TREES WITH MONUMENTAL DIMENSIONS IN THE SOUTH-WESTERN PART OF THE POZNAŃ AGGLOMERATION

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ABSTRACT. The research was carried out within three forest-park complexes located in the south-western part of the Poznań city, which once had the status of ecological uses. The aim of the work was to inventory a dendroflora for the selection of trees with monumental dimensions. In addition, changes in the participation of monumental trees in local vegetation over the last 12 years had been analysed. During the current inventory, 58 monumental specimens were recorded in three afforestation complexes. Most of them grew at Leszczyńska street (31 specimens), and the least at Tyniecka street (6). Since 2004 tree trunk perimeters had increased on average of 18.5 cm. All activities, including conservation works, undertaken in the three described afforestation complexes, or in the immediate vicinity, should lead to the preservation of these objects, their protection against devastation and to expose their most valuable fragments.

KEY WORDS: dendroflora, tree monuments, urban greenery, Poznań

INTRODUCTION

In the south-western part of Poznań city, in the valley of Junikowski stream, there is an area of closed excavations of the former Poznań clay mines. Clay exploitation was carried out for the needs of local brickworks from the late nineteenth century up to the seventies of the last century (Kaniecki et al. 1993). The natural habitats occurring here have been subjected to far-reaching degradation. However, this area until now has been a habitat of rare plant and animal species (Jackowiak 1995, Ludwiczak 1995, Kluza-Wieloch et al. 2006, Wrońska-Pilarek et al. 2016a).

Due to its natural values, the area from 1994 to 2000 was under the legal protection and two ecological uses (“Kopanina I” – 58 ha and “Kopanina II” – 68 ha), were established (Kluza-Wieloch et al. 2006). Currently efforts are being made to restore this form of nature protection, based on the floristic and faunistc studies, updated in 2016 (Wrońska-Pilarek et al. 2016a). This area characterised by a high environmental and geomorphological diversity has been interested in scientists for many years. Flora and fauna researches were studied here, among others: Urbanśki (1930), Rafałski & Urbanśki (1932), Dziaszelewski (1962), Olejniczak & Szeląg (1980), Rudawski & Kusiak (1994), Burchardt & Szeląg-Wasilewska (1995), Ptaszyn (1995, 2003), Kluza & Maciejewska (1998, 1999), Król et al. (1998), Kluza et al. (1999), Włosi-Kwietnica (2000a, b), Ptaszyn et al. (2002), Śmiełowski & Dziesiolski (2002), Maciejewska-Rutkowska et al. (2008), Kluza-Wieloch & Maciejewska-Rutkowska (2009, 2010, 2015), Maciejewska-Rutkowska & Kluza-Wieloch (2014).

The area is rather wet but also includes three forest-park complexes. The aim of the research was to carry out an up-to-date inventory of trees with monumental dimensions in the area described above and to compare current results with previous data (Kluza-Wieloch & Maciejewska-Rutkowska 2008).
METHODS

There are three afforestation complexes on the area of former ecological uses „Kopanina I” and „Kopanina II” located in the south-western part of Poznań (Fig. 1). Currently they have a nature of forest parks. The first one is located at Wykopy street, within the former use „Kopanina I” and covers an area of about 3.5 ha. The other two are located on the former use „Kopanina II”. Smaller, with an area of about 1 ha, is located near TyNiecka street, and a larger one, with an area of about 6 ha at Leszczyńska street.

Research on trees with monumental dimensions was made in 2004 and 2016. The trunk perimeters were measured at breast height (130 cm). A tape measure of 10 m was used for the measurements. The qualification of the individual trees was made on the basis of tables containing the values of the lower perimeter limits, classifying them as monumental trees (Pietrzak-Zawadka 2015). In 2016 the health condition of trees was also determined, and their exact geographical location was given by means of GPS (Table 1). A modified tree health scale was used, originally developed by Pacyniak & Smolski (1973), where respectively: 0 – means dying specimens, 1 – trees with more than 75% dead crown, 2 – specimens with more than a half dead crown, 3 – specimens having at least 25% dead crown and largely attacked by pests, 4 – trees with partially dying thinner branches in the upper part of the crown, with the presence of few plant or animal pests, 5 – completely healthy trees, without any losses in crown or presence of pests. Trunk growths for individual trees over the last 12 years were calculated, including their average as well as minimum and maximum values. The three examined objects were also compared according to the species and numerical composition of trees with monumental dimensions. Species names were given according to Mirek et al. (2002).

