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ORIGINAL RESEARCH ARTICLE

The current state of forest management in cities and associated problems in the Mazowieckie Province

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Abstract. The article presents research on the management and supervision of forests located within cities in the Mazowieckie Province. The information was obtained: from questionnaires sent to all 85 city authorities in the province. The questions were related to organization and supervision of forests, forest management and protection, recreational management and financing of forests, as well as main problems associated with the management of urban forests.

The research indicated that forests, which altogether cover more than 10% of city area, have a very important function, despite the forest area per resident being very small. The difficulties in forest management may arise due to their highly fragmented distribution as well as the mixture of many different types of forest owners.

Moreover, communal forests in the province's smaller towns lack proper management and protection structures and lack recreational facilities as local infrastructure is poorly developed. These sort of activities are conducted only in larger municipalities. Most of the non-state owned forests within cities have simplified forest management plans, which counts as a big plus for the Mazowieckie Province when considered in the context of the whole country.

Certain measures should be taken to improve the condition of urban forests in the Mazowieckie Province, and serve to preserve and protection these forests. It is fundamental that city governments should cooperate with as wide as possible a circle of interested parties, to undertake common activities in forests of various ownership types located within each given urban area. Additionally, all feasible sources of financing should be considered.

Key words: urban forests, urbanised areas, communal forests, private forests

1. Introduction

Urban forests have a principal role in implementing non-timber public functions, while production of raw timber in these forests is of small importance (Konijnendijk 2003). The most significant urban forest functions include enabling recreation and places for rest, protection of nature and landscape, protection of biodiversity, providing for aesthetical values, and shaping climatic conditions (Germann-Chiari, Seeland 2004). The importance of social functions in urban forests is supported by the fact that they are the most popular places of recreation in Europe (Konijnendijk 2003).

The Mazowieckie Province is one of the least forested regions of Poland. The area of forest per one resident in the Mazowieckie Province is on average a third less than the average forest area per Polish resident. The largest agglomeration of Poland is located there and also 84 other cities and towns, while the share of urban residents within the whole population of Mazowieckie Province is almost 65%, which is higher than the country average (about 61%) (GUS 2011b).

The aim of this paper is to present the research results related to management and supervision of forests located in urban areas of the Mazowieckie Province. The research analyses problems in organisation, supervi-

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sion, management and protection activities, recreational infrastructure and financing in urban forest areas. The study also presents the most essential practical problems with management of urban forests in the Mazowieckie Province.

2. Study area

Mazowieckie Province covers an area of 35,558 km^2 (11.3% of country area) and has population of 5243 thousand people (13.7% of population in Poland). In all, 85 cities are located within its boundaries, among which 39 have population below 10,000, 32 have population of 10,000 to 30,000, and 14 have population above 30,000 residents. Urban areas cover altogether 2157 km^2, or 6.1% of the province area, and are populated by 3386 thousand people, which is equal to 64.6% of the Mazowieckie Province population. The largest urban centres are Warszawa (1720.0 thousand residents), Radom (222.5 thousand residents) and Płock (126.1 thousand residents). The smallest towns include Wyśmierzyce (ca 900 residents), Mordy (ca 1800 residents) and Brok and Bieżuń (ca 1900 residents each) (GUS 2011b).

Forests located in the Mazowieckie Province cover an area of 8,207 thousand ha. The forest cover of the province is 22.7%, which is lower than the country average (29.2%). There is about 0.156 ha of forest per Province resident, which is a third less than the average forest area per Polish resident (0.239 ha). In the ownership structure, forests governed by the State Forests National Forest Holding have the largest area of 417.3 thousand ha, or 50.8% of the forest area in the Mazowieckie Province. Private forests cover an area of 353.4 thousand ha (43.1%) and forests with other ownership types cover an area of 50.0 thousand ha (6.1%) (GUS 2011a).

3. Methods

The general data on cities and forests of the Mazowieckie Province were obtained from the yearbooks of the Central Statistical Office. The more detailed information on forest management was collected using the 'Questionnaire on organization, management and financing in urban forest of the Mazowieckie Province'. The questionnaire was sent directly to all 85 city councils of the province. It was directed to the departments responsible for the supervision and/or management of urban forests.

The questionnaire contained questions related to forests, their management and nature protection within city boundaries. The respondents (representatives of the departments responsible for urban forest management) were asked to answer 16 questions on forests and forest management, specifically covering the following areas:

– general forest characteristics,
– forest supervision,
– financing of forest management and nature protection,
– selected problems with forest management (implementation of management and protective activities, and recreation).

