Allotment Gardens as Significant Element Integrating Greenery System of the City

Anna Dzikowska 1, Alicja Edyta Krzeminska 2, Anna Danuta Zareba 3

1 Faculty of Security and Safety Research, General Tadeusz Kościuszko Military University of Land Forces, Piotra Czajkowskiego St., 109, 51-147, Wrocław, Poland
2 Faculty of Earth Sciences and Environmental Management, University of Wrocław, Uniwersytecki 1Sq., 50-137, Wrocław, Poland,
3 Faculty of Earth Sciences and Environmental Management, University of Wrocław, Uniwersytecki 1 Sq., 50-137, Wrocław, Poland,
anna.dzikowska@awl.edu.pl

Abstract. The greenery system of the city is an extremely important element of the urban structure. It is responsible for the proper functioning of the city in the ecological and natural aspect, but also supports social functions. The dynamic development of urbanized areas and the pressure of investment often causes the reduction or elimination of allotment gardens area. The paper presents example of the system of city with particular reference to allotment gardens. It is focused on the contemporary role of allotment gardens as an element of cities green areas. It is also attempted to determine factors that affect the integrity of the Green Infrastructure and sustainability development of the urban structure.

1. Introduction

Urban development and excessive urbanization are some of the most important processes taking place in today's world. Undoubtedly, these processes will have their impact on the quality of human life and condition of the natural environment. In the 20th century, about 30% of the world’s population lived in cities, but this share may increase up to about 60% in mid-21st century [1,2]. In response to this tendency, it is important for cities, which now play the role of economic, trade or education centers, to also become eco-friendly places - accommodating for the needs of people, fauna and flora. Therefore, urban tissue must be planned and developed consciously, with consideration of its internal structure, catering for all human needs. Moreover, the ecological and natural environment infrastructure must be taken care of in line with the principles of sustainable development [3,4].

Cities are the integrative centers on local, and to some degree regional levels. Land development and individual elements that build space contribute the image of a region, strengthen the social ties, integrate the local population and attract migrants, or potential new investors. Not only symbolic, architectural or historical elements are important. Open or usable spaces often greatly contribute to the building the image, specific sense of belonging to space, or create the identity of a place [5,6]. For urban residents, access to open, green and recreational areas, including allotment gardens, is extremely important due to the quality of mental and health life. Allotment gardens began to appear apart of city space in the first
half of the 19th century. The first of them were created in Great Britain and Germany, i.e. countries where the processes connected with economic development and conscious planning of urban spaces were particularly dynamic [7]. The idea of creating allotment gardens was related to the need to diversify development and strengthen the potential of workers' housing estates. They were shaped as densely built-up areas, in close proximity to industrial areas. The primary functions of allotment gardens were connected with the provision of social assistance to underprivileged workers. However, the possibilities and potential vested in the development of these spaces were noticed quite quickly. These areas have become a place of rest and recreation, and were found to influence social relations and strengthen cooperation between the residents of individual housing estates [8].

In the 20th century Poland, the idea of gardening perfectly matched its political and economic system of the time. In socialism, allotment gardens were legitimized not only because of their economic values, but also their social, financial, health, aesthetic, a partly ideological benefits. In urban spaces, these areas were located in the outskirts, yet close enough to the main transport routes - so as to ensure convenient access. With the growth of urbanized areas, the areas of allotment gardens were naturally absorbed by development, and those that remained in the urban tissue are now located either in the buffer zones of cities or, on the contrary, close to city centers. Comfortably located on communication routes, they are very attractive areas in terms of investment, which contributed to a significant reduction of these areas at the beginning of the 21st century [8]. Today, an important problem to solve is the way these areas are managed, which now depends primarily on the garden owner and his needs. Over the previous decades, the manner in which these spaces were used and managed has diversified. This is mainly related to the social and societal needs of the present. A noticeable trend is a "fashion" for having a garden allotment, serving primarily as a place for recreation, rest and meetings with family and friends. However, their "productive" functions related to the cultivation of fruit and vegetables are diminishing. We can therefore distinguish gardens of a recreational, recreational and production character as well as typical production-oriented ones. Abandoned or neglected allotments are becoming a problem, as they may be detrimental to safety in these areas, attracting people from the social margin, as a space for residence, alcohol consumption or use of other stimulants.

