

Iwona Józefowicz¹, Hanna Michniewicz-Ankiersztajn²

Kazimierz Wielki University, Institute of Geography, Bydgoszcz

ORCID: ¹ <https://orcid.org/0000-0001-5436-9346>, ² <https://orcid.org/0000-0003-2119-6877>

Corresponding author: Iwona Jozefowicz, email: jozefowicz@ukw.edu.pl

Green and blue spaces as the area for residential investments in a modern city – example of Bydgoszcz (Poland)

Abstract: Urban space subject to constant transformation as a result of socio-economic and functional development becomes an arena for interaction and interpenetration of different elements of the urban area. In consequence, a public space with specific physiognomic features is created, reflecting the history, activities of the inhabitants, the policy of the city authorities, as well as the values of the existing natural environment. This study aims to characterize the topology of space in selected urban areas (greenspaces, bluespaces and multifamily residential areas). The subject matter is illustrated with the example of the city of Bydgoszcz, where both green and blue spaces are very visible in the landscape of the city and play an important role in its shaping. Based on their analyses of statistical and cartographic data paired with examination of planning documents, the authors propose a typology of selected elements pertaining to the city's landscape.

Keywords: greenspaces, bluespaces, residential development, urban area, Bydgoszcz

1. Introduction

The space of a modern city is a compilation of various morphological elements, which are subject to constant transformation, including its functional and spatial structures. These transformations arise from the phenomena and processes taking place on the political, economic and social level (Biderman, 1998; Marszał, 1999; Jażdżewska, 2000; Zborowski, 2000, 2005; Liszewski, 2001; Słodczyk, 2003; Węclawowicz, 2003; Słodczyk and Klimek, 2004; Szafrąńska, 2013; Runge, 2018).

It is also well worth referring to the urban space in its socio-psychological dimension. Man, as an entity living and working within the city, gives certain symbolism to its individual parts, as well as harness and values the space. He separates areas and places of public and private character (living environment), thus determining diverse social relations and interactions (Suliborski, 1976; Jałowiecki, 1980; Tuan, 1987; Szczepański and Nurek, 1997).

One of the integral elements of modern urban public space treated as an important component used by the inhabitants and intended to

meet their needs (Public Space Charter, 2009) are green spaces and blue spaces. They perform a variety of functions, including ensuring ecological diversity. They have a positive impact on citizens' health and social well-being (Krekel et al., 2015; Larson et al., 2016; Feng and Astell-Burt, 2017), bring important economic benefits and create necessary structural and functional spaces (Smaniotto Costa et al., 2008). They are therefore an important element of the urban landscape strongly identifying the space, increasing its attractiveness and importance. Moreover, according to the New Athens Charter signed in Lisbon in 2003, the existence of nature enclaves in cities is one of the important factors determining the well-being and even survival of people in the urban environment. Therefore, the distribution of green and bluespaces may be one of the most important prerequisites for the location and organisation of newly constructed housing facilities.

By *green spaces*, the authors understand natural and arranged greenery (such as parks, squares, forests, ecological areas, coppices),

while the term *bluespace* refers to all elements of the environment (<https://bluehealth2020.eu>) of natural or anthropogenic origin, which to a large extent contain water and are accessible to humans either in a proximal way (closer, water nearby) or in a distal, virtual way (when humans can hear, see or sense water in any other way) (Rojas et al., 2013; Hettiarachchi et al., 2015; Grellier et al., 2017). It should be noted that often the aforementioned types of spaces (green and blue ones) permeate each other (Gledhill and James, 2008), which allows us to consider them as a coherent area with similar features and functions.

The aim of this paper is to characterize the topology of space in selected urban areas (green spaces, blue spaces and multifamily residential areas) and, moreover, to define the relations between the elements of urban space: green spaces, blue spaces and residential areas in which new investments are developed. The study area comprises the entire space of Bydgoszcz. Based on cartographic data and study of documentation provided by the Urban Design Studio (Miejska Pracownia Urbanistyczna) pertaining to the distribution and development of green spaces, several such areas have been selected for further detailed analysis. In this respect, green space is understood as an area of greenery within a range of 10-minute walk, whereas blue space constitutes an area stretch-

ing 50 m from a stream, body of water, or the Vistula's flood plain. The subject matter includes the identification of areas attractive in terms of nature, in the vicinity of which the residential function is expanding, the characteristics and spatial distribution of the residential building erected in the years 1990–2016, and the environmental conditions in Bydgoszcz.

Based on good practices in the field of sustainable development and urban space management, and contemporary studies of the quality of life in large cities, it has been assumed that modern housing in Bydgoszcz is mostly (to a great extent) developed in the vicinity of environmentally attractive areas (green and blue spaces). In order to achieve the assumed objective and to verify the research hypothesis, the authors employed the method of desk research, which consists in analysing available data sources (i.e. public statistics, reports, development strategies and other publications). In this article the sources of choice included statistical data concerning the building register in Bydgoszcz for the years 1990–2016, planning documents and studies by the Urban Design Studio in Bydgoszcz, as well as the existing offers of developers. This was supplemented with an urban planning inventory, and the results have been compiled and analysed using selected cartographic methods and the QGIS software.

