

Useful wasteland – the potential of undeveloped land in modification of urban green infrastructure based on the city of Poznań

Abstract

Numerous barren land areas are found within administrative boundaries of cities. They include both former farmland located at the outskirts of cities, as well as vacant plots, postindustrial plots or former railway infrastructure plots. Barren plots are integral elements of the urban landscape and contemporary scientific concepts indicate their important role in the functioning of urban ecosystems. Abandoned land provides a potential for the development of green infrastructure and further development of recreation areas. At the same time some abandoned plots are informally adapted by local residents to suit their needs, transforming them into community gardens and recreation areas. This paper presents results of studies conducted by the authors in selected derelict areas in the city of Poznań. Analyses were conducted on their type, origin, size and location within the city. Observations were also recorded on the methods to adapt abandoned land by local communities.

Keywords

Urban barren land • community gardens • open space • system of green areas • Poznan green spaces

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Introduction

Urban spatial structures are being transformed under the influence of the continuous economic, social and political changes. The emergence of new manufacturing technologies and means of transport, new lifestyles and paradigms of development result in changes in needs connected with land use – both the acquisition of new land and the abandonment of other areas. With time, such abandoned land undergoes natural succession processes, frequently transforming into informal recreation areas and offering relief from intensive building development (Kremer et al. 2013). Abandoning the original intended use of land modifies the functional and spatial structure of the city in a multifaceted manner, while at the same time bringing about various ecological effects. Positive effects include the improvement of small retention, soil regeneration and erosion control, as well as an enhanced carbon dioxide absorption capacity, while negative aspects are connected with an increased fire hazard, loss of biodiversity and the expansion of invasive species (Rey Benayas et al. 2007; Navarro & Pereira 2012; Majchrowska 2014).

Due to the progress of succession processes and the diverse vegetation cover of derelict areas, the character of the landscape also changes. These are often perceived by urban residents as natural areas, while also being seen as attractive in contrast to developed land (Thompson 2002; Höchtel et al. 2005; Ruskule et al. 2013; Bonthoux et al. 2014). This is determined by the potential contact with both nature and open space. According to the prospect–refuge theory, based on the analysis of human biological and aesthetic needs, areas where viewers, while being partially hidden, may observe expansive spaces are considered to be the most attractive (Appleton 1995). Other values offered by

such areas, constituting the so-called preference matrix, include the cohesion, clarity and diversity of the composition, as well as mysteriousness (Kaplan & Kaplan 1989).

One aspect that is increasingly being stressed in relation to former farmland, post-industrial and former transport infrastructure areas within city limits, as well as urban abandoned plots, is the fact that they provide an opportunity to strengthen the urban natural system – for example, thanks to the presence of tall vegetation as a result of secondary succession (Kim et al. 2015). On this basis, the concept of ‘green infrastructure’ is being developed, which is compatible with the trend to create compact, sustainable cities ensuring quality living space for their residents. The term green infrastructure refers to the entire complex of open areas where vegetation predominates. In addition to the traditional elements of urban green spaces which require continuous maintenance (such as parks, squares and avenues), new forms are being proposed (green roofs, vertical gardens, pocket parks), which suit compact urban structures; this concept also includes post-industrial areas, abandoned plots and urban barren land (Sanches et al. 2016). The primary principle for the modification of such a system is provided by continuity, durability and balanced distribution across urban development areas, which are easily accessible to the residents. The continuity of green infrastructure is essential due to ecological concerns, and for recreation and the order of the urban spatial structure (Wang & Merrick 2013; Jim & Chan 2016).

Big cities offer limited potential for the development of green spatial systems. On the one hand, city centres are densely built-up and on the other hand, agricultural land is located at the

outskirts of developed land, which are attractive investment sites. There are many examples in the literature where abandoned plots, post-industrial zones or former transport facilities are treated as locations serving as sources of ecosystem services, including urban agriculture and elements of green infrastructure (Nassauer & Raskin 2014; Kim 2016). In American disappearing cities, abandoned areas affected by succession are becoming a kind of experimental laboratory for sustainable urban planning (Burkholder 2012; Németh & Langhorst 2014). The phenomenon of abandoned agricultural land within the zone of immediate impact of a big city may be considered typical for Central and Eastern Europe (Pointereau et al. 2008; Bell et al. 2009; Hartvigsen 2014).

Community gardens established on vacant plots constitute a specific type of barren land being assigned new functions. The importance of these gardens results not only from their utility value (growing fruits and vegetables), but also social functions, such as the activation and integration of local communities, the taming of space, promoting a sense of belonging and settling conflicts and disputes (Łatkowska 2012). Community gardens are typically established in problematic, abandoned areas located in the vicinity of dense urban built-up areas, frequently in districts undergoing gentrification processes. Such initiatives are often informal grassroot efforts and the management of these gardens is frequently only temporary (Drake & Lawson 2014).