The respondents were also asked to present their opinion on the topic of the most significant practical problems related to forest management in urban forests.

The research was conducted in autumn and winter of 2011. In total, 51 questionnaires wholly or partially filled were received. It equals to 60% of cities in the Mazowieckie Province. These cities cover 74.2% of province area and are populated by 85.3% of its residents. Relatively more responses came from the group of cities with population above 30,000 residents (11 questionnaires or 79%), and somewhat less from the group of cities with population of 10,000 to 30,000 residents (16 questionnaires or 50%). From the group of smallest towns with population below 10,000 residents came 24 questionnaires (62% of those sent). Among those replies received, only 15 respondents (which corresponds to 29% of received questionnaires) included their opinions on the problems related to the management in urban forests.

Due to incomplete information obtained in our survey, the current publication discusses problems linked to forest management (including recreational management) and forest protection in relation only to communal forests, meaning forests belonging to municipalities, and not all the forests located within urban boundaries.

4. Research results

4.1. Forest area, ownership structure and forest management planning

Combined forest area in 51 cities which replied to questionnaires is 17,597 ha. On average it equals to 11.0% of city area and 2.1 % of all forests in the Mazowieckie Province. The largest urban forest area is in Warszawa (6354 ha), Otwock (1878 ha) and Gostynin (1701 ha). Thirteen urban areas do not have forests at all, and forests in sixteen other urban areas cover less than 100 ha. The largest forest cover is in Gostynin (52.5%), Brok (44.9%) and Otwock (39.7%). Among cities where forests are present, the smallest forest cover is in Łosice and Iłża (less than 0.1%).

The forest area per 1000 residents is definitely the largest in Brok (665.7 ha), followed by Gostynin (90.0 ha) and Radzymin (76.1 ha). The smallest forest area per 1000 residents is in Łosice, Sokołów Podlaski and Iłża (0.1 ha). In three largest cities of the province, this number varies from 3.2 ha in Radom to 3.7 ha in Warszawa, which is clearly lower than the average in all cities of the Mazowieckie Province, equal to 6.1 ha per 1000 residents.

Private forests and forests owned by individuals (42.6% of area, 7494 ha) dominate the forest ownership structure in urban areas of Mazowieckie Province. Forests managed by the State Forests National Forest Holding amount to 33.8% (5943 ha) and communal forests (municipality forests, including cities with county rights or city counties) comprise 16.3% (2876 ha). Forests of other ownerships cover 7.3% of area (1284 ha).

There are also significant differences in ownership structure between studied cities. In Łosice, Iłża and Mogielnica all forests are communal. Within cities of Sokołów Podlaski, Nowy Dwor Mazowiecki and Ostrów Mazowiecka, only government owned forests managed by the State Forests are located. Seven cities (Zwoleń, Bieżuń, Garwolin, Brwinów, Halinów, Żelechów and Białobrzegi) have exclusively private forests. All three forest ownership types can be found in 12 cities of the Mazowieckie Province.

Regulations of the Act on Forests from 1991 declare that forest management in the State Forests is implemented according to forest management plans. Non-government owned forests base their activities on the simplified forest management plans, and for fragmented forests with an area below 10 ha forest management activities are stated in the decision of the county head based on the data of forest inventory. During the study period, ongoing simplified forest management plans existed in 25 among all 35 cities where non-governmental forests are present, which comes to 71% of their number. The area of forests covered by such plans was equal to about 10,000 ha or about four-fifths of all non-governmental forests in the cities discussed.

4.2. Forest supervision in urban areas

According to the regulations of the Act on Forests of 1991 (Ustawa 1991), supervision of forest management activities in governmental forests is implemented by the Minister of the Environment. A county head acts as a body supervising forest management in non-governmental forests (Art. 5.1). The city mayor implements the functions of a county head in city counties (Ustawa 1998, Art. 92.1). When agreement is reached, a county head can entrust realisation of such activities as supervision, including administrative decision-making, to a head of a State Forests district (Ustawa 1991, Art. 5.3).

The research results indicate that personal supervision on non-governmental forests was implemented by county heads (or city mayors) in 14 urban areas, which comes to 40% of areas, where non-governmental forests are present. In 21 cities, forest supervision was assigned to the heads of State Forests districts.

In Warszawa, forest management of communal forests as well as supervision of non-governmental forests is conducted by specially designated budgetary city unit, 'Warszawa Forests', which has its own staff, hired specifically for realisation of statutory activities in forests. In other cities, these activities are implemented by employees of agricultural or environmental protection departments within city or county councils (in cases when they are not entrusted to heads of State Forests districts).