2. Methodology
The aim of the research was to show the changes in the role and influence of allotment gardens on the greenery system in the urban tissue. Currently, the areas of allotment gardens are very often treated as a reservoir for future investment, with no regard for their historical context or environmental functions. As a result of the so-called urban sprawl, which has been observed in the past decades, these areas are now seen as having very good location - often close to the city center - and very good communication with the adjacent areas. All this affects their market value, thus increasing the risk of transformation into building areas.

The research was based on three main stages. The first, included desk and office studies related to the selection of a suitable, relatively representative area of research for Poland. In the course of work, the population characteristics of voivodships were taken into account, as well as their level of urbanization. On the basis of statistical data from the Central Statistical Office (CSO), a voivodship was selected that has a population structure typical of Poland, and notes high on indicators related to the level of urbanization. The Lower Silesia Voivodship was selected for further analysis due to the fact that allotment gardens occupy the largest percentage of space in this area (compared to other administrative units in Poland). Detailed spatial analyzes related to the analysis of the city's spatial structure and structure were made for the city of Wrocław. It is the capital of the voivodship, as well as the main urban center, which has had the greatest impact on the formation of the region for decades. Wrocław is one of the cities in the so-called "Recovered territories" that were taken over by Poland after the Second World War.
However, its spatial structure was shaped even before World War I. The warfare that took place in this area (during both World War I and II) had profound impact on the functional changes of the space. When choosing a suitable city center for analysis, an important consideration was the fact that just after World War II, Wrocław welcomed a large number of immigrant populations, becoming a cultural melting pot. Here came the population from eastern Europe, and areas excluded from the Polish territory after the war. With the end of the 20th and the beginning of the 21st century, Wrocław saw functional and spatial changes, which led to a more systematized and stabilized spatial structure of the city. Currently, some dynamic investment processes related to the economic development of the region are in progress. It is, therefore, a city with interesting historical conditions in terms of demography and spatial arrangement, and an active urban area in terms of improving the efficiency and functioning of the urban structure, with particular emphasis on the city's greenery system. It can therefore serve as a good example to analyze the subject.

The second stage was an analysis of the structure of greenery within the urban tissue, including such considerations as planning and development within the city and a historical outline. The analysis was based on the monographic and observational method. Next, the share of allotment gardens in the urban greenery system of Wroclaw and changes in the way they were used were taken into account.

**Table 1.** Land use characteristics.

| Category                        | Land development associated with category                                      |
|---------------------------------|----------------------------------------------------------------------------------|
| high greenery                   | • high greenery                                                                  |
|                                 | • urban forests                                                                 |
|                                 | • greenery along riverbeds                                                        |
| cultivated green areas          | • urban green areas                                                              |
|                                 | • parks                                                                          |
|                                 | • greenery accompanying buildings                                                |
| allotment gardens               | • allotment gardens areas                                                        |
| cultivated greenery with services| • gardens and theme parks: zoo, botanical garden, Japanese garden                |
| cemeteries                      | • large-area sports grounds                                                      |
| intensive residential areas     | • intensely developed housing with a developed spatial structure with accompanying service facilities |
| residential areas               | • housing function areas                                                         |
| service areas                   | • dense large-area spaces accommodating services                                 |
| industrial areas                | • dense large-area spaces accommodating industries                               |
| infrastructure                  | • areas of urban and communication infrastructure                                 |
| military areas                  | • off-limits military areas                                                      |

source: own elaboration

The third stage was the analysis of the functions performed by the researched area. The analysis was carried out on the basis of the available cartographic materials, e.g. the orthophotomap, the Study of Conditions and Directions of City Development of Wroclaw, and site inspections [9]. In total, 11
categories of land use were defined (table 1). Due to the subject matter of the Article, special attention was paid to biologically active areas - five categories of which related to green areas in the city were distinguished. Then, two categories were distinguished with a dominant housing function - intensive residential areas and residential areas. Service areas and industrial areas are understood as densely developed spaces where large, functional areas are dominant. Additionally, military areas and infrastructure areas were distinguished - as areas with an individual and specific form of development (table 1). The analysis focuses on the role of allotment gardens in the urban greenery system of urban tissue of Wroclaw.