2. Blue and green spaces as an element of a city

Sustainable managing of space in contemporary cities assumes exercising particular care for the existing enclaves of nature (green spaces). The green spaces which are part of the public space simultaneously constitute a biophysical and cultural component of human existence (Jędrzejczyk, 2004; Michniewicz-Ankiersztajn, 2014). According to the New Charter of Athens (La Nouvelle Charte d'Athènes, 2003), signed in Lisbon in 2003, the existence of natural enclaves in cities is one of the significant factors which are the condition for the well-being, or in fact the survival of human in the urban environment. Green spaces – their number and quality – unarguably exert an influence on the quality of the inhabitants' existence at various stages of their

lives (Krekel et al., 2015; Larson et al., 2016; Feng and Astell-Burt, 2017). Study results indicate that the vicinity of green spaces has a positive impact on the physical and mental health status of city inhabitants, and moreover it strengthens social coherence, social interactions and a sense of identity and the relationships with the location (Keniger et al., 2013; White et al., 2013; Bertram and Rehdanz, 2014; Krekel et al., 2015; Klimanova and Illarionova, 2020). Blue areas, on the other hand, apart from their unquestionable ecological or economic benefits (e.g. flood protection and water retention), are an important element increasing the aesthetics of the landscape (Gledhill and James, 2008). It is recognised that these areas can serve as a blue belt pro-

tecting both the city and surrounding areas, as is the case with green areas (Tang et al., 2007). Furthermore, urban waters can be integrated into the ecologisation of urban environments for recreational purposes. They are also an integral part of the cultural landscape of urbanised areas. Several European urban regions (e.g. London and Brussels) have even adopted spatial plans that promote increased connectivity between green areas and urban waters in the long term (Kühn, 2003; Iojă et al., 2018).

The spaces in question play an important role in terms of the form and content of the city, as shown by numerous theoretical studies on the important landscape issues from the point of view of urban planning and development.

According to the HLC (Historic Landscape Characterisation) methodology derived from the Anglo-Saxon region, arranged greenery, parks, recreational areas belong to one of several previously defined broad landscape categories (Winterburn, 2008; Majchrowska, 2015) called recreation and holiday areas (English Heritage, 2002; Dalton et al., 2010). In the French concept of landscapes, the most distinctive feature is the forested landscape, referred to as *paysages arborées*, which describes greenery planted by humans (e.g. orchards, parks), or natural vegetation selected and purposefully preserved (Plit, 2001). In the European concept

of landscape typology presented within the EUCALAND – EUropean Culture expressed in Agricultural LANDscapes scientific project, based on seven diagnostic features, namely identity, spatial arrangement, processes, change, spatial relations, social structure and natural background, recreational areas are indicated as a non-agricultural landscape type (Fairclough, 2010). In Poland, likewise in international studies, green spaces are indicated as one of the elements of the cultural landscape. From the point of view of this paper, the most important are the subtypes of urban landscapes covering areas of residential development with strongly concentrated residential buildings surrounded by arranged greenery and large sports and recreation areas, including adjacent areas in the form of arranged greenery (city parks, allotment gardens), zoological gardens and areas of the so-called funfairs (Chmielewski et al., 2015). Additionally, they include another subtype, i.e. large artificial water reservoirs of various functions, with engineering and hydro-technical facilities. The latter group includes five types of landscapes, out of which the study considers surface waters, i.e. flowing water systems with natural stretches of large river beds, as well as areas with forests and temporary forest land, and forest roads (forest land not permanently forested, e.g. water, buildings) (Chmielewski et al., 2015).

3. Residential areas within the functional and spatial structure of cities

Housing estates constitute a separate functional space in cities. They are intended to spatially separate or even isolate individual areas of residents' activity from one another (Siemiński, 2011). They are not only the place of residence of the population in the infrastructural dimension. For several decades, they have been perceived by researchers as a certain set of residence places identified by a group of socio-economical and natural elements that are important for humans surrounding these points, and the relations between the elements and points of residence, as well as inter-elemental relations (Suliborski, 1976). Based on the aforementioned definition, a residential space is perceived not only

from the perspective of the building itself, but also from the perspective of the way in which its closer and further surroundings are developed (Groeger, 2013). This space is subject to valorisation and still has an unquestionable influence on the population's decisions concerning the choice of places of residence. In fact, the features of the residential environment can directly translate into the future living comfort of its residents.

One of such features (which is also reflected in the valuation of real estate in the USA and European countries) is the proximity and availability of green or blue spaces located in the immediate vicinity of residential areas (Groeger, 2013).

It seems that also in Poland more and more attention is being paid to the way existing and newly built housing estates are developed. For example, Szafrńska (2013) points to the

improving state of housing estates development in terms of establishing green spaces, often with recreational functions.

4. Characteristics and transformations of selected elements of the urban space of Bydgoszcz. Research results

Bydgoszcz is located in the northern part of Poland; it is the capital of the Kuyavian-Pomeranian voivodeship and the biggest city therein (Fig. 1). It ranks eight in terms of population

in Poland (355 645 according to the Local Data Bank as of 2015, www.bdl.stat.gov.pl) and eleventh in terms of the area (176 km²).