4.3 Forest management and protection in communal forests

Table 1 presents the extent of the most important economic activities implemented in studied urban areas of the Mazowieckie Province in 2008–2010. Cities for which information was collected were grouped into three categories according to the number or residents: below 30,000 residents (14 cities), from 30,000 to 100,000 residents (7 cities) and above 100,000 residents (3 cities).

As indicated by the above data, forest management activities were conducted almost exclusively in large cities. Collectively in this group of urban areas, there were 10,000 cubic metres of timber harvested, stand treatment was implemented on an area of 23 ha, and new forest stands were planted on an area of 10 ha. Only stand treatment was conducted in all three cities of the group, while forest protection from wildlife damage and pests was implemented only in Warszawa. Occasional timber harvest was done also in two towns with population below 30,000 and in one city with population from 30,000 to 100,000.

4.4. Recreational management in communal forests

Similar to economic activities, recreational infrastructure in communal forests of the Mazowieckie province was not generally developed in small urban areas (Table 2). The research results show that the only city with well-developed recreational infrastructure is Warszawa. Small urban areas had only occasional recreational elements in their forests.

Table 1. The extend of the most important management activities in 2008–2010 conducted in communal forests of the Mazowieckie Province

Extend of management activity	City population [thousands]			
	<30	30–100	>100	total
Timber harvest (m^3)	129	35	9848	10.012
Stand treatment (ha)	0	0	230	230
Afforestation and reforestation (ha)	0	0	10	10
Protection from wildlife damage (ha)	0	0	73	73
Protection from pests (ha)	0	0	2698	2698

Table 2. Selected recreational objects in communal urban forests of the Mazowieckie Province

City size categories (residents)	Recreational objects						
	educational trails		bike trails		shade structures	campfire places	playgrounds
	number	km	number	km			
<30	1	5	5	13	0	0	0
30–100	1	3	1	0	0	0	0
>100*	8	23	0	0	64	33	13

*The results in this category are for Warszawa city.

4.5. Financing of communal forests in cities

Management of communal forests, including supervision and creation of recreational infrastructure are the tasks overseen by county heads (or city mayors). Tables 3 and 4 present information on the amount of costs in total and per 1000 residents spent on forest management activities, forest protection and infrastructure development. These costs do not include costs of forest administration and supervision.

Information presented in Tables 3 and 4 demonstrate that means for maintenance and management of communal forests were more commonly allocated in large urban areas. Only two cities from the group with population below 30,000 and four cities with population of 30,000–100,000 set aside means for urban forests during the period of 2008–1010. Warszawa city set a positive example within the group of largest cities. It has a specially designated city unit responsible for supervision and management of urban forests, which annually receives significant financial means for these purposes.

Besides Warszawa, the highest amounts of financing per 1000 residents intended on forest management in 2008–2010 were found in two cities with the population below 30,000 residents (on average 476 PLN/1000 residents). The average for four cities with populations from 30,000 to 100,000 was about 40% lower (296 PLN/1000 residents), and in the city of Płock with population of 126 thousand residents it was even lower – about 203 PLN/1000 residents. In contrast with this, the amount of financing in Warszawa was exceptional reaching almost 84 thousand PLN per 1000 residents. It is also important to mention that Warszawa was the only city which obtained means for financing of forest management in communal forests from other sources, such as the County Fund for Environmental Protection and Water Management.

4.6. Problems related to management in urban forests

The response to the open question on problems related to forest management in urban forests was included in only 30% of questionnaires received. Therefore, this information should be treated only as suggestions about the most important problems. They include:

- large fragmentation of communal forests within city boundaries and large variation in land ownership structure, which complicate effective forest management,
- significant anthropogenic impact, especially in large urban areas,
- littering in forests, destruction of forest vegetation and infrastructure,
- setting campfires in places not designated for such purposes and poaching,
- lack of up-to-date simplified forest management plans,
- lack of staff and required financial means.

Table 3. Total expenditures on forest management in communal forests in cities of the Mazowieckie Province during 2008–2010 (thousand PLN)

City size categories (thousand residents)	Funded from city budgets	Funded from the local funds for environmental protection and water management
<30	13.5	0
30–100	63.6	0
>100	14,455.4	3391.9
– including Płock	25.6	0
– including Warszawa	14,429.8	3391.9

Table 4. Expenditure on forest management in communal forests in cities of the Mazowieckie Province during 2008–2010 recalculated per 1000 residents (includes only those cities where given expenditures existed) (PLN/1000 residents)

City size categories (thousand residents)	Funded from city budgets	Funded from the local funds for environmental protection and water management
<30	476.0	0
30–100	296.4	0
>100	7828.6	1971.5
– including Płock	202.7	0
– including Warszawa	8389.5	1971.5

5. Discussion and conclusions

The research conducted indicates that forests comprise an important component of urban areas in the Mazowieckie Province. They cover more than 10% of all urban areas in the province, and in some smaller towns, forests cover up to 50% of their area. At the same time, the average forest area per city resident is quite low, except in several cities. Considering high environmental and social importance of forest ecosystems in cities as well as scarcity of those resources, it is absolutely necessary to preserve and protect them.

