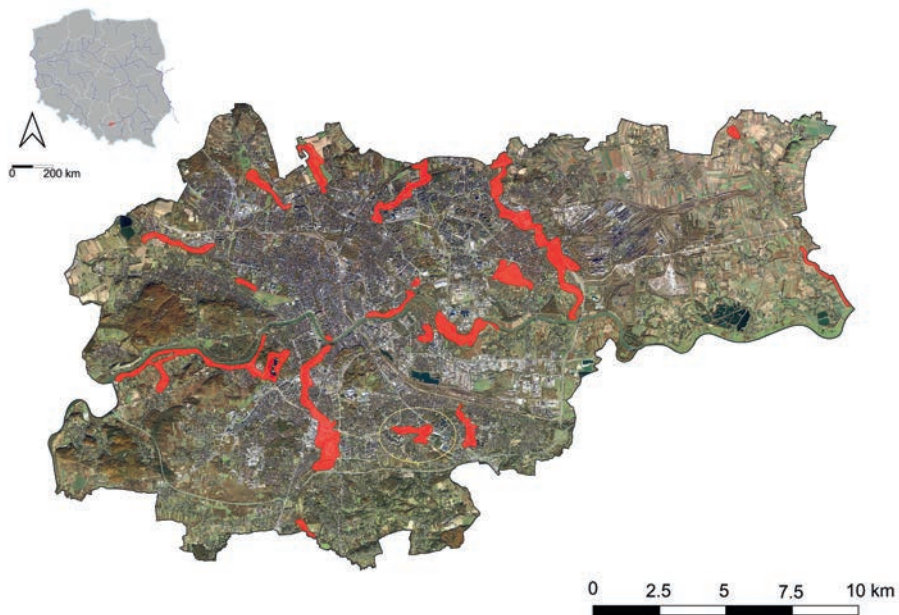
### Introduction

Many countries are placing an increasing emphasis on conservation services as urbanisation continues/ progresses (Ghelfi, Papadopoulos, 2021). The goal is to improve the quality of life in cities, including the economy. This is achieved by building a network of greenery. Additionally, agents operate both on and off the street. In new green areas in cities, “natural landscapes” are more and more often drawn (Kittiprapas, 2022). In terms of plant species, a wide range of different plants is used, including grasses, forest plants, aquatic plants, etc. To relocate non-urban landscapes into cities, the so-called naturalistic styling is used (Brown, 2008). The greenery concept can be used in all kinds of places, including small spaces, benches in small architecture, as well as in water bodies (Jelks et al., 2021). Landscape architecture designed specifically for drought-prone or water-conserving areas is known as xeriscaping (Çetin et al., 2012).

Green spaces must be included in the structure of a city (Gorham et al., 2009; Rodriguez-Plesa et al., 2022). Each area is distinguished by its size, composition, and plant diversity, as well as the function they serve for sustainable cities (Albino et al., 2020). Among green spaces, there are city parks, historic parks, city forests, squares, rooftop gardens, home gardens, pocket gardens, allotment gardens, and cemeteries. In addition, one can distinguish street greenery i.e. vegetation growing along roads and pedestrian routes, temporary gardens, and climbing plants, which are called “green walls” (Matoga et al., 2015; Joshi et al., 2022). Large areas of green space with a predominance of biologically active areas act as ecological corridors for wildlife and plants (Kondo et al., 2018; Halecki et al., 2022). These primarily include urban forests, parks, and vegetation in the valleys of unregulated, natural rivers. Some areas have been “adapted”

and incorporated into green areas. Common examples are remnants of ancient, natural forests that have been converted into urban spaces (Wang, 2022). In addition to serving as biodiversity refuges, these forests also contribute to recreational areas in cities. Some of them are located within the administrative boundaries of cities and are distinguished by arranged vegetation, planted by man, as well as fragments of spontaneous and natural vegetation, which is a remnant of forests. These areas serve many functions, including aesthetic, cultural, social, tourist, and educational (Wolch, 2014; Yan et al., 2018). Moreover, educational paths, such as those in city forests, are very appealing. As a part of an educational trail, participants may learn more about the genesis of a particular forest, the species composition of plants, animals, and insects as well as issues related to management and protection in that area (Kaletová et al., 2022).