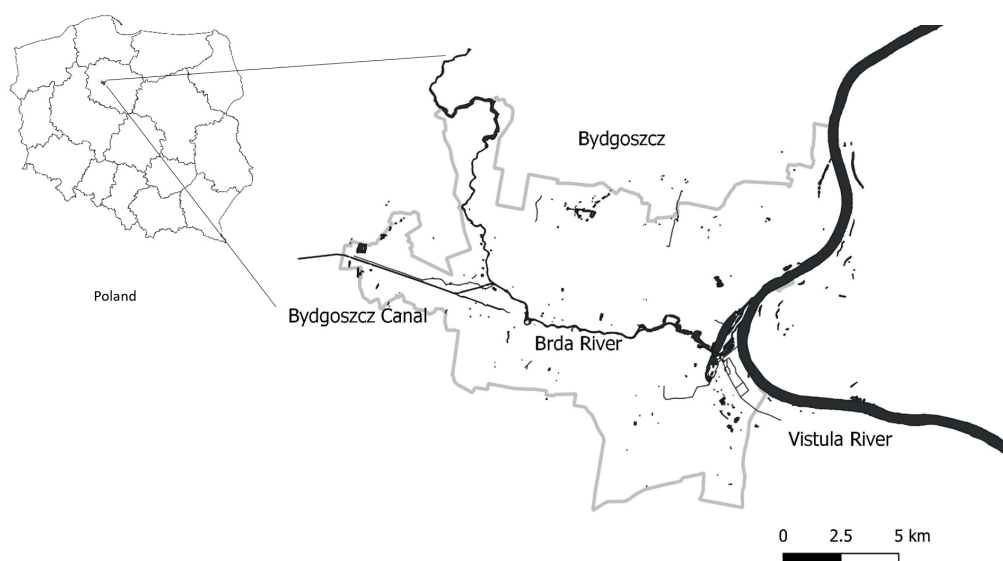


Figure 1. Geographic location of Bydgoszcz and the hydrographic network within the city boundaries (based on the Author's own study)

The city stands out due to a high share of its green spaces, i.e. more than 18% of the city's area (www.bdl.stat.gov.pl). In the structure of urban green spaces, more than 31% of the area is covered by forests, and only 3% by recreational areas. This is due to the specific location of the city in the Bydgoszcz-Toruń Valley, in the buffer zone of the Bydgoszcz Forest (Puszcza Bydgoska). The city ranks second in Poland in terms of the area of walking and recreation parks and greenstones. In the years 2005–2008 in Bydgoszcz an international project was carried out, entitled "Green Keys – zieleń miejska jako klucz do zrównoważonego rozwoju miast" (Green Keys – urban greenery as the key to the sustainable development of cities). The overarching idea of the project was treating urban green spaces as key elements directly embedded in the city landscape (Smaniotto Costa et

al., 2008). While analysing the green spaces of Bydgoszcz (parks, squares, forests, ecological areas, coppices) in the spatial aspect, one may notice that cultivated greenery is concentrated in the centre of the city (these are recreational areas of general-urban and supra-local significance), whereas the non-cultivated green areas are located at the peripheries – these are, among others, riverside areas along with the greenery.

The Brda and Vistula Rivers and the Bydgoszcz Canal constitute an interconnected water system, which is a recognizable element of the city landscape. The Brda River flows through the city and discharges into the Vistula (the so-called Brdyujście), whereas the Bydgoszcz Canal connects the city with the Noteć River and with the Odra River (Fig. 1). The city features a number of historic hydrotechnical structures, i.e. locks of the Old Canal, weirs in

the Old Town and a dam on the Brda in Smukała, which forms the Smukała Reservoir. In the city and its surroundings there are several other canals dug in the eighteenth and nineteenth centuries, which are part of the Bydgoski Węzeł Wodny (Bydgoszcz Water Junction). Moreover, there are kettles and post-glacial throughs in the city area in the form of lakes and small water reservoirs (e.g. ponds at Osowa Góra). In total, submerged areas cover about 4% of all the area of Bydgoszcz.

Another element considered a basic component of the city's functional structure involves residential areas. Their look, organization and development build the quality of the public urban space, which may be regarded as attractive (Groeger, 2016). It is worth mentioning that Bydgoszcz continues to pursue projects that involve development and modernization of residential areas. Housing investments in Bydgoszcz in the years 1990–2015, i.e. the study period under consideration, were carried out in the majority of the urban units of Bydgoszcz (57%) (Fig. 2a). The majority of investments (47.6%) were

implemented in the area of the Fordon urban unit. Moreover, developers are still highly interested in the units located near the city border, e.g. Osowa Góra (9.6%) Glinki (8.7%), Czyżkówko (5.8%). In the subsequent decades new housing investments were more frequently implemented in the urban units located in the inner centre of the city and the adjacent areas. In the most part these objects were established in the vicinity of cultivated green areas, and near the following units: Wilczak, Okole, Śródmieście – in the direct vicinity of Bydgoszcz Water Junction (Fig 2b, c, d).

In the years 1990–2016 a total of 524 multi-family residential buildings were built within the area. 40% of all investments in the city were developed in the areas directly adjacent to green and blue spaces, including about 21% near blue spaces. Such a high percentage of investments in these areas is confirmed by a significant correlation (0.89) between the number of new housing investments and the surface area of both cultivated and uncultivated green areas in individual urban units.

