

# Revitalization of the city's riverside areas on the example of the urstromtal of the Malczewski Stream in Radom

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**Abstract:** The area of the urstromtal of the Malczewski Stream, located on the border of two blocks of flats inside the Radom housing estate Południe, has remained undeveloped for over twenty years. The existing tree stand is primarily self-seeding with the dominance of *Salix alba* (32%) and *Populus tremula* (16%). In addition, there are: *Alnus incana* (11%), *Quercus rubra* (10%), *Acer negundo* (7%) and others. There are no paved pedestrian routes. Conceptual design of the new development of the valley is a response to the needs of local residents. The project involves creation of a square in the middle of the plot, with a focal point in the form of a fountain. Separation of an area with sports and recreational functions with a fitness and skate park, as well as two playgrounds for children are planned. There is also a designated area for a dog paddock. A part of the park with a roofed gazebo and three paved squares with stone barbecues will serve as a recreation and leisure function for entire families. Referring to the names of the surrounding housing estate Południe and associations with the sun – the place was called the Sunny Park. The name of the park is underlined by the arrangement of alleys, reflecting the wandering of the sun in the sky.

**Keywords:** city park, revitalization, Radom, housing estate Południe

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## Introduction

Green areas in the city center form a system of public spaces, constituting an important element in shaping the city's physiognomy. Greenery is an element that enriches the layout of squares and streets with the advantages of psychological impact on users, giving relaxation by changing the material that builds the urban space (Nowakowski 1990). The presence of the river further increases the natural and aesthetic value of the place and allows an attractive reception of urban space. The river has the ability to create characteristic places, distinguished by the originality of form, function and content, due to which the district will be recognizable and associated by both its residents and guests. The river valley in the city creates many possibilities for arranging interesting riverside spaces (Pancewicz 2004, Bernat 2010, Domańska 2012).

The area of the urstromtal of the Malczewski Stream is located on the border of two blocks of flats inside the Radom housing estate Południe. It has remained undeveloped for over twenty years. The stream valley co-creates one of the few open spaces in the district, with free air exchange and a specific microclimate. Despite the

fact that it was described as a reserve for the construction of the park in the local spatial development plan, it has not been developed yet.

The aim of this work was to develop a conceptual design for land development in the vicinity of Park Południe in Radom. With reference to the Radom river valley, the term revitalization will mean adding value to the areas of the Południe housing estate by enriching and refining their form, modernizing their functions, and thus increasing the quality of life of residents.

## Material and methods

The area of development are plots with a total area of 6.4 ha owned by the City of Radom. The valley is located between Wierzbicka, Łąkowa and Czarnoleska streets. The area from the north is adjacent to the housing estate "Południe", while from the south, it adjoins the compact development of terraced detached houses. From the west, there is the provincial road No. 744 leading from Radom towards Wierzbica. On the eastern side, there is the Południe Park, newly founded a few years ago. The Malczewski Stream is a periodically drying inflow of the Mleczna River, which is a left-bank tributary of Radomka River, which is in turn a left-bank tributary of the Vistula river. Rapid development of the city after World War II and high demand for water (construction of the pump station on Idalin) resulted in the formation of a large depression funnel, which, combined with low retention of these areas, caused the stream bed to dry out periodically.

## Methodology

This work is of a review and design nature. It used the inhouse and field studies, surveys and design works. The research was carried out in 2016–17. The local vision was to define a group of users using the designed area, functional, spatial and viewing analysis. Based on the interview with residents of nearby buildings, an analysis of users' needs was developed. Field studies consisted of detailed dendrological inventory and photographic documentation. On this basis, design guidelines were developed, followed by the park design.