3. Results and discussions
The Lower Silesian Voivodship is an administrative unit located in the south-western part of Poland, coming 7th place among all 16 provinces in terms of size. It is a highly urbanized area: with over 10% occupied by cities with a population of over 20,000. The only voivodship with a larger share of such areas is the Silesian Voivodship, where industry is the key factor shaping the functions and elements of its spatial development. In Poland, the average population density is 116 people per square kilometre, and in a fairly large group of provinces (9 out of 16), an analogous value oscillating in the range of 105 to 151 people per square kilometre can be observed. The Lower Silesian Voivodship is one of the administrative units with these characteristics. At the same time, in terms of the absolute number and average number of people living in cities with a population of over 20,000, it also ranks in average values typical for Poland. However, it stands out in terms of the percentage share of the number of people (residing in cities of over 20,000 people) in the total number of inhabitants of the province. Considering the fact that it is a unit with an average (relative to other voivodships) sized one, it does accommodate a very large surface area occupied by allotment gardens, i.e. 6 299.2 ha. It is the largest percentage of area among all voivodships, larger by over 2,000 ha than the administrative unit raining next. The number of allotment gardens is also the largest. Considering the above-mentioned characteristics, the Lower Silesian Voivodship is an administrative unit showing characteristics within the average statistical values related to the population size, population density or the size of the area occupied. However, it definitely stands out in terms of the number and area occupied by allotment gardens (table 2, table 3, table 4, table 5).

| Voivodships          | voivodship area [km²] | cities over 20 000 citizens | % of voivodship area |
|----------------------|-----------------------|-----------------------------|----------------------|
|                      | [ha]                  | [km²]                       | area [ha]  | area [km²] | average surface area [km²] |                  |
| Poland               | 31 269 610            | 312 695                     | 2 156 919 | 21 570     | 24                           | 6.9               |
| Lower Silesia        | 1 994 670             | 19 947                      | 220 785   | 2 208      | 24                           | 11.1              |
| Kuyavian-Pomeranian  | 1 797 134             | 17 972                      | 82 892    | 829        | 16                           | 4.6               |
| Lublin               | 2 512 246             | 25 122                      | 97 059    | 970        | 23                           | 3.9               |
| Lubusz               | 1 398 793             | 13 988                      | 64 558    | 646        | 15                           | 4.6               |
| Lodz                 | 1 821 895             | 18 219                      | 115 782   | 1 158      | 26                           | 6.4               |
| Lesser Poland        | 1 518 279             | 15 183                      | 165 558   | 1 656      | 27                           | 10.9              |
| Masovia              | 3 555 847             | 35 558                      | 215 728   | 2 157      | 25                           | 6.1               |
| Opole                | 941 187               | 9 412                       | 76 420    | 765        | 22                           | 8.1               |
| Voivodships     | voivodship area [km²] | cities over 20 000 citizens |          |          |          |          |
|-----------------|-----------------------|-----------------------------|----------|----------|----------|----------|
|                 | [ha]                  | [km²]                       | area [ha] | area [km²]| average surface area [km²]| % of voivodeship area |
| Sub Carpathian  | 1 784 576             | 17 846                      | 118 564  | 1 186    | 24        | 6.6      |
| Podlaskie       | 2 018 702             | 20 187                      | 92 495   | 925      | 23        | 4.6      |
| Pomeranian      | 1 832 193             | 18 321                      | 111 203  | 1 112    | 26        | 6.1      |
| Silesia         | 1 233 309             | 12 333                      | 379 023  | 3 790    | 53        | 30.7     |
| Swietokrzyskie  | 1 171 050             | 11 711                      | 66 904   | 669      | 22        | 5.7      |
| Warmia Mazurian | 2 417 347             | 24 173                      | 59 678   | 597      | 12        | 2.5      |
| Greater Poland  | 2 982 650             | 29 826                      | 149 191  | 1 491    | 14        | 5.0      |
| West Pomeranian | 2 289 732             | 22 897                      | 141 079  | 1 411    | 22        | 6.2      |