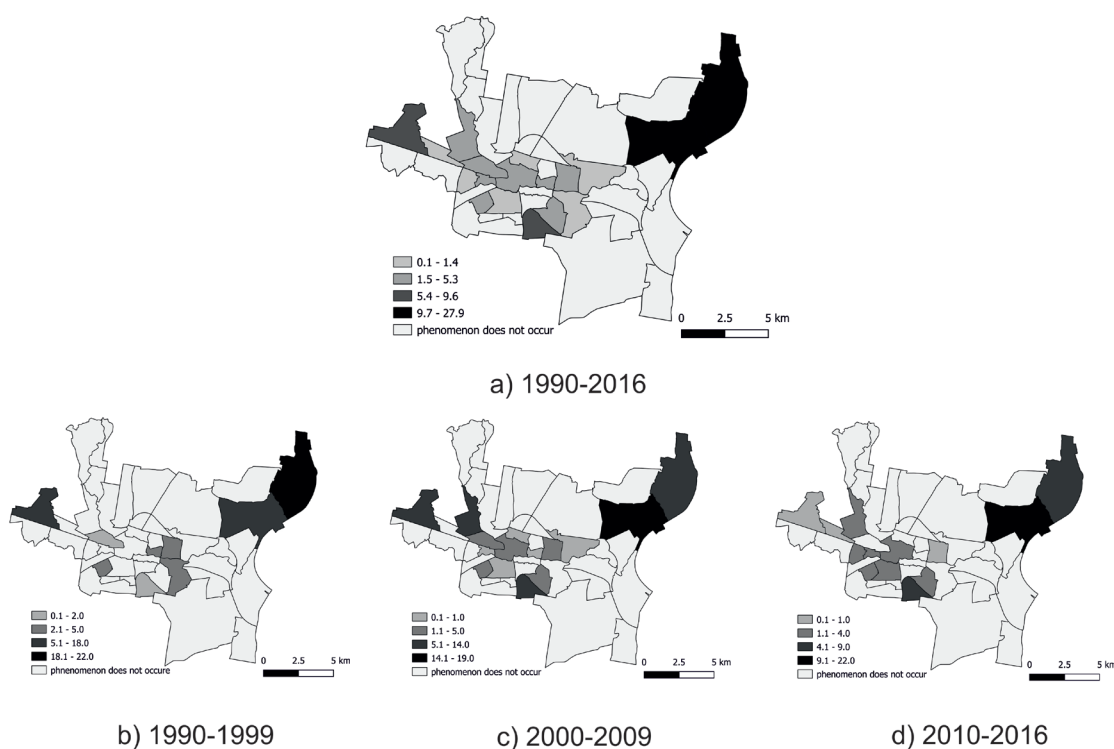


Figure 2. Spatial distribution of housing investments pursued in blue and green areas of Bydgoszcz in the years 1990–2016, as divided into urban units (based on the Author's own study)

Interest in investment areas located in the vicinity of the described spaces considerably increased after 2005. Nearly a half of all invest-

ments in these areas were completed within one decade (in the years 2005–2014) (Table 1).

Table 1. Residential investments in Bydgoszcz in the years 1990–2016 in general, in blue spaces and green spaces by time period (own elaboration based on the data of the City Hall of Bydgoszcz)

Item	Years	Total		Including blue and green spaces	
		number	%	Number	%
1	1990–1994	89	16.98	37	41.57
2	1995–1999	76	14.50	32	42.11
3	2000–2004	97	18.51	32	32.99
4	2005–2009	118	22.52	51	43.22
5	2010–2014	121	23.09	49	40.50
6	2015–2016	23	4.39	9	39.13
In total:	1990–2016	524	100	210	40.08

The city, both in its content and form, undergoes constant transformations. In an urbanized space such transformations nearly always lead to the merging of various landscape forms (Kosiacka-Beck, 2016).

For the purpose of the presented analysis, the authors differentiated two landscape types

pertaining to green and blue spaces, and four types of residential facilities featuring varied historic, genetic and functional character. It has been assumed that these landscape elements intertwine or merge with one another, and form various types of interactions (type A1. A2. A3. A4. B1. B2. B3. B4) (Table 2).

Table 2. Typology of selected functional and spatial elements of the city (green, blue and residential areas) (based on the Authors' own study)

Type of urban space		Building type	
A	Unaltered area (of green and blue spaces of the city) in the study period	1	Existing building. Previous function
		2	Existing building. New function
B	Transformed area (of green and blue spaces of the city) in the study period	3	New building. Previous function
		4	New building. New function

The analysis has demonstrated that out of the indicated types of interaction (Table 3) there are only three that fit into the discussed scope (A2, A4 and B4). The remaining ones,

owing to the subject of studies, have not been found (A1 and B1 – do not exist, because only new investments are taken into consideration. A3, B2 and B3 – have not been found).

Table 3. Types of interactions of selected elements of the urban space in Bydgoszcz (based on the Authors' own study)

A2 (unaltered area, existing building, the function it has held until now)		A4 (unaltered area, new building, new function)		B4 (transformed area, new building, new function)	
number	%	number	%	number	%
2	1	170	81	38	18.1