Urban forests primarily implement recreational and touristic functions, while timber harvesting is of secondary importance and usually accompanies stand treatment and protective activities as well as works related to providing safety to people and property (Zając et al. 2005). Besides creating necessary conditions for recreation and rest for city inhabitants, urban forests play an important role in protecting biological diversity, shaping the landscape, providing aesthetic values, regulating climatic conditions and supplying timber products (Ważyński 1995; Germann-Chiari, Seeland 2004).

Difficulties related to forest management in urban areas more commonly result from the large fragmentation of forests and large number of forest ownership types. In order to successfully implement all the goals and functions, it would be necessary to find a common approach that would allow implementing consolidated forest management activities in all forest ownership types within a single urban area. Therefore, forest management planning should extend beyond management plans and simplified management plans, and should become an essential component of city development plans and spatial planning documents (Grey 1996). Such an approach would require close cooperation among city councils, districts of the State Forests, private and other forest owners, and also city residents and social organisations. As demonstrated by Germann-Chiari and Seeland (2004), urban forests should reflect perception of forests by urban inhabitants and satisfy social needs.

Study results also indicate other problems. In smaller towns of the Mazowieckie Province, forest management and protection activities and also recreational management were not conducted in communal forests during the study period. Such operations were done in large urban areas. Assuming the data collected are reliable, it could be explained by the lack of interest in forest management by decision-makers, which also reflects on the noticeable deficiency of financial means for this purpose. With the presence of significant human impact on forests, adaptation of forests to the needs of recreation allows minimising the negative impact on forests by forest visitors (Springgate, Hoesterey 1995, Ważyński

1995; Łonkiewicz 1997; Malmivaara et al. 2002). Such adaptation should include development of functional network (such as roads, trails, rest areas, camp sites) equipped with technical infrastructure, as well as implementation of adequate forest management activities.

It is also important to mention that improvement of forest management and protection could be financed from sources other than city budgets. Protection of forest biological diversity could be co-financed from the Funds for Environmental Protection and Water Management (including the province fund), while development of recreational infrastructure and sport facilities could be carried out from the EU funds. The data collected indicate that the urban areas studied did not use these potential sources of financing.

There was also a positive phenomenon related to forest management activities observed in urban forests of the Mazowieckie Province. First of all, more than 70% of urban areas acquire up-to-date management plans for non-governmental forests, which covers about 80% of these forests. It is a much better result than national (62%) and Mazowieckie Province averages (60%) (GUS 2011a).

The second issue is linked to supervision over non-governmental forests. In more than half of the cities studied, supervision over forest management was entrusted to the heads of forest districts of the State Forests. Such a solution allows for conducting consistent activities in all forests within city borders and also implementing professional management of communal forests. The report of the Supreme Audit Office published in 2011 (NIK 2011) calls attention to the far-reaching inattentiveness of county heads (city mayors) related to preparation of simplified forest management plans for non-governmental forests as well as control over realisation of approved protective and management activities. At the same time, the officers of the Supreme Audit Office gave a positive estimate to the activities implemented by heads of the State Forest districts defined in the agreement with county heads. In addition, high marks should also be given to the specially designated forest management unit implementing activities described by the Act on Forests in Warszawa, where forests are affected by a remarkably high anthropogenic impact.

Based on the research conducted, the following conclusions were made:

1. Forests present an important component of urban areas in the Mazowieckie Province. Considering especially the high natural and social values of forest ecosystems in urban areas as well as scarcity of these resources in cities, it is necessary to undertake all possible activities needed for preservation and protection of such forests.

2. City authorities in co-operation with all possible related organisations should try to identify a common approach to the management of various forest ownership types existing within a single urban area.

3. It is desirable to develop a recreational infrastructure in forests, which would allow minimising the negative impact on forest resources.

4. Problems met by the units supervising and managing communal forests in urban areas of the Mazowieckie Province justify the need for strengthening supervision on forests.

5. City governments of the Mazowieckie province should search for alternative non-budgetary financial means for protecting natural resources and developing recreational infrastructure in urban forests.

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