RESULTS

The results of field studies are summarised in Table 1. The comparison of the species and numerical composition of trees with monumental dimensions among the three examined objects appears that the most such specimens are currently located in the afforestation at Leszczyńska street, and the least...
Table 1. List of trees with monumental dimensions within the former ecological uses “Kopanina I” and “Kopanina II” in comparison with data from the literature (inventory works made 26–30.09.2016)

| No | Species | Family | Perimeter at the height of 1.3 m (cm) | Health condition (0–5) | Geographical localization |
|----|---------|--------|----------------------------------------|-------------------------|--------------------------|
|    |         |        | 2004 | 2016 |                                |                          |

**Kopanina I – Wykopy street**

1. *Acer platanoides* Aceraceae 224* 236 5 N 52°22’20.7° E 16°51’02.5°
2. *Acer platanoides* Aceraceae 249 267 5 N 52°22’20.7° E 16°51’02.7°
3. *Acer platanoides* Aceraceae 225* 240 5 N 52°22’20.8° E 16°51’02.1°
4. *Acer platanoides* Aceraceae 239 254 4 N 52°22’20.8° E 16°51’01.0°
5. *Acer platanoides* Aceraceae 252 274 5 N 52°22’21.2° E 16°51’01.0°
6. *Acer saccharinum* Aceraceae 273 289 4 N 52°22’24.0° E 16°51’06.7°
7. *Aesculus hippocastanum* Hippocastanaceae 330 – – –
8. *Alnus glutinosa* Betulaceae 225 – – –
9. *Alnus glutinosa* Betulaceae 320 – – –
10. *Alnus glutinosa* Betulaceae 234 – – –
11. *Fraxinus excelsior* Oleaceae 366 392 5 N 52°22’20.0° E 16°51’03.8°
12. *Juglans regia* Juglandaceae 213 234 3 N 52°22’18.1° E 16°51’04.3°
13. *Juglans regia* Juglandaceae 210 – – –
14. *Populus ×canadensis* Salicaceae 400 412 3 N 52°22’20.7° E 16°50’59.9°
15. *Populus ×canadensis* Salicaceae 415 423 3 N 52°22’23.6° E 16°51’06.6°
16. *Populus ×canadensis* Salicaceae 376* 403 3 N 52°22’19.3° E 16°51’08.4°
17. *Populus ×canadensis* Salicaceae 440 – – –
18. *Salix alba* Salicaceae 394 462 2 N 52°22’20.9° E 16°51’00.1°
19. *Ulmus laevis* Ulmaceae 275 293 4 N 52°22’20.7° E 16°51’02.2°
20. *Ulmus laevis* Ulmaceae 275 301 4 N 52°22’19.0° E 16°51’02.1°
21. *Ulmus laevis* Ulmaceae 311 335 5 N 52°22’17.3° E 16°51’05.8°
22. *Ulmus laevis* Ulmaceae 264 308 4 N 52°22’17.8° E 16°51’03.1°
23. *Ulmus laevis* Ulmaceae 225 257 4 N 52°22’18.3° E 16°51’02.2°
24. *Ulmus laevis* Ulmaceae 230 252 4 N 52°22’17.4° E 16°51’06.0°
25. *Ulmus laevis* Ulmaceae 250 272 4 N 52°22’17.3° E 16°51’06.0°
26. *Ulmus laevis* Ulmaceae 223* 245 4 N 52°22’22.7° E 16°51’04.8°
27. *Ulmus laevis* Ulmaceae – 272 4 N 52°22’20.8° E 16°51’01.7°
28. *Ulmus laevis* Ulmaceae – – – –
29. *Ulmus laevis* Ulmaceae 440 – – –
30. *Ulmus laevis* Ulmaceae 325 – – –