The A2 type of interaction refers to a situation, where an investment of residential nature was performed on an existing building – one that used to serve different function – which is located in the vicinity of an existing, non-altered green or blue space. In the studied area

only two such cases were found (Table 3). Over a dozen flats have been built within the two-hundred-year old Peterson mill surrounded by green spaces (Fig. 3a). Electricity is supplied to this building by a small hydroelectric power plant built on the nearby Flis watercourse. The



a



b



c



d



e



f

Figure 3. Peterson's Mill (a), Arkada Park (Arcade Park) Neighborhood (b), Platanowy Park (Platanus Park) (c), Investments in the area of the Old Bydgoszcz Canal (d), Nordic Heaven (e), Brda River housing estate, the building of Budlex, Wrocławska Street (f) (based on: a - https://commons.wikimedia.org/wiki/File:Blok_maj%C4%85cy_przypomina%C4%87_%22M%C5%82yn_Petersona%22_od_podw%C3%B3rza_-_panoramio.jpg, b - photo by I. Józefowicz, 12.12.2020, c - photo by P. Dziamska, 12.12.2020, d, e, f - photo by H. Michniewicz-Ankiersztajn, 30.09.2017, 12.12.2020

second location is the Arkada Park, which is a nineteenth-century military laundry facility adapted for residential purposes. It is located several dozen meters away from the Brda riverbank (Fig. 3b). The historical building itself was converted into lofts, and two modern multi-family buildings were built nearby. In this case, the investments fit in with the existing space by preserving the architecture of buildings as far as building materials, shape and height are concerned.

The most common type of interaction is A4, which involves new housing facilities that have been built in the immediate vicinity of an existing green or blue space. 81% of the investments are considered to be of this type. (Table 3, Fig. 4). This is directly related to the succession of function clearly displayed by the city. However, one should bear in mind that housing develops predominantly in the vicinity of environmentally attractive areas. Examples of such interactions include Platanowy Park, where a large housing estate was constructed in post-industrial areas in the vicinity of a green space in the Leśne district (Fig. 3c), residential

buildings at the Old Bydgoszcz Canal (from the 1990s and the first decade of the 21st century), the Brda Housing Estate in Czyżkówko district of Bydgoszcz (Fig. 3d), buildings at street Fordońska 442 located near the Vistula River, the Nordic Heaven apartment building on the Brda River bank (Fig. 3e), or New Venice on the Młynówka River bank. It can be observed that the emerging residential areas mostly consist of typically low (maximum five-storey) blocks of flats. The exception is the above-mentioned Nordic Heaven apartment building, which due to its height constitutes a landscape dominant. The elevation of said building is meant to evoke and blend in with the river flowing in the immediate vicinity (Fig. 3e). A vast majority of the buildings in this category demonstrate typically neutral structure and colours. In fact, one may argue that the emerging investments fail to fit in with the existing cultural landscape in terms of their character or form. The architects do not take advantage of the landscape potential of the place, but rather focus entirely on the functionality of the designed objects.

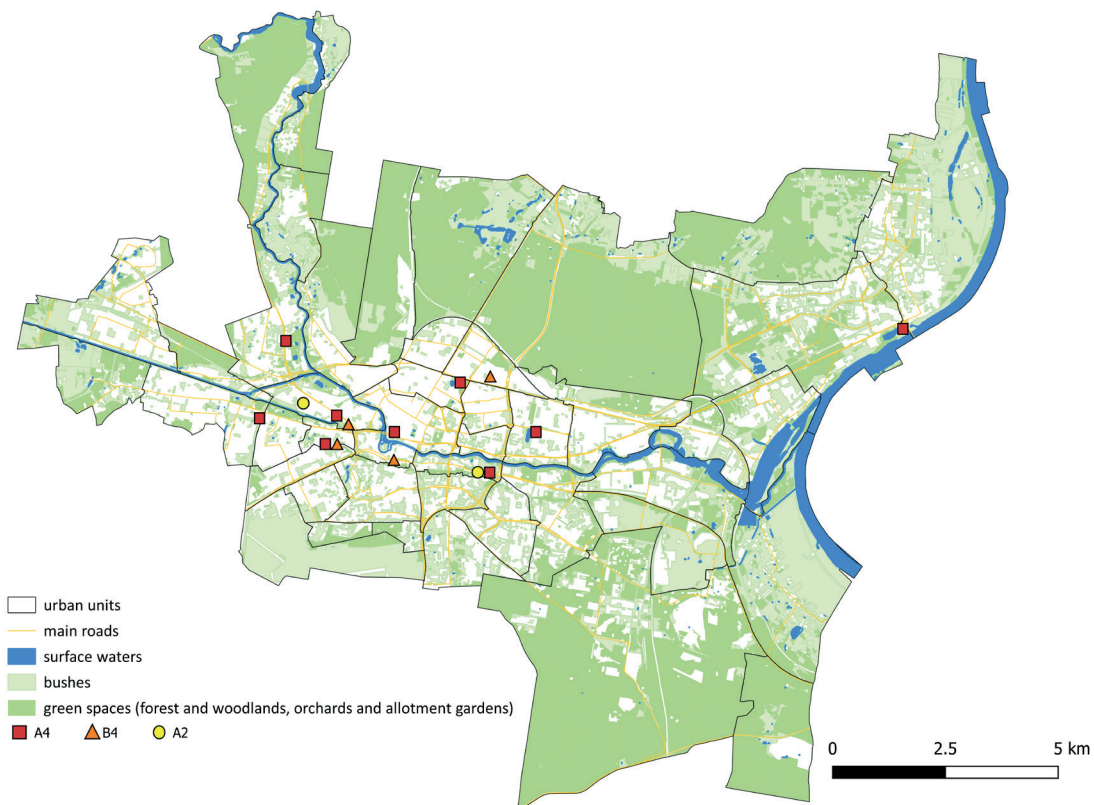


Figure 4. Location of selected housing investments from 1990-2016 against the green and blue spaces of the city (according to the types of changes) (own elaboration based on *Tereny wypoczynku i Rekreacji w Bydgoszczy...*, 2012)