The aim of this study was to analyse the potential of urban barren land in the city of Poznań in terms of elements of the urban green infrastructure system and to confirm that it is the location and size of the barren land that determine the chance for the supplementation of the existing urban green system with new elements and enhancing the pool of open spaces. It was also shown how and for what purposes such areas are adapted by local communities as informal urban recreation areas.

Study Area And Methods

The first stage of the study, based on the analysis of urban land cover and use, identified the size and spatial distribution of urban barren land and former farmland within the administrative city limits of Poznań. Analyses were conducted based on field studies, as well as current and archive orthophotomaps available on the city web portal (System Informacji Przestrzennej Poznań 2017). The data was collected in the GIS environment. In order to indicate a further direction for development, it was stated which of the abandoned areas have some potential for supplementation of the urban green system and should thus be excluded from building development and preserved as public areas, with the existing succession vegetation left intact. Important areas to be incorporated into the planned network of green infrastructure were considered to be the barren areas adjacent to urban green spaces, or areas of the urban natural system which connect at least two such areas.

In the next stage, detailed studies were conducted on three selected abandoned areas, which at present are already used as informal green spaces and recreation areas. The examples were areas with different locations, spatial scales, geneses and land use. The first comprised former farmland with a large area, situated on the city outskirts; the second example includes two community gardens with a small area, arranged in vacant plots among dense building development structures (Fig. 1). The selected examples illustrating the situation commonly observed in big cities present various functional and spatial relationships with the city, while also serving different roles in the modification of the green infrastructure. The paper indicates the types of activities undertaken in these areas and the scale of intervention by users in the adaptation of the described sites to their needs.

The analysed post-agricultural land is located in the northern part of the city in the former village of Morasko, incorporated

into the city of Poznań in 1986, in the immediate vicinity of the forest complex with the Meteoryt Morasko reserve. This area has preserved the rural, agricultural character of its landscape, although it incorporates an intensive development of family housing infrastructure. The analysed area is approx. 80 ha and at present it is fallow land. Its northern part reaches the building infrastructure of the former village of Morasko, while the southern part is located in the vicinity of the Piątkowo housing district with prefabricated blocks of flats. This area is characterised by a moraine landscape, a varied relief and numerous in-field tree plantings as well as an expansive vista to the blocks of flats in the northern housing districts of Poznań. This area is used primarily by the residents of the Piątkowo district.

The two investigated community gardens, selected from those currently operating in Poznań, were established on urban barren land. The Wilda garden was established in 2013 as part of the Generator Malta urban project in a plot formally occupied by a demolished tenement house. The other, the Kolektyw Kapielisko garden, is connected with the social protest against the closure of a summer swimming pool in the Kasprowicz park. Urban activists initially planned their protest to involve filling the empty pool with soil and creating an area for the cultivation of useful plants. However, as a result of high local interest in the facility, the city restored its recreation function and the residents were leased another abandoned plot adjacent to the swimming pool to establish a community garden.

Results

The analysis of the spatial structure of Poznań conducted in the GIS environment showed that the urban investment areas cover approx. 11,985 ha, which accounts for 45.5% of the city's area, while urban barren land covers 1,523 ha, which is almost 6% of the area of Poznań (Fig. 2). The natural system areas (including urban green spaces) together with agricultural land occupy a total of approx. 12,922 ha (49% of the city's area). In the spatial management plans, barren former farmland, at present left fallow and located in the outer zone of the city, is most frequently allocated for building development (Fig. 1). Post-industrial and former railway infrastructure derelict areas are located in urbanised zones, although outside the city centre. In the city centre there are vacant plots, situated within dense built-up areas, where buildings have been demolished. The location of most barren land in Poznań indicates the considerable potential of these areas in the development of the green infrastructure system of the city. As much as 68% of such land is found in the direct vicinity of urban green spaces, municipal forests or other areas of natural value, linking at least two separate areas in the urban natural system.