It was planned to assess the development of green areas of the “Na Kozłówce” housing estate, located in the XII Bieżanów-Prokocim District, in the south-eastern part of Kraków (50°03'41"N 19°56'18"E, southern Poland; Fig. 1).



**Fig. 1.** The figure shows the protection zones of river parks in Kraków (in red); the Drwinka River Park is marked with yellow ellipse

In this study, I present an analysis of the area between the street and the planned Drwinka riverfront park area, located south of the neighbourhood. An attempt has also

been made to develop a project for the recomposition of this area, and in particular to unify and create a convenient and accessible space for residents. The (main) aim of this project has been designing the river park as an environmentally friendly area that tourists and residents could use all year round. By this design, it will positively affect the aesthetics of the neighbourhood and the quality of life of its residents.

### Characteristics of the project area

Kraków experiences both hot summers and cold winters, as the area is under the pronounced influence of a continental climate. The city records an average annual air temperature of 8.7 °C. The warmest months are July and August with an average temperature of about 19 °C, while the coldest month is January with an average temperature of 0 °C to -5 °C. The study area is located on a slope to/towards the northwest, separated by two road arteries. The Drwinka Valley encloses Nowosądecka Street and Wielicka Street to the south. Since the site is a part of the Vistula catchment area, the groundwater is of tertiary origin. A small stream, the Drwinka, runs nearby. In Drwinka valley, a River Park is planned (Fig. 1).

In the study area, the Office of Spatial Planning of Kraków city found the presence of urban soil (Urbisol), or anthropogenic soil. Urban soils and old parks soil are common in the study area. In these soil profiles, some layers display traces of earlier use (e.g. remnants of pavements and foundations). The area surrounding the settlement is mostly covered with dense buildings (Fig. 2–3). Industrial and commercial buildings are located to the north and east of the settlement.

Along the estate, there are located gardens, allotments, urban green areas, and small deciduous forests. Residents take care of the greenery and many types of bedding plants, shrubs, and woody plants can be seen here. Thus, there is both arranged and unarranged vegetation throughout the analysed area, along with neighbourhood greenery. There are a lot of trees surrounding buildings, green squares, and greenery near sports facilities in areas of multi-family housing. In addition, traffic routes are planted with low hedges, and streetcar tracks are covered with grass and are known as “green tracks.” Arterial roads and local roads form a dense network in the part of the city near the Drwinka stream, where the River Park is being developed. To the northeast lies Jerzmanowski Park with its old trees. Pedunculate oaks have a long history here. At the same time in the Drwinka valley itself, situated south of the settlement, there are deciduous trees and shrubs along the river. There is an ash-elm riparian forest in this region, while most of the land directly in the Drwinka valley is occupied by alder forests.



Fig. 2. Developing green spaces in the analysed area “Na Kozłówce” (south-eastern Kraków)



Fig. 3. Spatial development in the analysed area “Na Kozłówce” (south-eastern Kraków)

The main objectives of the project

### Greenery analysis

Tall greenery is abundant in the development area, which consists mainly of coniferous and deciduous trees. Inter-block greenery enhances the aesthetic qualities/ aesthetic value of the adjacent blocks (Fig. 4 – Appendix 1). A community garden can be beneficial for residents, including the elderly (Fig. 5 – Appendix 1).

There are several assumptions that community gardens should meet:

- integration – it is one of the most important factors affecting the quality of life of residents living in densely populated areas. As a result of integration the sense of belonging to a given place increases leading to a greater sense of security and responsibility for the environment (Joshi et al., 2022);
- education – nowadays, it is crucial to raise awareness of the value of nature, environmental protection, and ecology. Thanks to ecological solutions, such as permeable surfaces, retention reservoirs, apiaries, insect hotels, or birdhouses, residents can be introduced to nature and increase their ecological awareness. The community garden allows conducting workshops on various activities both for schoolchildren, students, and pre-schoolers from nearby institutions, as well as for everyone interested in the subject. Thanks to the Gardener’s House, the activities can be conducted throughout the year, not limited to the season and weather conditions (Kou, Zhang, 2019);
- recreation – leisure is an integral part of everyone’s life. It will certainly be much more pleasant to relax in a semi-private space, enclosed in the beautiful scenery, than within the dense and monotonous block of flats. Visitors are attracted to this friendly and peaceful place in increasing numbers, and some may even discover a passion for social gardening, naturism, or just having a good time in a natural environment (Asensio, 2022).

