

## Greening and 'De-concreting' of Polish Cities – Directions, Best Practice and Recommendations

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**Abstract:** The purpose of the paper was to identify and assess the directions of changes in the development of urban space in Poland in terms of greening and 'de-concreting' ('decementification'), as well as to formulate preliminary recommendations in this regard. The research selected the following Polish cities: Warsaw, Kraków, Wrocław, Gdańsk, Katowice, and Lublin. The primary methods used in the study were literature and source materials analysis, comparative analysis, and case study. As a result, three different groups of actions taken in Polish cities to fight 'concretosis' (cementification) were identified. It was also found that there is still a lot of scope for expanding these actions, both in terms of tools and areas of urban space affected by changes. Finally, the authors proposed recommendations that may facilitate Polish city planning, 'de-concreting', and greening.

**Keywords:** urban space, 'concretosis' (cementification), quality of life, climate change, municipal greenery

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## 1. Introduction

Urban greenery is an essential factor influencing the quality of life, both directly and indirectly, e.g. through its positive impact on air quality. This problem is becoming particularly important nowadays, especially in large cities that struggle with several challenges regarding the quality of life, including those related to climate change. The research subject presented in this article was the direction of actions taken and good practices related to the greening and 'de-concreting' ('decementification') of Polish cities. The study aimed to identify and assess the direction of changes in the development of urban space in Poland in terms of its greening and 'de-concreting' and formulate preliminary recommendations in this regard. The primary methods used in the study were literature and source materials analysis, comparative analysis, and case study. Much of the focus centred on selected case studies of activities undertaken in large Polish cities (Warsaw, Kraków, Wrocław, Gdańsk, Katowice, and Lublin).

## 2. Spatial Development and Quality of Life. A Literature Review

The quality of life and the prospect of its change (especially improvement) are essential factors influencing a city's attractiveness and that of specific areas in the city (Morris, 2019). This applies to both residential and investment attractiveness (for more detail, see e.g. Schlesinger et al., 2016; Wong, 2001) and translates directly into interest in a given location. It is worth noting that the role of the quality of life as a location factor increases with socio-economic development and the increase in social well-being.

The quality of human life depends on psychological and moral values (innate and acquired features, views on life, hierarchy of values, psycho-physical fitness, random events, etc.), socio-cultural values (origin, education, skills, abilities, place of residence, social environment, interpersonal relations, etc.) and technical and economic values (level of wealth, availability of goods and services, quality of available goods and services, tax burden, availability of innovative solutions, etc.) (Błaszczyk et al., 2006, p. 20; Borys & Rogala, 2008; Kolman, 2000, pp. 7-8). This article focused primarily on selected technical and economic values and some socio-cultural values.

The deepening environmental problems of Polish cities, resulting from their spatial policy which is not adapted to be used as a tool for adopting a strategy of urban centers towards climate change, have resulted in reduced climate resistance of urban areas. Additionally, there are issues such as:

- lack of monitoring regarding the sealing of city surfaces,
- entities shaping urban spatial policy ignoring issues related to building the resilience of urban centres (e.g. through construction decisions),
- various entities downplaying the threats resulting from climate change due to growing investment pressure,
- lack of inclusion of adaptation to climate change in the spatial policy model of Polish cities (Sobol, 2021).

In the case of adaptation to climate change, the concept of a sponge city becomes important. All types of ponds, basins, and infiltration ditches can play an essential role in the stormwater management process (Naumann et al., 2020). Stopping water from flowing freely is only possible if the city has unconcreted or water-permeable surfaces. Urban greenery, such as squares, parks, and gardens (including allotment gardens), can help accumulate water (Marzuchowska & Żebrowski, 2020). Thanks to this, heat islands are not formed, which is vital during periods of drought. This also enables the cleaning of dust from surfaces and the air. Importantly, green and blue solutions can perform several functions simultaneously. This is crucial in cities working to mitigate and adapt to climate change. In this context, the more non-concrete and bioactive surfaces a city has, the better (Brodowicz, 2020).