Table 3. Characteristics of basic administrative units in Poland in terms of population and residents of cities over 20 000 inhabitants (data from 2017), [10]
| voivodships          | number of citizens | population in cities over 20 000 residents |
|----------------------|--------------------|--------------------------------------------|
|                      | total number       | person/km² | total number | average number of people in the city | person/km² | % in the total number of people in the province | cities over 20 000 citizens |
| Swietokrzyskie       | 1 247 732          | 107        | 572 136      | 18 456                                   | 855        | 44.9                                             | 6                         |
| Warmia Mazurian      | 1 433 945          | 59         | 860 237      | 17 556                                   | 1 441      | 59.3                                             | 11                        |
| Greater Poland       | 3 489 210          | 117        | 1 920 117    | 17 616                                   | 1 287      | 55.5                                             | 20                        |
| West Pomeranian      | 1 705 533          | 74         | 1 183 574    | 18 493                                   | 839        | 68.8                                             | 11                        |

Table 4. Quantitative characteristics of allotment gardens in Poland, broken down into basic administrative units, including their area (data from 2017), [10, 11].

| voivodships          | area [ha] | gardens total number | area [ha] | total number | cultivated area [ha] |
|----------------------|-----------|----------------------|-----------|--------------|----------------------|
| Poland               | 31 269 610| 4 636                | 40 556.9  | 917 445      | 31 961.9             |
| Lower Silesia        | 1 994 670 | 525                  | 6 299.2   | 150 092      | 4 792.5              |
| Kuyavian-Pomeranian  | 1 797 134 | 396                  | 2 676.5   | 53 985       | 2 030.7              |
| Lublin               | 2 512 246 | 169                  | 1 285.0   | 29 927       | 1 007.8              |
| Lubusz               | 1 398 793 | 191                  | 2 105.5   | 44 569       | 1 699.3              |
| Lodz                 | 1 821 895 | 306                  | 1 974.8   | 44 332       | 1 520.5              |
| Lesser Poland        | 1 518 279 | 454                  | 1 239.8   | 29 118       | 961.3                |
| Masovia              | 3 555 847 | 454                  | 3 490.6   | 79 431       | 2 706.1              |
| Opole                | 941 187   | 104                  | 1 633.1   | 38 521       | 1 319.5              |
| Sub Carpathian       | 1 784 576 | 161                  | 1 307.5   | 29 140       | 1 060.6              |
| Podlaskie            | 2 018 702 | 98                   | 951.0     | 21 281       | 733.9                |
| Pomeranian           | 1 832 193 | 252                  | 2 685.8   | 62 439       | 2 180.4              |
| Silesia              | 1 233 309 | 660                  | 4 227.4   | 101 718      | 3 523.9              |
| Swietokrzyskie       | 1 171 050 | 79                   | 810.1     | 18 699       | 609.3                |
| Warmia Mazurian      | 2 417 347 | 242                  | 2 231.4   | 48 602       | 1 749.4              |
| Greater Poland       | 2 982 650 | 508                  | 4 125.4   | 91 592       | 3 215.7              |
| West Pomeranian      | 2 289 732 | 251                  | 3 513.9   | 73 441       | 2 850.9              |
Table 5. Changes in the number of allotment gardens and the area they occupy in the Lower Silesia Voivodship in the years 2003-2017, [11]

| Year | area [ha] | gardens | total number | area [ha] | allotments | total number | cultivated area [ha] |
|------|-----------|---------|--------------|-----------|------------|--------------|---------------------|
| 2017 | 1,994.670 | 525     | 6,299.2      | 150,092   | 4,792.5    |
| 2016 | 1,994.670 | 528     | 6,270.5      | 150,650   | 4,811.0    |
| 2015 | 1,994.674 | 528     | 6,284.4      | 138,409   | 4,742.0    |
| 2014 | 1,994.674 | 535     | 6,376.7      | 152,240   | 4,834.2    |
| 2013 | 1,994.674 | 536     | 6,405.7      | 152,880   | 4,865.9    |
| 2012 | 1,994.674 | 536     | 6,445.9      | 153,254   | 4,907.1    |
| 2011 | 1,994.674 | 540     | 6,480.8      | 154,319   | 4,942.0    |
| 2010 | 1,994.674 | 545     | 6,482.5      | 154,375   | 4,943.8    |
| 2009 | 1,994.674 | 546     | 6,501.0      | 154,632   | 4,948.0    |
| 2008 | 1,994.674 | 546     | 6,503.7      | 155,332   | 4,953.9    |
| 2007 | 1,994.677 | 547     | 6,556.9      | 156,760   | 5,002.9    |
| 2006 | 1,994.677 | 545     | 6,560.2      | 156,911   | 5,006.6    |
| 2005 | 1,994.677 | 560     | 6,577.6      | 157,165   | 5,027.5    |
| 2004 | 1,994.677 | 561     | 6,597.4      | 157,373   | 5,030.2    |
| 2003 | 1,994.674 | 564     | 6,617.0      | 155,862   | 5,040.5    |