**Kopanina II – Tyniecka street**

1. *Acer platanoides* Aceraceae 240 258 4 N 52°21’38.0° E 16°51’49.8°
2. *Acer platanoides* Aceraceae 227* 235 5 N 52°21’38.2° E 16°51’49.7°
3. *Acer platanoides* Aceraceae 234* 255 5 N 52°21’38.0° E 16°51’50.1°
4. *Acer platanoides* Aceraceae 228* 236 5 N 52°21’35.5° E 16°51’48.4°
5. *Acer platanoides* Aceraceae 240 256 5 N 52°21’35.5° E 16°51’48.7°
6. *Acer platanoides* Aceraceae 226* 232 5 N 52°21’36.6° E 16°51’47.1°
7. *Fraxinus excelsior* Oleaceae 250 – – –
8. *Salix alba* Salicaceae 230 – – –

**Kopanina II – Leszczyńska street**

1. *Acer saccharinum* Aceraceae 333 341 4 N 52°21’39.4° E 16°52’37.1°
2. *Acer saccharinum* Aceraceae 234* 250 4 N 52°21’42.3° E 16°52’38.8°
3. *Acer saccharinum* Aceraceae 293 300 4 N 52°21’43.0° E 16°52’38.1°
4. *Acer saccharinum* Aceraceae 331 345 4 N 52°21’41.5° E 16°52’38.2°
5. *Acer saccharinum* Aceraceae 295 336 4 N 52°21’40.0° E 16°52’37.4°
6. *Acer saccharinum* Aceraceae 328 340 4 N 52°21’39.4° E 16°52’37.1°
7. *Acer saccharinum* Aceraceae 312 324 4 N 52°21’40.7° E 16°52’37.5°
8. *Acer negundo* Aceraceae 298 327 4 N 52°21’37.3° E 16°52’35.5°
9. *Acer negundo* Aceraceae 290 – – –
10. *Acer negundo* Aceraceae 287 – – –
11. *Acer platanoides* Aceraceae 285 – – –
12. *Acer pseudoplatanus* Aceraceae 284 300 5 N 52°21’39.7° E 16°52’38.7°
13. *Acer pseudoplatanus* Aceraceae 280 298 5 N 52°21’41.1° E 16°52’38.3°
at Tyśniecka street. Compared to the research from 2004, when a total of 66 monumental trees were recorded, at present 58 were found.

Compared to 2004, within the afforestation at Wykopy street, seven trees with monumental dimensions disappeared. Currently, there were no three black alder trees, two elm trees and one chestnut tree and one black walnut tree. While in 2016 five trees were noted, that were not included in the previous inventory and had recently reached the appropriate dimensions of their breast height. These were two common maples and one Canadian poplar and one white elm. During the current inventory, 21 trees with monumental dimensions grew on this studied area. They belonged to seven species of six genera. White elms were one of the most frequently found within magnificent trees at Wykopy street.

During current inventory within the object at Leszczyńska street 31 trees with monumental dimensions were described. They belonged to 10 species of seven genera. Compared to the previous
inventory (2004) 21 trees with monumental dimensions, including 10 white willows, four Canadian poplars, two ash maples and two black alders and individual specimens of common maple, sycamore maple and Scots pine, disappeared. In turn, during the last inventory works, 10 magnificent trees were recorded, which were either not shown in 2004, or in the meantime had reached the dimensions giving them the status of monumental trees. There were three Canadian poplars, three European ashes, two field elms and a silver maple and silver birch.

The comparison of the tree perimeters given in the 2004 (KLUZA-WIELOCH & MACIEJEWSKA-RUTKOWSKA 2008) with the data obtained in 2016 shows that tree trunks increased on average by 18.5 cm over twelve years. The largest growth was noted in the size of a specimen of white willow (68 cm), and the smallest in the common maple (6 cm). Compared to the other two afforestation complexes, the trees near Wykopy street were characterised by the largest growth of trunk perimeter.