A holistic view of the issues mentioned above allows to conclude that, from a planning and environmental point of view, there is a notable insufficient coupling of the use of ecosystem services with engineering solutions. The so-called 'concretosis' directly results from the latter's domination (Sobol, 2021). In times of

climate catastrophe, it is a phenomenon harmful to the life of the city and its users. Despite this and due to the constantly growing ecological awareness of the users and entities administering the city, some initiatives continue moving away from greenery and 'concreted' (cemented-over) areas. However, the authors would like to focus on positive examples in the rest of the article.

### 3. Greening and 'De-concreting' – Case Studies of Polish Cities

An example of good practice is the activity undertaken by Warsaw City Hall, in which the flagship project is the creation of the Central Square. This is an activity that is part of the New Centre of Warsaw, where as part of this activity, it is planned to rebuild part of the Parade Square so that it serves the city's residents as a green, orderly, and friendly space while respecting the local history. The new development concept assumes that the currently almost entirely concreted area (there are parking lots for buses and cars) will be transformed into a place for everyday meetings and cultural events. A smaller area will be separated from the main square, with lawns of several thousand square metres. Over a hundred trees, forty species of bulbs and perennials, as well as eleven species of shrubs, will be planted. A shallow pond will be built next to the Museum of Modern Art and the Theatre Rozmaitości. Additionally, the irregular arrangement of walkways and greenery will follow the network of old streets and the outline of the previous buildings. At the same time, the lawns will also mark the places of tenement houses that were demolished to construct the Palace of Culture and Science. The reconstruction is scheduled to be completed in July 2024. and cost 61.2 million zloty (Wojajczyk, n.d.). The Dmowski roundabout is also being rebuilt as part of the New Centre of Warsaw. A biologically active surface has replaced two-thirds of a hectare of concrete and asphalt. Several species of shrubs, perennials, and other plants have been planted on and around the roundabout (Stuch, n.d.). The courtyard greening program is also thriving. In 2022, the city managed to 'go green' (i.e. remove the concrete surface and install forms of the so-called small architecture such as flower beds, and plant bushes and trees) in seven courtyards in Wola and several in Śródmieście; by the end of 2023, a total of 37 courtyards in Śródmieście were planned to be de-concreted (Stuch, n.d.).

Actions taken to go green, increase water retention, and 'de-concrete' city surfaces can take many forms. The simplest way is to plant flowers, shrubs, and trees. This is how the Kraków authorities proceeded – this process covered, among others, Aleja Róż, whose historic character was restored by re-planting the roses that grew there in the period 1956-1972 (from which the street took its name), as well as by restoring the forms of small architecture existing at that time. Another excellent investment was creating the park named after Wisława Szymborska, located on the site of a 'wild' parking lot. It is filled with 125 trees, 1,500 shrubs, 18,000 perennials, over 70 thousand bulb plants, and approximately a thousand aquatic plants. Both projects are implemented under the Kraków civic budget (Stuch, n.d.; *City Residents...*, n.d.). In terms of parks, the most important Kraków investment in recent years was Zakrzówek, currently the largest park in the city. This is the area of a former quarry transformed into a 60-hectare park and recreation complex with bicycle paths, climbing areas, running routes, and picnic areas. Additionally, Bednarski Park was also revitalised, and investments in the parks around Dworek Matejki and Fort Borek were completed, whereas in Płaszów Gardens and Tetmajer Park work is still in progress. In the first case, this involves separating the system of pedestrian communication routes, building a basketball court, educational path, and external lighting, designing an orchard, and placing small architectural elements such as benches, hammocks, and garbage bins (*Płaszów Garden...*, n.d.); in the latter, nearly 5.5 thousand plants are planned to be planted (*Tetmajer River Park...*, n.d.). Another project is the construction of a park at Radzikowski Street and the Kraków Chess Garden (*City Residents...*, n.d.).