## City park – definition and role

The term 'park' first appeared in French garden art at the turn of the 17<sup>th</sup> and 18<sup>th</sup> centuries as a designation of the natural parts of a regular garden. It was adopted to describe landscape gardens in England and then throughout Europe (Tołwiński 1963, Majdecki 2009). Currently, a large green area of several to several hectares is accepted as a park. The size of park depends on its location and administrative belonging to the district, e.g. district park up to 5 ha, city park up to 20 ha. Green areas in city centers are subject to common principles for building spatial composition. Basic element of the park is high and low vegetation (trees 20–30%, lawns 70%, flower beds and 1% rebates). Species resistant to urban conditions, i.e. dust, exhaust fumes and low humidity are used here. Flower beds are planted mainly with perennials, and to a lesser extent with annual plants, which require more work. Roads, paths and squares as well as elements of small architecture, i.e. pergolas, trellises, stairs, fountains, cascades, walls, benches, lighting, cover 8–18% of the area. Water reservoirs covering about 10% of the park are interesting and at the same time introducing a unique atmosphere of the park interior. An inseparable element of the parks are playgrounds, cafes, a concert shell or small gastronomy (Borczyk 2000, Malczyk 2005).

Plant clusters in cities purify the air from harmful carbon dioxide in photosynthesis, and in return, they emit pure oxygen. They accumulate large amounts of harmful compounds emitted by factories in the form of fumes. Large green mass is a place for dust to settle, making the plants purify the air. Compact groups of shrubs or rows of trees provide shelter from winds, suppress noise from traffic arteries, and at the same time, create favorable microclimate (Zachariasz 2012). They are a place of living and breeding for many animals that have permanently settled in cities. Greenery has a positive effect on the urban microclimate by regulating the soil and air humidity due to transpiration, i.e. evaporation of water from the above-ground parts of plants. This

process contributes to cooling the air inside the agglomeration and saturating it with moisture. For example, the amount of evaporation from an open water surface may be 50–70% smaller than the same size of an area covered with compact vegetation (with fully open stomata), assuming identical climatic conditions. Literature data say about the evaporation of about 500 liters of water during the day by one large deciduous tree with an energy consumption of 300,000 kcal from the environment. It follows that a single leaf evaporates five times more water per day than its weight [Adamczyk 2004]. Analyzing the relative humidity values in the parks, it shows that it is higher by 3–8% on average in the cold season and by 5–20% higher in the warm season compared to the rest of the city. Similar interactions take place over large lawn areas (above 3000 m<sup>2</sup>), where the air humidity definitely increases by up to approximately 90% compared to areas near roads (Oleksiejuk 2005).

## Studies and analyzes

Four viewpoints can be designated in the analyzed area. The height difference between the bottom of the stream and the plateau, on which the estate is located, is 15 meters. These are places that dominate the landscape of the proposed park. The indicated points also fulfill the function of entering the park – thus, when entering the park, to admire its entire panorama will be possible.

There are no paved pedestrian paths in the area. There are only wild roadside areas leading to other parts of the district, used by residents of the estate eagerly (fig. 1–3).

The existing tree stand is primarily self-seeding, which gradually took over the area. The species composition is dominated by white willow (*Salix alba* – 32%) and aspen poplar (*Populus tremula* – 16%) (Fig. 3). There is also gray alder (*Alnus incana* – 11%), red oak (*Quercus rubra* – 10%) and ash-leaved maple (*Acer negundo* – 7%). Other trees complete the species composition, and their percentage ranges from 1–3% depending on the species. There are fruit trees individually.



**Fig. 1.** View of the valley of the Maleczewski stream, 2019 [by S. Kaczmariski]



**Fig. 2.** View of the valley of the Maleczewski stream, 2019 [by S. Kaczmariski]



**Fig. 3.** View of the valley of the Maleczewski stream, 2019 [by S. Kaczmarek]

Analyzing the percentage of crown coverage of the soil surface based on the diameter of the crowns of individual trees shows that the most, i.e. 48% of the area covered with trees, is covered by white willow. This is also due to the fact that it is the most numerous species. Gray alder and red oak are followed by 18%. The situation is interesting in the case of aspen poplars, which in terms of quantity, took second place, and taking into account the percentage of crown coverage of the soil surface, is only 4%. On the contrary, ash-maple, the crowns of which cover 12% of the area occupied by trees. Its number is more than half smaller than that of aspen poplars. This comparison shows how different crown sizes are formed by trees in the analyzed area, depending on the species, under similar growth conditions.