Since the cultivated areas are allocated in the Study of the Conditions and Directions of the Spatial Management of a Commune (Studium 2014) for future building development, many of them are currently left fallow. As a result, the beginning of secondary succession processes can be observed in these areas. This 'new wildlife' character within the city is gaining in public support, as many people are willing to use these areas for recreation, which can be seen in the case study for Morasko. That area ceased to be used agriculturally before 2006, which is evident in archive orthophotomaps (System Informacji Przestrzennej Poznań 2017), in which succession vegetation is already recorded. At present, on the fallow land there are over 3 km of informal roads and paths, as well as several spontaneously arranged recreation areas. One of them has been named 'Darmowy Punkt Widokowy Morenowa' [Free Viewing Point Morenowa] by users (Fig. 3). This viewing point offers a panorama of both Piątkowo district and the skyline of the former village of Morasko with the church dominant. This point is a frequent destination for both walking and cycling

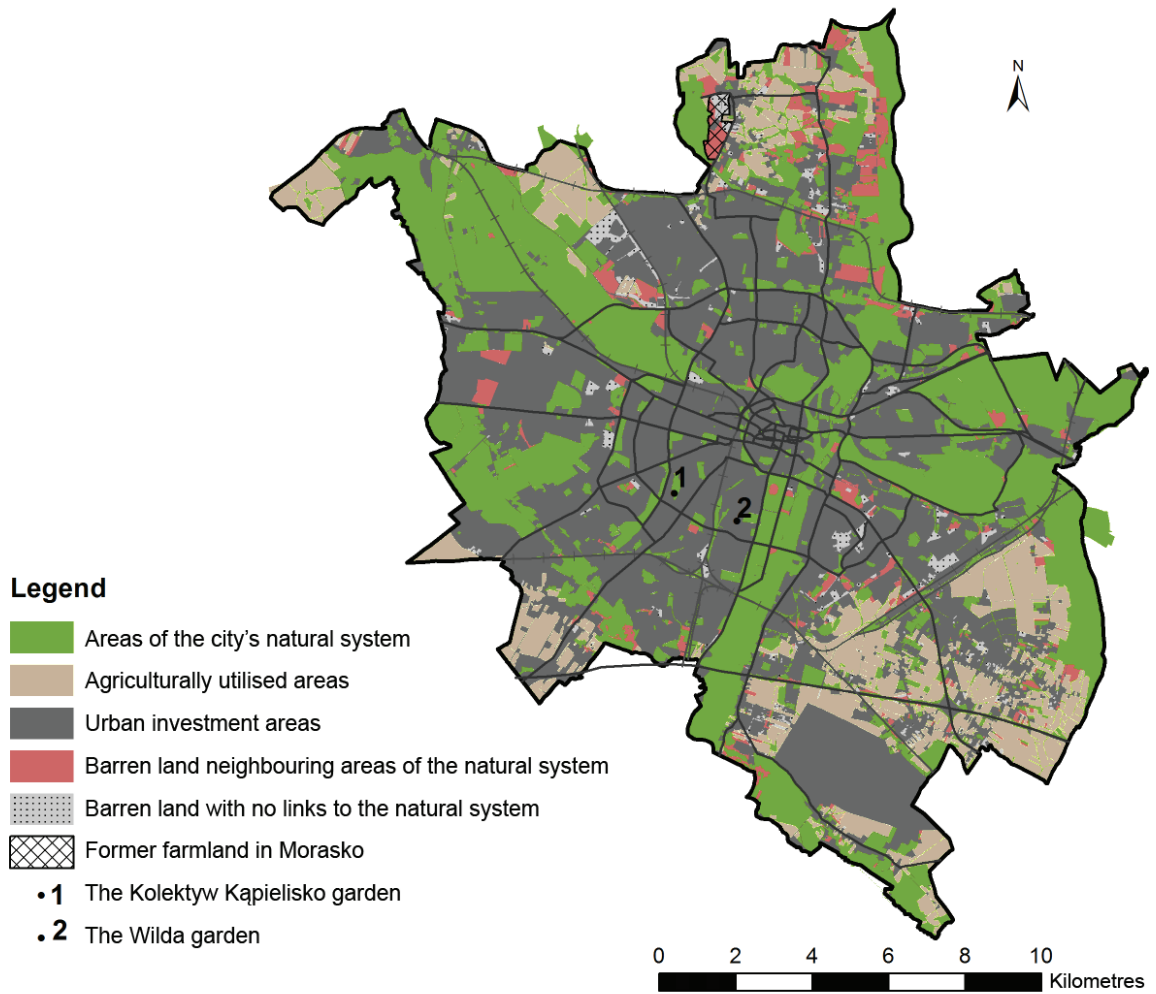


Figure 1. Abandoned areas in the spatial structure of Poznań, their spatial relationships and the location of the analysed barren land (study area) in the city of Poznań. Source: authors' own elaboration