3.1. Elements of greenery structure in the urban tissue on the example of Wrocław

Plans regarding the urban greenery system in Wrocław were created at the beginning of the 19th century, when the first municipal parks were designed and opened. An interesting and existing element of the green infrastructure system is the Old Town Promenade, which was created on the site of the former fortifications of the Wrocław fortress (Festung Breslau). At the beginning of the 20th century, during the planning work, the importance and effectiveness of the green wedge system of the city was emphasized, mainly based on the greenery accompanying numerous riverbeds crossing Wrocław. After World War II, more urban parks were created, some of them in locations cleared out by demolition of damaged buildings, e.g. Wzgórze Andersa, the green wedge between Borowska Street and Ślężna Street, or the greenery within Kępa Mieszczańska and Wielka Wyspa [12]. Nowadays, Wrocław’s greenery system has the features of a ring-wedge system. The planning documents emphasize its ecological role: playing part in the proper functioning of the city’s climate, ensuring the continuity of biologically active areas with the surrounding city space, and the need to properly shape and equip green areas with elements serving the local community to provide recreational functions [9,13].

The first allotment gardens were established in Wrocław in 1840. The period between 1924 and 1925 was a particularly important one in the development of this type of areas and city planning policing – this is when the Wrocław City Development Plan (Stadterweiterungsamt) was compiled based on documents prepared partly for the 1921 competition for the Wrocław development plan [14]. The plan defined areas for development, industrial functions, areas of national railway, agriculture, public
greenery, as well as areas that were to include garden allotments. The location of green areas, including allotment gardens, has been linked to the areas of river valleys, flood plains and areas with high levels of groundwater. The next stage of planning works within the city was the development of the General Plan of the City of Wrocław (Generalbebaungsplan) [15]. It further defined in more detail the location of allotment gardens in the immediate vicinity of sports and recreation squares, parks, railway lines and residential areas. Moreover, their even dispersion along the perimeter of the city ring was emphasized. They were designed in detail, with a regular compositional arrangement, making references to the concept of a "city-garden". Public spaces (squares, sports grounds and greenery) and smaller enclosed spaces (garden plots and playgrounds) were distinguished [16]. After the First World War, the administrative area of Wrocław was expanded. At that time, the changes in the functional structure that took place were favorable for the greenery system, with the extension of city parks, small cemeteries situated near churches and synagogues were removed (large-scale municipal cemeteries were established), and the areas of allotment gardens were enlarged considerably. In 1928, the administrative area of the city was increased by 3.5 times by including agricultural and forest areas located in the direct buffer zone of the Wrocław border. Until the Second World War, sports and recreational infrastructure was dynamically developed, and the implemented investments were conducive to the creation of new allotment and home gardens. Planners working within the city noticed the need for integration and a specific combination of existing elements of greenery, so as to combine the existing green wedges with the emerging outer ring of parks, gardens and forests. At that time, model assumptions of "housing estates – gardens" were created, which also favored the strengthening of green infrastructure [17]. After the Second World War, during the reconstruction of the city, special attention was paid to the creation of allotment gardens, and their area was significantly enlarged. The years 1960-1980 were a period of stabilization of the city limits and the size of the area it occupied. Unfortunately, pre-war plans and concepts for strengthening the ring-wedge system of greenery have not been completed. However, in comparison to other Polish cities, one can observe a increasing trend in the size of allotment gardens zones [17,18]. In the last decades of the 20th century, Poland's economic and political changes also resulted in transformations in the spatial policy of cities. Urbanized areas flourished, and much more attention was devoted to the areas of public greenery and finding new functions to wastelands (figure1).