A holistic approach to city management involves acting on many levels simultaneously, making it possible to achieve more positive effects at a lower cost. Therefore, the greening, as mentioned above, is often combined with the reconstruction of communication routes to give most of the city back to people (in this case, pedestrians). In order to 'calm' car traffic, the roads are narrowed, and the quality

of public transport in the city is improved while the pavements are widened and new green elements are planted. A very common inspiration is the old appearance of the city. Activities in this direction also include, Katowice and Lublin, where based on historical solutions, plantings and paving are being carried out (removing paving stones and pavement slabs to create larger spaces around tree elements while maintaining the existing accessibility of pavements) and turning the roads into pedestrian routes. In the case of Katowice, Korfantego Avenue was narrowed and 46 trees were planted; Warszawska Street was transformed into a boulevard, along which it is planned to plant 33 tall trees, 37 columnar trees, 2.5 thousand shrubs, 2.7 thousand perennials and plants, and nearly 200 vines. The historical layout was recreated from the turn of the 19th and 20th centuries.

In Lublin, the former avenues of trees are being restored, while the streets and walkways are being paved. An example is revitalizing the city’s famous streets – Krakowskie Przedmieście, Chopina Street and Lubartowska Street (Stuch, n.d.), whilst 70 million zloty was spent on revitalising Saski Garden and People’s Park, and constructing Zawilcowa Park and John Paul II Park. In consultation with the residents and district councils, undeveloped sites and places requiring aesthetic improvement are redesigned yearly. These are both larger areas, such as Skwer Pokoleń at Biedronki Street, a gorge in Czechów, and the square in Wspólna Street and Plac Seniora in Motorowa Street, as well as smaller ‘mini squares’, called “places for you” (*Tetmajer River Park...*, n.d.).

Paving is also being carried out in Gdańsk; over a hundred pavements have already been laid, combining them with replacing the soil with more fertile earth to plant trees and other plants. Maples, lindens, and ginkgo trees were planted along Grunwaldzka Street, and at the intersection of Partyzantów Street and de Gaulle’a Street, where hosta, sage, and ornamental grasses were also planted (Stuch, n.d.).

Another vital project is the reconstruction of Nowy Targ (Square) in Wrocław. The square, previously an example of a ‘concrete frying pan’, will become green – over 63,000 plants will be planted there, including 172 trees (currently there are 35 trees, including 8 growing in pots), various species of grass, including ornamental ones, bulb plants and vines. A construction of a fountain was also planned in accordance with the historical layout as it was once located there (Pasiewicz, n.d.).

The surveyed activities carried out in the six analysed cities are presented in Table 1.

Table 1. The examined pro-environmental activities undertaken to combat the ‘concrete disease’ (concretosis) in the analysed cities

City	Plantings	Paving	Forms of small architecture	Building modernization	Restoring historic character
Warsaw	X	X	X	X	
Kraków	X	X	X	X	X
Katowice	X	X			X
Lublin	X	X	X		X
Gdańsk	X	X			
Wrocław	X	X	X		X

Source: own study based on (Stuch, n.d.; *City Residents...*, n.d.; *Płaszów Garden...*, n.d.; *Tetmajer River Park...*, n.d.; Pasiewicz, n.d.).