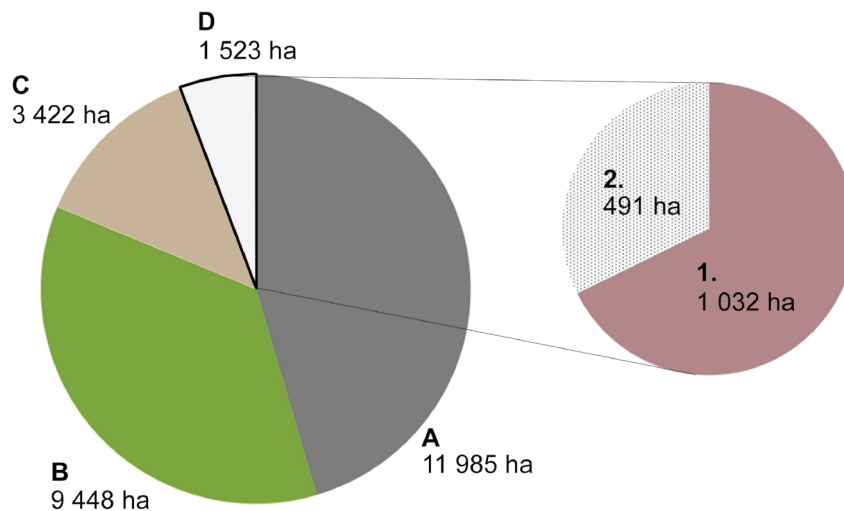


Figure 2. The share of the barren land area within the spatial structure of Poznań: A – urban investment areas, B – areas of the city's natural system, C – agriculturally utilised areas, D – barren land, 1 – neighbouring areas of the natural system, 2 – no links to the natural system. Source: authors' own elaboration



Figure 3. Former agricultural areas in Morasko: 1 – the in-field green cover system, 2 – the building infrastructure of the former village of Morasko, 3 – the housing infrastructure of blocks of flats in Piątkowo, 4 – 'Darmowy punkt widokowy Morenowa', 5 – walking paths. Source: authors' own elaboration

tours. The observed forms of recreation activity in the analysed area include strolling, particularly dog walking, jogging, Nordic walking and cycling, including mountain biking. The considerable interest in this area among informal users results from several factors: the vicinity of large housing districts of blocks of flats, the lack of formal green areas in that part of the city, the immediate vicinity of objects of natural interest (the forest complex with the Meteoryt Morasko reserve), the landscape value thanks to the diverse relief and semi-natural plant communities, the contrast with the built-up areas, the expansive vista, the large size of the area facilitating unlimited sporting activities and recreation, and the absence of spatial barriers (for example, a road infrastructure).

A specific form of adapting barren land to suit the local needs of users in the dense urban building structure of Poznań is connected with community gardens, created by various initiatives. The first such example, the Wilda garden, was established as part of the Generator Malta cultural project, the objective of which was to create a place promoting the social integration of the local residents. The first stage of this project involved clearing the unmanaged area, which for many years had been an illegal camp for the homeless and a waste dump. Shrubs and herbaceous perennials were planted, beds for vegetables and annual flowers were established, and the area was then equipped with hardscape and street furniture made of recycled materials. The garden, in addition to its functional role, has also become a venue for local cultural events and various initiatives of community members. The space, which was degraded as a result of long-term neglect, has gained a new quality and is now accepted by the residents of the Wilda housing district, who now have a small green area among the dense building infrastructure. The Wilda garden was created as an experimental initiative of various associations active at the annual Poznań cultural festival

'Malta'. Unfortunately, after the end of the festival, there were no local leaders to sustain the initiative. Since that time, the garden has only been used occasionally and the space has become gradually degraded.

The second analysed area, the Kolektyw Kapielisko garden, operates within a large urban green complex and constitutes a supplementation to its utilisation programme. It is an example of a successful grassroots initiative of residents, which differentiates it significantly from the Wilda garden (Table 1). A strong group of leaders is active there, initiating numerous actions connected with the functioning of the area, which has a positive effect on the number of attractions offered by the garden and the sustainability of the initiative. Since it was established, the garden has gradually been equipped with the necessary hardscape and street furniture. There is space for experiments with design and materials, such as a green table with succulents, a bird feeder with a green roof and a garden stove. Growing fruits and vegetables is merely an additional function of the garden, with the social meetings and cultural events organised there being more popular. The Kolektyw Kapielisko garden is the longest lasting such initiative in Poznań. A threat to the future existence of this garden is posed by the planned construction of a skater park (Łukaszewski 2017) in that area, which will not only eliminate this recreation area, but will also disintegrate one of the most valuable social communities in the city.