Currently, there are 159 Family Garden Allotment Plots in the city of Wrocław, whose total area is 1 429 ha and includes 35,000 individual plots [19]. Most of them are located on the inner ring of greenery of Wrocław, and at the same time on the outer contour of the historic center – a terrain with a very high level of urbanization. They are therefore a very important element interconnecting other parts of the city's greenery system. It has been pointed out that the compositional elements of spatial arrangements of allotment gardens have been largely lost. There remains a typical geometric division of space into individual plots, but the main compositional axis disappears as well as open areas (sports, recreation), located in the immediate vicinity of the gardens. These areas were available to all residents. Moreover, at present, the areas of allotment gardens are enclosed, fenced spaces that are available only to the owners of individual plots. Nowadays, one can notice quite characteristic trends in the manner of developing individual garden plots. The first of these is associated with the emergence of the "new type of owners", emphasizing primarily recreational and leisure functions. The second one is a continuation of the traditional form of use, primarily associated with health functions and the possibility of growing vegetables and fruit. The third one is a transitional form between the recreational-leisure form and the traditional one.
Figure 1. Upper left: Promenada Staromiejska (Old Town Promenade) – Bulwar Tadka Jasińskiego (Tadek Jasiński Boulevard). Upper right: green areas along the River Oder, Osobowicki Bridge area. Lower left: entrance to the Family Garden Allotments Śnieżka at Jana Kasprowicza Ave., Lower right: cultivated greenery in Promenady Wrocławskie housing estate, in Zakładowa St. source: authors’ photographs

The new type of owners are residents of Wrocław aged 30-40, working in Wrocław or in its vicinity. They treat the allotments as a place of recreation, integration and meetings with family and friends. Most residential buildings in Wrocław are housing estates consisting of multi-storey blocks. Despite the existence of estate greenery and city parks, these people declare their will to own plots. A certain type of conformism and other social needs make them want to live in a vibrant urban agglomeration, but at the same time to have their own garden as a place of leisure. These needs are reflected in changes in architectural elements and vegetation. A visible trend is a much greater care of the architectural elements in these areas. Garden houses are renovated, equipped with additional elements such as roofs, separate sheds for garden tools, or renovation equipment. Additional elements such as sandpits, swings, hammocks or brick garden grills or large tables with benches are introduced. It is very popular now to have basic infrastructure elements such as electricity (necessary for lighting in the evenings and at night, and the use of small electronic and technical equipment), or wells with drinking water. Field studies have shown that the dominant species of plants are fruit trees and shrubs, which do not require extensive care. Typical garden plot-associated vegetables and flowers are limited to a minimum or treated as decorative elements mostly.

The second characteristic type of allotment gardens’ development emphasizes their traditional functions. Most commonly, the owners of such plots are people over 50 years of age. These people often
inherited the plots, hence from an early age they were raised in this trend of cultivation and learned the way of growing plants. Within these allotment gardens, positive changes related to the improvement or introduction of infrastructural elements (electricity and water) are also noticed. Architectural elements are treated very practically, they are made of durable materials, decorative details are rare. Some characteristic elements include hotbeds and small garden greenhouses. In terms of the cultivation of plants, these plots are especially well cared for and varied. The selection of flowers, vegetables, and fruit is varied, often serving as a source for homemade preserves.

Figure 2. Spatial structure analysis of Wrocław. Upper left: Area function analysis. Upper right: Location and developmental trends analysis for the greenery system. Lower left: Location and developmental trends analysis for residential and services areas. Lower right: Location and developmental trends analysis for industrial, military areas and infrastructure. Source: own elaboration

The third trend in shaping spatial development of allotment gardens is a somewhat transitional form, which has elements characteristic of the traditional form of plots, as well as a new recreational and leisure trend. The owners of such gardens are usually people who have inherited plots or are their new owners and gradually try to transform them in accordance with their own individual needs. A characteristic feature of this trend is a gradual introduction of changes, consisting mainly in modernization, renewal or addition of new architectural elements and transformation of greenery. Changes in greenery include gradual elimination of vegetable and fruit patches, for the benefit of
decorative shrubs or recreational spaces, e.g. lawns with permanent architectural elements such as garden grills, tables, benches and swings.