### Detailed instructions for shaping the plant cover

The richness of dendroflora in the “Na Kozłówce” housing estate, fulfills its functions both in terms of aesthetics and functionality. Apartments need to be exposed to greenery to suppress noise and protect it from excessive snowfall. In this regard, local authorities can create a unified plan of action to coordinate different types of greenery throughout the neighbourhood. Most city dwellers live in urban environments that favour the creation of community gardens. However, not everyone can afford or maintain a community garden, which negatively affects the appearance of the home. Households cannot maintain gardens. By separating green areas and ameliorating soil quality, community gardens (Kirsch et al., 2022) and forested urban parks (Millward, 2011) can be improved.

### A plan for land development

#### Composition

In the conceptual design for the redevelopment of the “Na Kozłówce” housing estate, the leading form is the square. The plan mainly includes elements of small architecture, such as kiosks, bicycle playgrounds, flower beds, gazebos, and even garbage cans. The leitmotif is intended to enliven the monotonous landscape and, in a way, unify it in the neighbourhood structure. The study area contains public (“Na Kozłówce” park) and

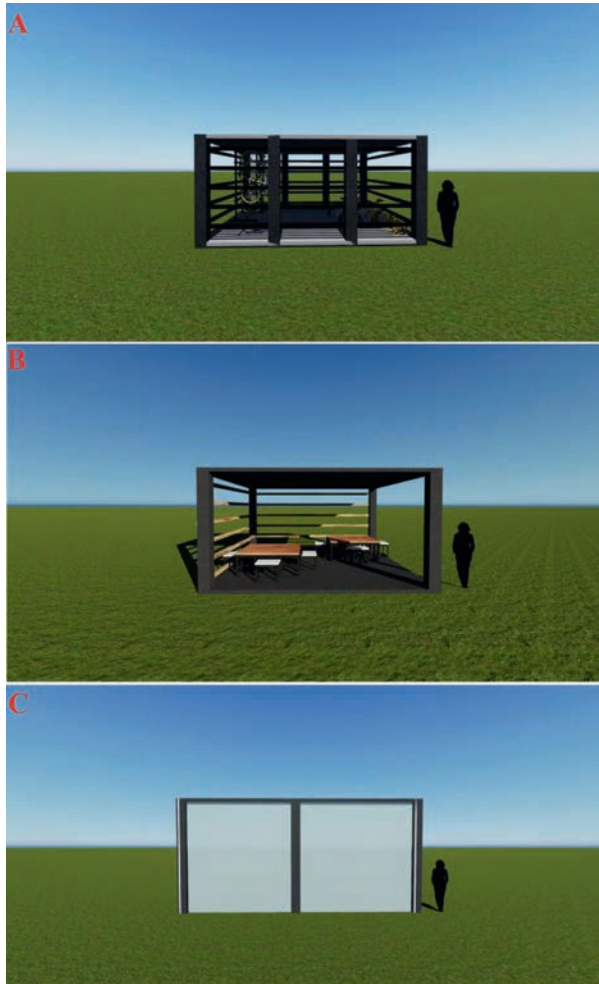


semi-public (semi-private and private) zones. In the central part of the estate, a community garden was placed both for integration as well as educational, recreational, and representative purposes. Flowerbeds, greenhouses, gazebos, and outbuildings are arranged in squares throughout the estate.



**Fig. 6.** Illustration of the conceptual design. Honey plants, perennial plants, green roof, hives, and picnic and meeting areas are included in this project

A community garden was proposed as a place for learning, relaxation, and contact with neighbours. A detailed plan, selection of plants, and landscaping elements were developed. With the use of insect hotels, birdhouses, beehives, and, in a technical context, retention tanks, the site was also able to cope with the ecological aspect of the project. A detailed analysis of the district and neighbourhood was carried out, which allowed a solid understanding of the study area (Fig. 2). Many factors were taken into account, including terrain, development, communications, historical and cultural connections, greenery, and the functionality of the neighbourhood. Based on the above analyses, design guidelines for the recomposition of the estate were developed. Raise beds, greenhouses, gazebos, and farm buildings are all arranged in squares throughout the estate.