The last interaction that has been observed is type B4, namely constructing new housing facilities close to altered green and blue spaces. Over 18% of all housing investments from 1990–2016 are located in such areas (Table 3). Examples include the five-storey Budlex building (Fig. 3f) above the revitalised part of the Bydgoszcz Canal (Wrocławska Street), the buildings of the Nad Wisłą Housing Cooperative (Miedza Street) or the ‘Pearl Valley’ residential complex under construction near the Dolina Pięciu Stawów park (Five Lakes Valley), which is very futuristic and innovative in its form, and refers to organic architecture.

A characteristic feature of new investments is that low (five-storey) buildings clearly prevail in the area, constituting over 92% of all constructions. Six and seven-storey buildings are located mainly in densely developed areas.

5. Conclusions

Nowadays green spaces constitute an important element of the residential attractiveness of the area, as they are one of the determinants of a property value in an urbanised environment, and the quality of its surroundings has a significant impact on the decisions made by market participants (Senetra and Szczepańska, 2012). Due to customer preferences, developers are increasingly looking for locations considered attractive from an environmental point of view. In the case of Bydgoszcz, the above statement is reflected in the value of the correlation coefficient (0.89).

In consequence of the amendment to regulations and standards concerning planning and development of urbanised areas in Poland after 1989, paired with an increase in the price of urban land, availability of concentrated green spaces near the place of residence has considerably diminished. Thus, the existing greenery enclaves, which are part of the urban space, have become extremely valuable in terms of ensuring an appropriate level and quality of life for the inhabitants, especially in residential areas (Bożętka, 2008).

In Bydgoszcz between 1990 and 2016 over 40% of residential investments were located in the vicinity of green and blue spaces. In most

Only in one case such buildings are located near a natural green space (Bydgoszcz Forest).

It should be stressed, however, that investments located in the vicinity of green and blue spaces rarely attempt to fit into the surrounding landscape in terms of their form, construction material or colour. The decision to refrain from constructing high buildings is much more common, which may be treated both as a manifestation of protection of the existing urban ecosystems and as a planned, harmonious integration of the investment into the existing urban and cultural system. Such examples include the successive buildings with a residential function located at the old Bydgoszcz Canal, Osowa Góra or the Brda River in its downtown section or the Pearl Valley, being built in the immediate vicinity of the revitalized Five Lakes Valley, which is to combine architecture with organic nature.

cases, new residential buildings were erected in close proximity to the existing, unaltered green and blue spaces. Initially the investments were conducted in urban units located near large complexes of non-cultivated greenery, i.e. at the periphery of the city. Gradually (since the year 2000), new multi-family buildings have been increasingly more often established in urban units closer to the city centre, in the immediate vicinity of cultivated green areas and blue spaces. One should note, however, that almost every fifth new housing investment has been implemented in the areas subject to the urban revitalization programme.

Study results indicate that of all the space types distinguished by the authors, the developers hold greatest interest in green and blue areas that have remained unaltered for years (e.g. Platanus park at Old Bydgoszcz Canal, the Brda River valley) (81% of analysed investments). On the other hand, very rarely does the succession of function occur in existing, unaltered spaces (1%). This may be indicative of the so-called environment gentrification, which results in greater willingness among clients with higher incomes to procure more expensive apartments in areas featuring better quality and availability of natural spaces. This

trend is apparent upon taking a closer look at residential investments either recently completed or currently under way – near the Old Bydgoszcz Canal, in Osowa Góra district and at the downtown segment of the Brda River.

Particularly note-worthy example is the ‘Pearl Valley’ apartment complex currently under construction in the immediate vicinity of the Dolina Pięciu Stawów park, which is meant to merge architecture with organic nature.

Acknowledgment

The study was supported by grant No BS/2017/N1 financed at Kazimierz Wielki University in Bydgoszcz.