An interesting social phenomenon is how these trends co-function within one area of allotment garden plots. It supports the integration of social groups from different backgrounds and people working in completely different industries and having varied family, educational or religious experiences.

3.2. Analysis of the city area of Wrocław

The spatial structure of the city of Wrocław has been shaped not only by the vision of planners and architects, but also as a result of historical changes and natural spatial conditions of the area. In the city structure, one very important element is the hydrographic system of rivers, which does not only determine the possibility of land development, but also determines the framework of the ecological structure of the city, constituting a kind of skeleton of the greenery system. From the architectural and historical point of view, the city's old defense system is an important feature.

In the spatial analysis, 5 categories have been distinguished: greenery systems (compact green areas, greenery, allotment gardens, service greenery, cemeteries). These categories intertwine to form a radial-concentric system. The most important element is the areas of compact greenery. The pattern of space in this category is characterized by fairly consistent continuity. Their shape is conditioned by the river system and the areas of urban forests. These are areas characterized by a fairly diverse course of the separation boundary. The range of this category is limited mainly by urbanized areas. The other categories are complementary elements of the city's skeleton greenery. Most of them are located in the immediate vicinity of compact greenery, which ensures continuity and consistency. However, the other categories are a somewhat complementary. In the city center, the occurrence of small biologically active areas in terms of the area occupied determines the proper functioning of the urban system in ecological terms. There are green squares, green areas along communication routes and estate greenery. The remaining three categories of land use (which build the city's greenery system - allotment gardens, cemeteries, service greenery) are areas that, through their development, also perform other accompanying functions. The combining features are the geometric shape, regular course of borders resulting from the functional division of the city, and the course of communication routes. They also have clear boundaries of anthropogenic origin in the form of fences. The service greenery performs recreational, social and educational functions. Cemeteries are distinguished by social and mental as well as semantic meaning. Allotment gardens have various functions depending on the individual manner of development. They are areas of recreation, leisure, social and family integration. The traditional use and development of these areas allows for amateur production of fruit and vegetables. For seniors, they are an extremely important activating factor (table 6, figure 2).

Areas with a residential function have been divided into two categories. The first one is the areas of compact development with an accompanying service function - small accompanying services constituting an integral element. They occupy the city center and three much smaller sections: in the north-eastern part - Psie Pole, in the western part - Leśnica, and in the south-eastern part - Brochów. These are areas with a consistent layout, and have regular geometric boundaries. They are accompanied by small greenery areas. Other areas of buildings with a housing function are arranged in three "wedges". An element closely related to the residential category are service areas. They have a geometric shape, and depending on the specificity of use, they can be fenced (table 6, figure 2).

The urban structure shows a clear pattern of their location: along the most important communication routes, but also the ring system can be identified - at a distance of about 5 - 7.5 - 10 kilometers from the city center. Industrial areas, infrastructure and military areas are located mainly on the outskirts of the city. They are also areas with geometric shapes. They form bands, crossing the city from the north-west to the south-east (table 6, figure 2).
Table 6. Detailed characteristics of the land use categories in the city of Wrocław.