**Fig. 7.** Elements of social garden equipment used during picnics on the grass; the infrastructure of the estate garden consists of: A) bicycle room, B) seats, C) exhibition stand

### Functional zones

The green zone combines both passive and active activities. A section of the establishment has been divided into subzones so that the function meets the needs of the residents. Green, yellow and blue residential zones have been separated. Residents of the blue zone primarily benefit from the community garden located nearby. In the green zone, there are places for relaxation such as gazebos. With ornamental plants more elderly people with mobility problems have the opportunity to take care of their places near their apartments, thus integrating with others (Fig. 6).

### Small architecture: A selection of elements

Concrete buildings mainly constructed in the second half of the 20th century, have monotonous and uninteresting aesthetics, especially if they do not contain greenery. “Na Kozłówce” estate is a place of both daily recreation and leisure, which has been transformed thanks to a conceptual design based on a number of distinctive and functional elements. These elements were planned to meet residents’ needs. Community gardens play a crucial role in the integration of residents, but also in education and recreation. By organising the space and unifying it, the estate will be renewed and the residents will be more inclined to spend their free time near their apartments, thus improving their quality of life. This concept includes elements of small architecture. An amphitheatre, a bicycle storage, and an exhibition stand are included (Fig. 7). All these elements are composed in a square plan.

### Planned plantings

Plots of land have been set aside in the residential area for ornamental plants, which will be arranged by residents according to their tastes and gardening skills. In turn, the community garden proposes planting fruit trees, melliferous and ornamental plants. A variety of honey-producing plants should be planted so that the nectar can be collected throughout the summer (Tab. 1).

**Tab. 1.** Four plant categories recommended for shaping the plant canopy in a community garden

No.	Plant category	Plant names (common and scientific*)
1.	Herbaceous honey	e.g. alfalfa ( <i>Medicago</i> sp.), blue tansy ( <i>Phacelia tanacetifolia</i> Benth.), broad-leaved thyme ( <i>Thymus pulegioides</i> L.), catnip proper ( <i>Nepeta cataria</i> L.), clover ( <i>Trifolium</i> sp.), columbine ( <i>Aquilegia</i> sp.), common bugle ( <i>Ajuga reptans</i> L.), common dandelion ( <i>Taraxacum officinale</i> coll.), common sage ( <i>Salvia officinalis</i> L.), European goldenrod ( <i>Solidago virgaurea</i> L. s.str.), lemon balm ( <i>Melissa officinalis</i> L.), lungwort ( <i>Pulmonaria</i> sp.), monkshood ( <i>Aconitum</i> sp.), primrose ( <i>Primula</i> sp.), trefoil ( <i>Lotus corniculatus</i> L.), white melilot ( <i>Melilotus alba</i> Medik.), wild thyme ( <i>Thymus serpyllum</i> L.)
2.	Fruit trees	e.g. apple tree ( <i>Malus</i> sp.), cherry plum ( <i>Prunus cerasifera</i> Ehrh.)
3.	Fruit bushes and shrubs	e.g. blackberry ( <i>Rubus hybridus</i> Vill.), blackcurrant ( <i>Ribes nigrum</i> L.), European gooseberry ( <i>Ribes uva-crispa</i> L.), northern highbush blueberry ( <i>Vaccinium corymbosum</i> L.), quince ( <i>Cydonia oblonga</i> Mill.), redcurrant ( <i>Ribes rubrum</i> L. s.l.);
4.	Herbaceous fruit	e.g. strawberry ( <i>Fragaria ×ananassa</i> , Duchesne), wild strawberry ( <i>Fragaria vesca</i> L.)

\* scientific nomenclature of plants according to: [www.atlas-roslin.pl](http://www.atlas-roslin.pl)

## Functional program of the community garden

The Community Garden Initiative which includes a series of progressive actions designed to increase community engagement and reduce external intervention intensity was formulated by researchers from around the world. For example, a community-



university partnership has been developed in Shanghai since 2014 as part of a shift in urban regeneration paradigms in China that emphasizes people-centred strategies. Social participation was quickly accepted by the public. Moreover, community gardeners' attitudes toward other neighbours were positively rated (Hencelova et al., 2021). Local farms and gardens can provide healthy diets for residents in metropolitan areas. For every £1 invested in a London community garden, the return on investment is calculated at £3. As a contribution to social well-being in cities, community gardens should be included in municipal planning policies (Schoen et al., 2020).