References

- Bertram C., Rehdanz K., 2014. The Role of Urban Green Space for Human Well-Being. Institute for the World Economy. Working Paper 1911, 1-31.
- Biderman E., 1998. Problemy i kierunki przemian struktury przestrzenno-funkcjonalnej dużych miast w Polsce w okresie transformacji systemowej. [In:] Parysek J., Rogacki H. (Eds.), *Przemiany społeczno-gospodarcze Polski lat dziewięćdziesiątych*. Wydawnictwo Naukowe Bogucki, Poznań, 99-110 [In Polish].
- Bożętka B., 2008. Urban green areas systems in Poland – evolution and problems of management. *Problemy Ekologii Krajobrazu* 22, 49-63 [In Polish with English abstract].
- Chmielewski T.J., Myga-Piątek U., Solon J., 2015. Typology of Poland's current landscapes. *Przegląd Geograficzny* 87(3), 377-408 [In Polish with English abstract].
- Dalton M., Rowe P., Toase S., 2010. *The North Yorkshire & Lower Tees Valley Historic Landscape Characterisation*. North Yorkshire County Council & English Heritage, Northallerton.
- English Heritage, 2002. *Historic Landscape Characterisation: Template Project Design for EH-supported county-wide projects*. English Heritage, London.
- Fairclough G., 2010. Complexity and contingency: classifying the influence of agriculture on European landscapes. [In:] Pungetti G., Kruse A., (Eds.), *European culture expressed in agricultural landscapes – perspectives from the Eucaland Project*. Palombi Editori, Roma, 115-148.
- Feng X., Astell-Burt T., 2017. Residential Green Space Quantity and Quality and Child Well-being: A Longitudinal Study. *American Journal of Preventive Medicine* 53(5), 616-624.
- Gledhill D.G., James P., 2008. Rethinking Urban Blue Spaces from a Landscape Perspective: Species, scale and the human element. *Salzburger Geographische Arbeiten* 42, 151-164.
- Grellier J., White M.P., Albin M., Bell S., Elliott L.R., Gascón M., Gualdi S., Mancini L., Nieuwenhuijsen M.J., Sarigiannis D.A., van den Bosch M., Wolf T., Wuijts S., Fleming L.E., 2017. Blue Health: a study programme protocol for mapping and quantifying the potential benefits to public health and well-being from Europe's blue spaces. *BMJ Open* 7(6), 1-10.
- Groeger L., 2013. Zróżnicowanie i wartościowanie przestrzeni mieszkaniowej na przykładzie miast województwa łódzkiego. *Wydawnictwa Uniwersytetu Łódzkiego, Łódź* [In Polish].
- Groeger L., 2016. Management of urban residential space in terms of the needs of local communities. *Acta Universitatis Lodzianensis Folia Geographica Socio-Oeconomica* 24, 29-43 [In Polish with English abstract].
- Hettiarachchi M., Morrison T.H., McAlpine C., 2015. Forty-three years of Ramsar and Urbanwetlands. *Global Environmental Change* 32, 57-66.
- Iojă I., Osaci-Costache G., Breuste J., Constantina Alina Hossu C.A., Grădinaru S.R., Diana Andreea Onose D.A., Nită M.R., Skokanová H., 2018. Integrating urban blue and green areas based on historical evidence. *Urban Forestry & Urban Greening* 34, 217-225.
- Jałowicki B., 1980. *Człowiek w przestrzeni miasta*. Śląski Instytut Naukowy, Katowice [In Polish].
- Jażdżewska I., (red.), 2000. *Miasto postsocjalistyczne: organizacja przestrzeni miejskiej i jej przemiany*. XIII Konferencja Wiedzy o Mieście. Katedra Geografii Miast i Turyzmu Uniwersytetu Łódzkiego, Łódź. 29-39 [In Polish].
- Jędrzejczyk D., 2004. *Geografia humanistyczna miasta*. Wydawnictwo Dialog, Warszawa [In Polish].