Generally, in all three investigated areas the trees were on average in good condition. Most trees with monumental dimensions was classified to the fourth class of health (31 trees). They were characterised by only partially dying thinner branches in the upper parts of the crowns and by the presence of few plant or animal pests. 17 trees were completely healthy (5th class). Next nine trees were classified to the 3rd range of health. Only one tree (white willow) was to a large extent dead (2nd class). The trees growing in the afforestation near Tyniecka street were distinguished by the best condition (5th and 4th classes). A monumental tree in the weakest condition (2nd class) grew in the afforestation complex at Wykopy Street. The most often willows and poplars were in poor health condition and on the other hand Norway and sycamore maples, ashes and beech were the healthiest.

DISCUSSION

Currently, there are 32 natural monuments in the Poznań city, including three erratic boulders, eight avenues, five groups of trees and 16 individual trees. Together it consists of 903 monument trees, of which 748 grow in alleys, 139 in groups and 16 individually. Monumental trees in Poznań belong to 31 taxa (26 species, four hybrids and one variety), classified into 23 genera. The trees of horse chestnut (Aesculus hippocastanum), London plane (Platanus ×hispanica) and small-leaved lime (Tilia cordata; WRONSKA-PLAREK et al. 2016b) are the most common.

The number of nature monuments in Poznań is too small. This mainly applies to the individual trees. Therefore, 58 trees with monumental perimeters, growing in the described area, could be a significant supplement to the list of the most valuable trees in Poznań, after being protected in the form of natural monuments. Their presence significantly increases the natural value of the area. The occurrence of such valuable natural objects may contribute to the re-emergence of this area as a form of protection that is ecological uses.

The latest valuations of the former ecological uses “Kopanina I” and “Kopanina II” proved the described area to be very valuable in respect of nature (KLUZA-WIELOCH et al. 2006, WRONSKA-PLAREK et al. 2016a). Especially natural or semi-natural ecosystems of the object are very important for preserving biodiversity of Poznań city. It has high landscape and tourist values. It is distinguished by floristic richness (113 phytoplankton taxa, 54 bryophyte species, over 540 species of vascular plants, including 11 protected species, over 140 species of rare and endangered plants in Wielkopolska region and Poznań, and 58 trees with monumental dimensions in three forest and park complexes). The vegetation of the area is varied up to 65 plant communities, including 20 rare and endangered associations. The rich and valuable fauna (23 species of molluscs, 14 species of fish, 12 taxa of amphibians and 8 reptiles, 23 species of breeding birds and numerous migratory taxa and 13 species of mammals) (KLUZA-WIELOCH et al. 2006) is also the value of the described area. Additionally, it is worth mentioning the important didactic functions of the object for children and youth of different types of schools.

CONCLUSIONS

In current study totally 58 trees representing 13 species were found, that should be considered natural monuments in the examined afforestation complexes. The following taxa were the most often observed: Acer platanoides (11 trees), Ulmus laevis (9), Acer saccharinum (8), Populus ×canadensis (7) and Salix alba (6). Current investigation showed the object to be a valuable natural element of the south-western part of the Poznań city in reference to the dendroflora.

Most of the actually described trees with monumental dimensions in the studied area is in good condition.

Over 12 years from the previous inventory the trunk perimeter at the breast height has grown on average by over 18 cm. The largest growth of trunk was recovered at white willow.

The weather conditions in the last decade, in particular strong winds, resulted in extensive damages in habit of many old trees, leading even to their extinction. Nevertheless, the three areas of urban greenery studied are still of great natural value, as there are many trees with quite a large perimeter, which in a few years may achieve monumental dimensions.

All activities, including conservation works, directly undertaken in three described afforestation complexes or in their immediate vicinity should
lead to the preservation of these objects, protection against devastation and to display the most valuable parts of the stand.

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