An innovative landscape design was reported e.g. in the case of the Alex Wilson Community Garden in Toronto (Canada). This kind of design approach reconstructs the natural and cultural history of southern Ontario, encompassing lakeshores, agriculture, and woodlands. Gardening in the design exclusively uses native plants, which should increase biodiversity. Residents monitor and assess the ecological health of the naturalized area as part of their community life. While both of these movements are popular today, they are rarely combined to demonstrate sustainable land use and community planning principles (Irvine et al., 1999).

The Chitora community gardens (Zimbabwe's rural region) were found to improve the lives of many households in rural communities, including wetland revitalisation, increased food security, livestock, crop management, and value-added initiatives. Knowledge transfer, resilience building, sustainable asset building, and climate change mitigation and adaptation programs benefited rural communities (Matsa et al., 2022). Additionally, rural community gardens provide locals with opportunities to grow alternative food and engage in activities that promote social development and tackle neoliberal inequities (Ghose, Pettygrove, 2014). Consequently, their users are at a lower risk of chronic and non-infectious diseases and stress. Growing vegetables change their eating habits. The benefits of gardening include therefore improved health, education, and social connections (Janowska et al., 2022).

Urban horticulture is positively recognised, e.g. by residents of a housing estate in Lublin (Poland). The study concluded that food security, the primary purpose of urban horticulture, is not essential to its inhabitants. Urban gardens are not only functional, but they have secondary functions as well, such as recreation, social integration, aesthetics, and others (Sosnowska et al., 2022). The next example is the "Szeląg Garden," which was founded in 2018 by the "Winogrady" Estate Council and local activists in Poznań (Poland). Within the garden, there is a wooden pavilion. As the terrain was sloping, the pavilion was mounted on concrete poles, which allows people in wheelchairs to access it easily. Apart from the pavilion and the community garden, there is also a catering area, a kids' zone, a leisure area with wooden terraces, and a marina for riverboats on the plot. On the other hand, the abandoned orchard on the site of the former church was transformed into the "Fort Bema City Garden"

(Warsaw, Poland) in 2015. In the centre of this garden, apple trees are interspersed with a vegetable garden. A relaxation area can be found in the orchard. Also in Warsaw, in the same year, the “Motyka i Słońce” Community Garden was established. Throughout the season, it is mainly used for growing herbs and vegetables. Sponsors also made available a winter garden, which provides plants with more light in autumn and winter. Numerous educational workshops, picnics, and cultural events are held in the garden in addition to relaxing.

Designing urban community gardens has the potential to generate a new city model, in terms of both the physical and human dimensions (Maćkiewicz et al., 2022). The residents of Kraków are interested in using community gardens and creating new ones near their estates. The following community gardens are the most popular among users in Kraków: (a) Kleparski Park Community Garden (b) Azory Community Garden (c) Reduta Community Garden. Based on the survey, over 80% of respondents believe that newly emerging housing estates should establish community gardens for social, economic, and revitalisation purposes (Rajca, Kajzar, 2022).

A new city plan is included in both the Study of Conditions and Directions of Spatial Planning and the Local Plan of Spatial Development. A Local Plan of Adaptation has been adopted by Kraków and 43 other Polish cities to mitigate and adapt to climate change. Moreover, the city has also adopted a plan to increase afforestation by at least 8% through its “*Powiat Programme to Increase Afforestation in the City of Kraków for the years 2018–2040*”. “*Development and Management of Greenery in Kraków, 2017–2030*” is the most important document and planning initiative of the city. The document discusses land use, cultural heritage, and the social requirements of green spaces as aspects of blue-green infrastructure. It also highlights many real estate management, spatial planning, and cultural heritage management activities. The design of integration and management of green areas is found in “*Directions for development and management of green areas in Krakow for 2017–2030*”. Defining a coherent, planned, and long-term policy for the development of green spaces is its primary goal.