When analyzing the surface share of individual herbaceous plants in the area of the study, it was noticed that the largest area, as much as 33%, is covered by dandelion and canine grass (*Taraxacum officinale* and *Elymus caninus*). On the other hand, nettle (*Urtica dioica*) covers 19% of the area. Plants such as cuddly crab (*Galium aparine*) and plantain (*Plantago major*) occupy 3% of the area. Compact fields of Jerusalem artichoke (*Helianthus tuberosus*), greater burdock (*Arctium lappa*), lanceolate (*Calamagrostis canescens*) and caution lanceolate (*Cirsium vulgare*) cover only 2% of the area. Other species listed in the area share of herbaceous plants occupy 1% each. The rest of the developed area, i.e. 29%, is occupied by plants in individual and fine-clump mixing of a few individuals. Analyzing the species composition of herbaceous plants and their distribution in the area of the study, taking into account soil preferences, it can be assumed that the entire southern part of the study is artificially covered with soil brought there. It probably came from excavations during the construction of the surrounding housing estate. Only the central and northern part of the object is the natural fertile soil of the stream valley.

The estates surrounding the development, both from the north and from the south, are compact blocks of flats built in the technology of large slab. The main disadvantage of this type of blocks of flats is very limited space between individual multi-family buildings. Housing estate greenery is often limited to a few trees surrounded by tight concrete or asphalt surfaces. Constantly increasing number of cars parked under the blocks forces the construction of an increasing number of parking lots, which are created at the expense of housing estate greenery. This problem was noticed at the end of the 19<sup>th</sup> century in European cities, where the increase in population caused shrinking of green spaces. They were replaced by dense residential and industrial buildings. Therefore, both in the past and nowadays, the basic need of local residents is to create as many new green areas as possible. Utilizing the wasteland located in the center of the housing estate will satisfy the basic need of residents, i.e. communing with nature.

As results of the interviews show, the residents of the estate as future park users would like to see, among others, the planned park places to spend time outdoors, divided and adapted to specific age groups. The



interlocutors mentioned here, among others, separate playgrounds for young and old children, as well as recently popular outdoor gyms. Another interesting suggestion is to create intimate, secluded places to spend time in nature with the whole family or friends. In addition, local residents would like the park to create a kind of communication link between the two housing estates, and also be a place encouraging meetings in the open air. Among many postulates, one seems to be very apt, namely one of the inhabitants mentioned the close-to-natural shape of the development area, which should remain as little changed as possible. The naturalistic shape of the slopes and very diverse surface of the terrain introduce the impression of an enclave intact by human hands. Encounters of quadrupeds postulated in their statements that the emerging land development project should also include the latest solutions for dog owners who are *de facto* regular visitors to the city parks.

## Design

Referring to the name of the surrounding housing estate – Południe (South) and associations with the sun, it was proposed that the place should be called Sunny Square. In the designed arrangement of alleys, the journey of the sun across the sky was mapped, e.g. a square with a fountain with alleys radiating in a bright tone symbolizes the full southern sun (fig. 4).



**Fig. 4.** Conceptual design of the Sunny Square in Radom (developed by S. Kaczmarek)

A fragment of the housing estate where a new park is planned to be established will fulfill several new functions. After the investment is completed, it will be possible to separate, among others, a main square with a representative function. It will be a paved courtyard with a fountain. Within the area of the study, areas fulfilling the sport and recreation functions were distinguished, among others, a gym under the cloud and a skate park. Children will have fun on two playgrounds. Each of them will be fenced and adapted to a specific age group. The area marked in green will act as a park for dogs. The roofed gazebo, allowing meetings of larger groups, serves the recreation and leisure function for entire families. It is equipped with a large table surrounded by benches, which will allow to organize various types of meetings. Other equipment in this space will be three paved squares with solid brick grills.