Activities related to greening and decementification are not only about returning a city to its former look as new and innovative solutions are being created, e.g. green path where grass is planted instead of gravel. These can be found in Kraków, Wrocław and Poznań, and there are over 30 kilometers of them in Warsaw. They increase the level of greenery and reduce noise. Green stops are also being built (bus stops/shelters with a large presence of greenery), for example in Kraków. Łódź is planning to build green overpasses for public transport. In Warsaw, in addition to plans to green the viaduct between

Wałowa and Rokicińska Streets, the Annapol tram depot is being built, which will be the most modern and greenest facility of this type in Poland; the area occupied by plants will amount to approximately 20% of the total. The plants will be grown on buildings and acoustic screens, and all paths within the area will be green. The investment is scheduled for 2024 (Stuch, n.d.). The so-called 'pocket parks' were created in Warsaw in 2022, among others, in Praga-Południe (at the intersection of Gen. Fieldorf "Nil" Street and Gen. Bora-Komorowskiego Street), Praga-Północ (near the Prague port), Mokotów (at the intersection of Balonowa and Raławicka Streets and in Ursynów (at KEN Avenue); the construction of further ones is being planned (*City Residents...*, n.d.). In Wrocław, the WROśnij in WROclaw campaign was initiated, which involves planting trees for newborn children – the City Greenery Board designates the area and organizes the plants, and those interested plant trees dedicated to specific children. About 3,000 trees have been planted so far (*City Residents...*, n.d.).

'Concretosis' is one of the greatest threats to Polish cities, however many of them have taken steps to counteract it. Thanks to this, the percentage of greenery in the largest Polish centers is constantly increasing, improving their environmental situation and providing their inhabitants with new opportunities for recreation and spending free time.

#### **4. Identification of Directions of Changes in Urban Space and Recommendations for Polish Cities**

In contemporary conditions, urban centres in Poland face many challenges. They result from numerous factors, including differences in the level of development, attractiveness for residents (and people who migrate to particular locations), internal polarisation of development, demographic and climatic changes, air pollution, diversified needs of residents, attention to maintaining or improving the level of quality of life, as well as new opportunities for activities and challenges in the field of intelligent solutions. Currently, the issues of building up cities' resilience to climate change and pollution are becoming particularly important. The earlier trend in urban space development focused on creating spaces that would be easy to maintain, clean, cheap, quick to build, and at the same time imposing. As a result of these aspirations, large concrete areas were created in many places, with massive buildings intended to drain rainwater from the city as quickly as possible, with a low percentage of greenery (especially high-growing greenery) and relatively cheap to maintain. Spaces developed in this way have become 'heat islands' in changing climatic conditions. Concrete spaces do not 'breathe'. Cities are often badly designed, which disrupts wind circulation. Moreover, the air quality deteriorates in spaces with too few green areas and their intensive development (industry, cars, home heating). Residents do not feel well in a concreted space, which is unfriendly, overwhelming, and not conducive to relaxation.

Actions are increasingly being taken in cities to reduce concrete build-up. In Poland, these activities focus on several groups of actions. The first involves introducing radical changes, which means a complete transformation of the space, both visually and often functionally. This is associated with long-term, high financial and social costs, but it is assumed that maximum effects will be achieved and the applied solutions will last for many years. This concerns a complete change of space, its de-concreting, and instead, the creation of urban green spaces conducive to rest, relaxation, meetings, and social integration. The resulting space is multifunctional. This is possible when redeveloping a larger space, e.g. post-industrial, post-military areas, old districts in ruins, to create a new sustainable territory. This also includes activities focused on rivers running in urban space, as well as the restoration and recovery of buried and cemented-over rivers.

The second group of activities is introducing greenery into the city, namely greening the city, leaving concrete spaces, or only partially removing them. This means revitalisation of urban spaces, assuming less restrictive changes. There is a focus on searching for undeveloped spaces or those whose current functional layout requires repair, and these areas are developed as much as possible, transforming them into green areas, woonerfs, pocket parks, and green infrastructure (e.g. green tracks); at the

same time, bicycle and pedestrian paths are separated. From the perspective of a functioning urban organism, the possibilities of its improvement are assessed to increase the quality of life and implement the idea of sustainable development, assuming relatively large effects at limited costs. These activities are undertaken in areas where significant interference cannot be allowed, e.g. historic city centres and densely built-up housing estates.