As part of the urban greenery and Nature-based Solutions (NbS) system developed since 1996, a great deal of emphasis is placed on the preservation and development of the Kraków River Parks system, which also function as community gardens. In urban environments, community gardens are a response to the worldwide trend towards green spaces that are tended by residents (Lux, 2001; Kou et al., 2019). Therefore, among others, the cultivation and integration of plants along the Drwinka river are planned. Aesthetic reasons and the ability to commune with nature lead residents to seek out such places, when they do not have direct access to them.

## Summary and conclusion

Trees, shrubs, and climbers play a very important role in the design of the estate’s green spaces. The design of the green areas in a well-planned housing estate should take into

account several principles of planting trees in such a way that they are useful. The placement of greenery is beneficial in case of the construction of residential blocks since tall buildings tend to shade them. In residential areas, lawns are mainly used for recreation by the elderly and families with young children. This depends largely on the scale of the building and the architectural form to which the surrounding greenery should be adapted. In this type of green space, you can find a variety of social garden spaces. Among others, carpet lawns, flower beds or vases with flowers, ornamental shrubs, colourful varieties of trees, etc. are used here. Nevertheless, the path system must be very simple and easy to navigate. Neighbourhood greening programs should be comprehensive and tailored to the needs of all residents. The shortest distances between stops occur on pedestrian routes. To create more privacy and intimacy, it is beneficial to separate interiors with vegetation that is decorated with plants of different heights. Maintaining an effective community garden involves providing favourable growing conditions.

### Conflict of interest

This article contains no conflict of interest declarations from the author.

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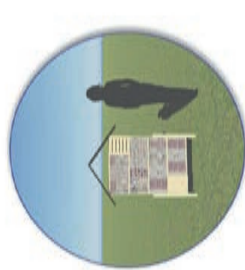
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- Kształotowanie estetyki przestrzeni i krajobrazu dla ogrodu społecznego oraz ocena stref aktywności społecznej w projektowanym Parku Rzecznym Drwinka (Kraków, Polska)



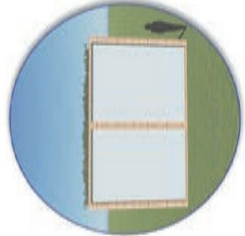
Appendix 1



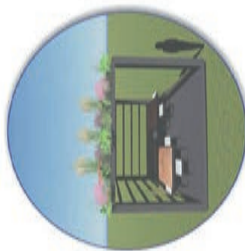
Fig. 4. The analysed area "Na Kozłowiec" (south-eastern Kraków)



**Garden cottage**



**Insect hotel**



**Gazebo with a green roof**



**Hives**

Fig. 5. Proposal to redesign green spaces and build a community garden

## Inżynieria krajobrazu i podejście estetyczne do projektowania ogrodu społecznego: ocena stref aktywności społecznej w projektowanym Parku Rzeki Drwinki (Kraków, Polska)

### Streszczenie

W związku z tym, że miasta rozwijają się zgodnie z zasadami zrównoważonego rozwoju, przestrzeń miejska musi być efektywnie wykorzystywana. Aby prawidłowo kształtować środowisko miejskie, należy osiągnąć równowagę między terenami inwestycyjnymi, a obszarami cennymi przyrodniczo. W ostatnich latach uwagę rządu przykuwa planowanie przestrzenne, zwłaszcza rozwój zieleni miejskiej. Ochrona krajobrazu miejskiego jest istotnym elementem rozwoju gospodarczego, dlatego niezbędne jest odpowiedzialne zarządzanie terenami zielonymi. Jednak racjonalne zarządzanie zielenią miejską wydaje się być ciągle dużym wyzwaniem dla władz miasta. W planie zagospodarowania przestrzennego, można wyznaczyć miejsca pod nową roślinność, odnowić zniszczone tereny zielone lub zmienić przeznaczenie terenów przemysłowych. Celem artykułu jest przedstawienie spójnego projektu odnowienia osiedla, ze szczególnym uwzględnieniem zieleni w planowanym Parku Rzecznym w Krakowie. Utworzenie ogrodu społecznego sprzyja spotkaniom towarzyskim, a także podnosi estetykę przestrzeni miejskiej i jakość życia. Parki i ogrody społeczne są wymienione, jako strategiczne elementy wyposażenia infrastruktury miasta i komponent przestrzeni publicznej do spotkań i rekreacji lub innych aktywności.

**Key words:** blue and green infrastructure, green areas, river park, social life

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