The main park alleys will be made in hot MMA technology (mineral-asphalt mass). Alleys with less pedestrian traffic will be made using the innovative ELASTOPAVE technology (water and air permeable surface). The fountain will be equipped with pump aggregates creating spatial water images illuminated by colored LED

light, and an automatic water treatment and disinfection system in a closed circuit. The area will be illuminated by lanterns with a metal halogen head of varying light intensity, depending on the location and lighting needs from 35 to 150 W. Slopes will be protected by gabion baskets, which act as a "filter", letting excessive amounts of water hold the soil in place. To further minimize the risk of landslides, three retaining walls with a smaller height, so-called multiple walls instead of one high, will be built.

Species of deciduous trees used in new plantings are: silver birch (*Betula pendula*) 'Crispa' and 'Youngii', common beech (*Fagus sylvatica*) 'Pendula', red oak (*Qercus rubra*) 'Aurea', Japanese creeper (*Cercidiphyllum japonicum*), mealworm (*Sorbus aria* 'Magnifica'), Pennsylvanian ash (*Fraxinus pennsylvanica*) 'Aucubifolia', maple (*Acer pseudoplatanus*) 'Brillantissimum' and 'Printz Handjery', Amur cork (*Phellodendron amurense*), silver lime (*Tilia tomentosa*) 'Brabant'. Coniferous trees used in the project are: Douglas fir (*Pseudotsuga menziesii* var. *glauca*), California fir (*Abies concolor*) 'Glauc', Ginkgo biloba (*Ginkgo biloba*) 'Seratoga', Brewer's spruce (*Picea breweriana*), Engelmann's spruce (*Picea engelmannii*) and Caucasian spruce (*Picea orientalis*) 'Aureospicata'. Shrub plants include: Thunberg barberry (*Berberis thunbergii*) 'Bonanza Gold', 'Erecta' and 'Kelleriis' varieties, white dogwood (*Cornus alba* 'Elegantissima' and 'Spaethii'), Japanese viburnum (*Viburnum japonica*) 'Grandiflora', carrageenan Siberian (*Caragana arborescens*) 'Lorbergii' and 'Walker', shrub (*Weigela*) 'Candida', common lilac – *Syringa vulgaris* 'Mme Florent Stephan', Podolian wig (*Cotinus coggygia*) 'Ancot', Lawson cypress (*Chamaecypod laweniana*) 'Golden King', Pfitzer juniper (*Juniperus × pfitzeriana*) 'Blue and Gold', creeping junipers (*Juniperus horizontalis*) 'Glacier' and 'Glauc Group'. Perennials: periwinkle (*Vinca minor*), funkier (*Hosta*) 'Patriot' and 'Wide Brim', Siberian iris (*Iris sibirica*), ostrich plume (*Matteuccia struthiopteris*), and spirea (*Astilbe*) 'Fanal' and 'Irrlicht' will be planted in large single-species groups.

## Summary

Inhouse works and field studies confirmed the need for revitalization measures in the urban valley of the Malczewski Stream. The necessity of arranging the park areas was noticed. It will be important to strengthen public safety by lighting embankment areas, as well as shaping recreational offer for various age and social groups. More and more city dwellers practice many spot disciplines in the surroundings of urban greenery. It is also important to connect the valley with the estate through communication routes. The use of natural materials – wood, stone, ceramics – is envisaged for the installation of Sunny Square. The interiors of the area will be filled with decorative greenery, the "skeleton" of which will be plants characteristic of alluvial communities. As part of social activities, it will be desirable to enrich the waterfront landscape with art objects thematically related to the square.

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