The third group of actions assumes minor interference in the city's structure and the construction of green spaces. In this case, previously 'concreted' spaces remain intact, and even further concrete space elements are introduced (although they are smaller and connected to green areas). Such limited activities result from various reasons, e.g. lack of public support for changes, lack of financial resources, lack of technical and organizational support, and weakness of the legal and ownership systems. As part of the undertaken activities, flower pots with low plantings or dwarf tree varieties are introduced, green walls and flower beds are created, etc. These are low-budget activities that are quick to implement, but unfortunately, they require constant maintenance, and their effects are often short-lived.

Against the background of the indicated groups of activities carried out in Poland in the field of urban space development, aimed at decementification and creating green areas, the following recommendations can be formulated:

1. Prepare a strategy for de-concreting a city and its green revolution, including a comprehensive (non-fragmentary) approach to this problem. Use good practices for this purpose.
2. Plan the development of space so that residents near their homes can satisfy their needs in a relatively wide range, e.g. shopping, learning, entertainment, recreation, sport, and culture.
3. Plan investment financing by creating a range of financing sources.
4. Create resident-friendly, multifunctional, and integrating spaces.
5. Formulate landscape resolutions that will improve the qualitative image of the city.
6. Involve residents in decementification and creating green spaces (both creatively – by submitting ideas and needs, and physically – by participating in the work).

Currently, sustainable development is being implemented in many urban centres, strengthening the effects of the implemented activities.

## 5. Conclusions

The urban space of cities in Poland is being developed in a diverse way. Many areas were concreted-over, and greenery was pushed out of cities for a long time, but nowadays, this trend is changing. Cities are trying to 'de-concrete' the space. Greenery, relaxation, and integration zones for residents are being introduced, and the urban space is becoming multifunctional. The scope of these changes and their pace are not the same. The article shows that activities can be carried out in many different ways. Three primary groups of such activities were identified, differing, among others, in the durability and effectiveness of solutions but also their cost. The first group comprises activities involving the complete transformation of a space (changing its image and often also its function). The second group includes limited greening, leaving the concreted spaces (or only partially removing them), and often involves the revitalisation of a certain space. Finally, the third group of activities is the minor (sometimes temporary) interference with the structure of the city and the construction of green spaces. Spaces previously cemented-over remain intact; furthermore, even more concrete elements of space are introduced (although they are smaller and combined with green areas).

The type of action taken depends, among other things, on the financial resources available, but also on the attitude of the authorities and other users of the city. The authors show that awareness among the authorities, residents and users of the city (including investors) is essential for present and future development, raising the level of quality of life and the attractiveness of the location, through activities aimed at de-concreting and expanding urban green areas.

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## Zazielenianie i „odbetonowanie” polskich miast – kierunki, dobre praktyki, rekomendacje

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**Streszczenie:** Celem artykułu jest identyfikacja i ocena kierunków zmian w zagospodarowaniu przestrzeni miejskiej w Polsce pod kątem jej zazieleniania i „odbetonowania”, jak również sformułowanie wstępnych rekomendacji w tym zakresie. Obiektem badań są wybrane polskie miasta: Warszawa, Kraków, Wrocław, Gdańsk, Katowice i Lublin. Podstawowe metody wykorzystane w badaniu to analiza literatury i materiałów źródłowych, analiza porównawcza oraz studium przypadku. W wyniku przeprowadzonego badania wyodrębniono trzy odmienne grupy działań podejmowanych w polskich miastach w celu walki z „betonozą”. Stwierdzono także, że pozostaje jeszcze duże pole do poszerzenia tych działań, zarówno w zakresie narzędzi, jak i obszarów przestrzeni miejskiej objętych zmianami. Na koniec zaproponowano rekomendacje, które mogą ułatwić zaplanowanie i przeprowadzenie procesu „odbetonowania” i zazieleniania polskich miast.

**Słowa kluczowe:** przestrzeń miejska, „betonoza”, jakość życia, zmiany klimatyczne, zieleń miejska

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