- Keniger L.E., Gaston K.J., Irvine K.N., Fuller R.A., 2013. What are the benefits of interacting with nature? *International Journal of Environmental Research and Public Health* 10(3), 913-935.
- Klimanova O.A., Illarionova O.I., 2020. Green infrastructure indicators for urban planning: applying the integrated approach for Russian largest cities. *Geography, Environment, Sustainability* 13(1), 251-259.
- Kosiacka-Beck E., 2016. Spaces of interpenetration. Interpenetration of spaces. Polysemantic of the question. *Prace Komisji Krajobrazu Kulturowego* 32, 31-40 [In Polish with English abstract].
- Krekel C., Kolbe J., Wüstemann H., 2015. The Greener. The Happier? The Effects of Urban Green and Abandoned Areas on Residential Well-Being. SOEP (German Socio-Economic Panel Study), Berlin.
- Kühn M., 2003. Greenbelt and green heart: separating and integrating landscapes in European city regions. *Landscape and Urban Planning* 64(1-2), 19-27.
- La Nouvelle Charte d'Athènes, 2003. The New Charter of Athens. Alinea. Firenze <https://www.apr-strasbourg.org/downloaddocument/20182/la-nouvelle-charte-d-athenes-2003.pdf> (Date of access: 20.08.2020).
- Larson L.R., Jennings V., Cloutier S.A., 2016. Public Parks and Wellbeing in Urban Areas of the United States. *PLoS ONE* 11(4), 1-19.
- Liszewski S., 2001. Model przemian przestrzeni miejskiej miasta postsocjalistycznego. [In:] Jażdżewska I., (Ed.), *Miasto postsocjalistyczne – organizacja przestrzeni miejskiej i jej przemiany*. XIV Konwersatorium Wiedzy o Mieście. Wydawnictwo Uniwersytetu Łódzkiego, Łódź, 303-309 [In Polish].
- Majchrowska A., 2015. European typologies of cultural landscapes. *Prace Komisji Krajobrazu Kulturowego* 27, 27-43 [In Polish with English abstract].
- Marszał T., 1999. Zróżnicowanie i kierunki rozwoju budownictwa mieszkaniowego w Polsce. [In:] Marszał T. (Ed.), *Budownictwo mieszkaniowe w latach 90. - zróżnicowanie przestrzenne i kierunki rozwoju*. Biuletyn KPZK PAN 190, 7-28 [In Polish].
- Michniewicz-Ankiersztajn H., 2014. The role of green areas in European cities' spaces in the context of the quality of life of inhabitants. *Journal of Health Sciences* 4(13), 130-140 [In Polish with English abstract].
- Plit F., 2001. Kilka uwag o terminie krajobraz (krajobraz kulturowy) w geografii francuskiej. *Człowiek i przestrzeń*, Instytut Geografii i Gospodarki Przestrzennej UJ, Kraków, 205-209 [In Polish].
- Public Space Charter (Karta Przestrzeni Publicznej), 2009. Towarzystwo Urbanistów Polskich i Związek Miast Polskich, http://www.tup.org.pl/download/2009_0906_KartaPrzestrzeniPublicznej.pdf (Date of access: 20.08.2020).
- Rojas C., Pino J., Basnou C., Vivanco M., 2013. Assessing land-use and-cover changes in relation to geographic factors and urban planning in the metropolitan area of Concepción (Chile). Implications for biodiversity conservation. *Applied Geography* 39, 93-103.
- Runge A., 2018. Functional and spatial transformations of towns in a traditional socio-economic region – Katowice as an example. *Przeobrażenia funkcjonalno-przestrzenne miast tradycyjnego regionu społeczno-ekonomicznego – przykład Katowic*. *Studia Miejskie* 32, 35-46 [In Polish with English abstract].
- Senetra A., Szczepańska A., 2012. The value of residential space as affected by landscape perception – the example of the city of Olsztyn. [In:] Dzieciuchowicz J., Groeger L. (Eds.), *Kształtowanie przestrzeni mieszkaniowej miast*. Wydawnictwo Uniwersytetu Łódzkiego, Łódź, 113-131 [In Polish with English abstract].
- Siemiński W., 2011. Housing estate as an urban-planning-social phenomenon. *Człowiek i Środowisko* 35(1-2), 107-124 [In Polish with English abstract].
- Słodczyk J., 2003. *Przestrzeń miasta i jej przeobrażenia*. *Studia i Monografie* 298. Uniwersytet Opolski, Opole [In Polish].
- Słodczyk J., Klimek R., 2004. Nowe tereny mieszkaniowe w strukturze przestrzennej Opola. [In:] Słodczyk J. (Ed.), *Przemiany struktury przestrzennej miast w sferze funkcjonalnej i społecznej*. Wydawnictwo Uniwersytetu Opolskiego, Opole, 121-138 [In Polish].
- Smaniotto Costa C., Šuklje Erjavec I., Mathey J., 2008. Green spaces – a key resources for urban sustainability. The GreenKeys approach for developing green spaces. *Urbani Izziv* 19(2), 199-211.
- Suliborski A., 1976. Środowisko mieszkaniowe miasta jako przedmiot badań geografii osadnictwa. *Acta Universitatis Lodziensis. Nauki Matematyczno-Przyrodnicze* 2(7), 123-135 [In Polish].
- Szafrańska E., 2013. Possibilities of transformation of large housing estates in post-socialist city in Poland. *Studia Miejskie* 11, 39-53. [In Polish with English abstract].

- Szczepański M.S., Nurek S., 1997. Miasto i świat społeczny jego mieszkańców w perspektywie socjologicznej. IX Konwersatorium Wiedzy o Mieście. Wydawnictwo Uniwersytetu Łódzkiego, Łódź [In Polish].
- Tang B.S., Wong S.W., Lee A.K.W., 2007. Green belt in a compact city: a zone for conservation or transition? *Landscape and Urban Planning* 79(3-4), 358-373.
- Tereny wypoczynku i rekreacji w Bydgoszczy. Diagnoza stanu istniejącego, 2012. Miejska Pracownia Urbanizacyjna, Bydgoszcz, unpublished work [In Polish].
- Tuan Y.F., 1987. *Space and place*. Państwowy Instytut Wydawniczy, Warszawa [In Polish].
- Węclawowicz G., 2003. *Geografia społeczna miast. Zróżnicowania społeczno-przestrzenne*. Wydawnictwo Naukowe PWN, Warszawa [In Polish].
- White M.P., Alcock I., Wheeler B.W., Depledge M.H., 2013. Would you be happier living in a greener Urban area? A fixed-effects analysis of panel data. *Psychological Science* 24(6), 920-928.
- Winterburn E., 2008. Historic Landscape Characterisation in Context. *FORUM Ejournal* 8, 33-46.
- Zborowski A., 2000. Przemiany przestrzeni miasta postsocjalistycznego. Teoria i praktyka. [In:] Jażdżewska I., (Ed.), XIII Konwersatorium Wiedzy o Mieście. Miasto postsocjalistyczne. Organizacja przestrzeni miejskiej i jej przemiany. Wydawnictwo Uniwersytetu Łódzkiego, Łódzkie Towarzystwo Naukowe, Łódź, 61-66 [In Polish].
- Zborowski A., 2005. Przemiany struktury społeczno-przestrzennej regionu miejskiego w okresie realnego socjalizmu i transformacji ustrojowej (na przykładzie Krakowa). Instytut Geografii i Gospodarki Przestrzennej UJ, Kraków [In Polish].

Internet sources

- https://commons.wikimedia.org/wiki/File:Blok_maj%C4%85cy_przypomina%C4%87_%22M%C5%82yn_Peter-sona%22_od_podw%C3%B3rca_-_panoramio.jpg (Date of access: 12.12.2020).
- <https://bluehealth2020.eu> – official website of the EU project under Horizon 2020 (Date of access: 04.12.2018).
- www.bdl.stat.gov.pl – official website of the Local Data Bank (Date of access: 14.12.2018).