| category                           | location                                                                 | size                  | shape                                 | borders                                                              | continuity                                      |
|------------------------------------|--------------------------------------------------------------------------|-----------------------|---------------------------------------|----------------------------------------------------------------------|------------------------------------------------|
| high greenery                      | • areas that cut into the urban structure with narrowing wedges          | large areas           | • compact surfaces                    | • a small amount of artificial anthropogenic boundaries              | • clear continuity in the urban structure      |
|                                    | • band shaped areas                                                      | historically conditioned location (former areas of the Wrocław fortress) or natural factors (numerous riverbeds) | • band separations | boundaries conditioned by the course of urbanized areas             |                                                |
|                                    |                                                                         |                       |                                       | areas with the most diversified course of borders                    |                                                |
| cultivated greenery                | • areas located near residential areas                                   | varied area           | geometric separations due to the division in the urban structure and the course of communication routes | limited number of artificial anthropogenic boundaries               | lack of continuity in the urban structure      |
| allotment gardens                  | • scattered areas in the city structure                                  | areas with a varied size | geometric separations due to the division in the urban structure and the course of communication routes | clear boundaries of anthropogenic nature - fencing                 | lack of continuity in the urban structure      |
|                                    | • the largest concentration of land is about 5 km from the city center - scattered around the district |                       |                                       |                                                                     |                                                |
| cultivated greenery with services  | • location determined by planning the urban structure or historically conditioned (areas existing for several decades) | areas of considerable size | geometric separations resulting from division in the urban structure and the course of communication routes | clear boundaries of anthropogenic origin - fencing                  | lack of continuity in the urban structure      |
| cemeteries                          | • location determined by urban structure planning or historically conditioned | areas of considerable size | geometric separations resulting from division in the urban structure and the course of communication routes | clear boundaries of anthropogenic origin - fencing                  | lack of continuity in the urban structure      |
| intense residential areas          | • city centre                                                             | large areas           | • compact surfaces                    | lack of clear boundaries                                            | clear continuity in the urban structure        |
|                                    | • areas on the outskirts of the city - former villages, incorporated into the urban str. with an educated structure |                       |                                       |                                                                     |                                                |
|                                    |                                                                         |                       |                                       |                                                                     |                                                |
| Category       | Location                                                                 | Size       | Shape       | Borders                                                                 | Continuity                          |
|----------------|---------------------------------------------------------------------------|------------|-------------|-------------------------------------------------------------------------|--------------------------------------|
| Residential Areas | • about 5km away from city centre; • areas located at different distances from the city center; • located close to the main communication routes, in concentric bands | • large areas; • areas of considerable size | • compact areas; • geometric separations resulting from division in the urban structure and course of communication routes | • boundaries of anthropogenic origin; • separated, enclosed housing estates | • clear continuity in the urban structure; • limited number of artificial anthropogenic boundaries | • lack of continuity in the urban structure |
| Service Areas   | • areas mostly located on the outskirts of the city; • located close to the main communication routes, in concentric bands | • areas of considerable size | • geometric separations resulting from division in the urban structure and course of communication routes | • clear boundaries of anthropogenic origin - fencing | • lack of continuity in the urban structure |
| Industry Areas  | • location conditioned by the course of infrastructure networks | • varied area | • geometric separations resulting from division in the urban structure and course of communication routes | • clear boundaries of anthropogenic origin - fencing | • lack of continuity in the urban structure |
| Infrastructure  | • historically conditioned location - areas existing for several decades | • areas of considerable size | • geometric separations resulting from division in urban structure and course of communication routes | • clear boundaries of anthropogenic origin - fencing | • lack of continuity in the urban structure |

Source: own elaboration

4. Conclusions

Greenery systems within any urban tissue should serve as a skeleton for the urbanized space, as it performs the role of a component that integrates and supports other elements of that space. They ensure proper circulation of matter, ecological and natural continuity. They also are crucial in integration of green areas located in city buffer zones or areas surrounding urbanized spaces. They have significant impact on the quality of a city’s climate, regulating air temperature, humidity and ventilation processes.

Taking all these into consideration, is the city greenery shaping and modification is now an issue of paramount importance for designers, urban planners, ecologists and urban space management specialists. Allotment gardens are a constituent part of urban greenery and are a crucial component of city structure. They are biologically active, and help to maintain good communication between other elements of urban greenery. At the same time, they are a source of new investment sites enjoying good communication and convenient location within a city. They were established as a result of the economic and social changes of cities in the nineteenth century. In the industrial revolution era, cities struggled...
with increasing environmental, social, and most importantly, planning problems. City structures developed dynamically, industrial areas and workers’ districts were expanding rapidly. The idea of creating garden allotments was mainly associated with workers’ and industrial districts. Gardens were meant to enrich these areas providing them with diversity of development, to strengthen their natural environment, enable independent production of food and enrich the choice of food resources, and to diversify leisure opportunities available to the working classes. Nowadays, the idea is being reborn in many cities. At the same time, the importance of garden allotments in activating and integrating the elderly population and the occupationally inactive [20] is strengthened. Often, their role and function related to the independent production of fruit and vegetables is reduced, giving ground to recreation, leisure and building family and community bonds. They can contribute to building social cohesion and strengthening the relationships within local communities. Their ecological functions are also extremely important. They strengthen the natural urban system by ensuring the continuity of green areas. As biologically active areas, they positively influence city climate by reducing noise and by helping maintain the balance in air humidity and temperature.

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