Discussion and Conclusions

These analyses have shown that Poznań has a considerable potential for the development of a green infrastructure system thanks to the existing land reserves of barren land of various origins. This is determined by the location of these areas and their relations with the existing natural system. Since 68% of all

Table 1. The most important characteristics of selected community gardens in Poznań

GARDEN	Wilda	Kolektyw Kąpielisko
GENESIS	Cultural project	Social protest
FINANCING OF ITS ESTABLISHMENT	Sponsors – “Malta” Festival	Local community, small businesses
FOUNDING YEAR	2013	2014
AREA	4700 m ²	1300 m ²
DISTRICT	Wilda	Łazarz
SURROUNDINGS	Dense urban building infrastructure	Expansive park and recreation areas
FORMS OF ACTIVITY	Growing vegetables, summer outdoor cinema, workshops	Growing vegetables, summer outdoor cinema, workshops, monographic meetings, a fair with stalls selling preserves, communal meal preparation, educational and eco-friendly activities

Source: authors' own elaboration

barren land located within the Poznań city limits has direct spatial links with areas comprising the natural system of the city, this land should be treated as an excellent reserve for the development of this system.

The potential of the barren land in the formation of the green infrastructure is varied, depending on its location within the urban structure – in the city centre or on the outskirts. In the districts with dense building infrastructure, a tremendous role is played even by small green enclaves, which may be adapted, for example, for community gardens. Examples are provided by the Wilda and Kolektyw Kąpielisko gardens, the establishment of which made it possible to introduce natural elements into the urban structure of the districts, while at the same time providing local residents with daily access to green areas. In turn, large-area barren land is playing an increased role on the outskirts of the city, where its use facilitates the development of a network of ecological connections and strengthens the natural system of the city. This is consistent with the concept of the so-called ecosystem services – in other words, the benefits provided to people by the natural environment. The protection of post-agricultural areas against building development is crucial not only for the protection of ecosystems, but also for the improvement of living conditions (Kronenberg 2012). The example of the analysed areas in Morasko justifies the need to preserve open spaces within the city limits. This landscape of former farmland with advanced stages of vegetation succession is consistent with the prospect-refuge theory (Appleton 1995). The diverse landscape with well-defined interiors formed by planted trees and characterised by considerable view potential is perceived as attractive and, at the same time, satisfying the human sense of safety. This indicates the justification for the preservation of a mosaic of small green complexes and open spaces, since this kind of land cover is perceived as more attractive than a dense forest complex, for example (Vecchiato & Tempesta 2013).

The utility value of abandoned areas, apart from the ecological and landscape aspects, is also functional and social. This study indicates considerable variation in the methods of utilising the recreation value of barren land and the observed social relationships, depending on the size and location of these areas. Actions undertaken by residents in community gardens in densely built-up areas are generally similar to those offered

by programmes of arranged green areas; meanwhile, in areas of informal recreation, a greater range and freedom of activities is observed. The role of community gardens is to provide a site to promote communality, social integration and activity in an organised manner initiated by leaders (either individuals or groups). In turn, the recreational use of former agricultural areas located on the outskirts of the city is informal and individual in character. Users appreciate the possibility for seclusion and undisturbed contact with open spaces. As a result of being abandoned, the landscape is perceived as wild and mysterious, offering unlimited potential for exploration and use. The forms of activity that appear are extremely different from those offered by planned urban investment areas, which also include managed urban green areas (Matsuoka & Kaplan 2008).

The aim of this pilot study was to indicate the importance of abandoned areas in Poznań. The determination of the barren land resources and preliminary observations of the existing forms of their adaptation for recreation and utility purposes constituted the first stage of this research. In the following stages, it is planned to undertake further studies on the functioning of urban barren land in terms of the spatial planning and modification of urban landscape.

Residents spontaneously adapt abandoned post-farming areas and vacant plots as sites for various events and activities, providing them with new functions and a new utility value. The role of municipal authorities is to carefully observe social needs and respect them in the process of spatial management, while at the same time protecting the safety of users and enhancing the accessibility of these areas. As elements of the green infrastructure system, abandoned areas should be managed through subtle interventions at relatively small outlays (Anderson & Minor 2017; Pietrzyk-Kaszyńska et al. 2017). To ensure a sustainable urban ecosystem and protect biodiversity, it is advisable to control processes of secondary succession – preferring native species and protecting them from the expansion of alien invasive species (Rey Benayas et al. 2007; Navarro & Pereira 2012; Majchrowska 2014). Abandoned areas may supplement the natural system, broaden the recreation offer, enhance the social integration and activity of local residents, and improve the quality of the living environment; thus, they may become useful elements of the urban structure in a contemporary city.

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