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Forest site types and soil cover in the Roztocze National Park – the current state of knowledge

Typy siedliskowe lasu oraz pokrywa glebowa Roztoczańskiego Parku Narodowego – aktualny stan rozpoznania

SUMMARY

The forest sites and soil survey conducted by the Bureau for Forest Management and Geodesy, Branch in Lublin in the years 2009–2010 involved all of the Roztocze National Park (RNP). The studied area was 8335.31 ha. Throughout the Park, 417 soil sampling plots (open pits) and 2,400 auxiliary soil sampling plots (soil boreholes) were established. A total of 28 soil subtypes, subsumed under 14 soil types, were identified, with the most abundant soil type being rendzina. Furthermore, 17 forest site types were described, including 12 lowland and 5 upland forest site types. Two upland forest types (upland broadleaved forest and upland mixed broadleaved forest), were found to be predominant in the National Park.

Key words: Roztocze National Park, soil types, forest site types

STRESZCZENIE

Prace glebowo-siedliskowe wykonane przez Biuro Urządzania Lasu i Geodezji Leśnej Oddział w Lublinie w latach 2009–2010 objęły swym zasięgiem cały obszar RPN. Powierzchnia na której dokonano rozpoznania gleb i siedlisk leśnych wyniosła 8335,31 ha. Na terenie Parku założono 417 powierzchni typologicznych - odkrywek glebowych oraz 2400 powierzchni pomocniczych – wierceń glebowych. Ogółem wyróżniono 28 podtypów gleb, ujętych w 14 jednostkach nadrzędnych – typach gleb. Największą grupą gleb pod względem zajmowanej powierzchni są rędziny. Opisano także 17 typów siedliskowych lasu, wśród których znajduje się 12 typów siedlisk nizinnych oraz 5 typów siedlisk wyżynnych. Biorąc pod uwagę udziały procentowe powierzchni poszczególnych typów siedliskowych lasu, można zaobserwować zdecydowaną dominację siedlisk wyżynnych: lasu wyżynnego oraz lasu mieszanego wyżynnego.

Słowa kluczowe: Roztoczański Park Narodowy, typy gleb, typy siedliskowe lasu

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INTRODUCTION

The objective of the forest sites and soil survey was to identify soil types and subtypes and forest site types, to describe their diversity, delineate their ranges, and measure their areas. The results are useful for long-term planning and sustainable forest management, as well as natural protection.

The first thorough forest site types and soil survey for the Roztocze National Park (RNP) was carried out by the Habitat Unit of the Bureau for Forest Management and Geodesy (BFMG), Branch in Warsaw and Lublin at the beginning of the 1990s (6). That survey involved an area of 7948.54 ha and was based on 355 soil pits. It was later updated with an annex made by the Habitat Unit of the BFMG, Branch in Lublin in 1996 (7). That project involved a forest area of 441.59 ha, which had been transferred to RNP by the Zwierzyniec Forest District. The last forest site types survey of RNP was performed by the BFMG, Branch in Lublin in the years 2009–2010 (8). The results of the above survey are presented in this publication.

It should also be emphasized that apart from the above-mentioned comprehensive surveys carried out by the BFMG, the soil cover of RNP has been the subject of many studies and analyses (2, 3, 10, 11). The results of those studies reflect an evolving approach to the systematics and classification of soils, which makes them difficult to compare.

STUDY AREA, MATERIALS AND METHODS

The forest site types and soil survey conducted by the Bureau for Forest Management and Geodesy, Branch in Lublin in the years 2009–2010 involved all of the Roztocze National Park (RNP). The studied area encompassed 8335.31 ha. Fieldwork was started in April 2009 and concluded in April 2010. A total of 417 soil sampling plots (soil pits) were established, with one sampling plot per 40 ha, on average. A thorough description of the soil profile was made for each soil pit with samples taken for laboratory analysis. Furthermore, the tree cover and the herb and moss layers were characterized. The herb and moss layer was studied twice to reflect its spring and summer aspects. In order to delineate the actual borders of soil units and forest site types, 2,400 auxiliary soil sampling plots (soil boreholes) were established, with one site per approx. 4 ha, on average. In the field, the borders of soil units were delineated in line with the natural borders of forest site types. A total of 1,291 soil-and-site types units were defined, with an average area of 4.5 ha. The density of sampling sites was uneven. The location of boreholes was determined on the basis of land relief and the spatial habitat pattern. The survey was conducted in accordance with the Forest Management Guidelines, Part 2 “Guidelines on Site Types Identification and Mapping” (4) and the Classification of Forest Soils in Poland (8). Along with soil and forest site types identification, also the state of site types was diagnosed in terms of the degree of consistency or the nature of inconsistency of a given site with its natural form. Pursuant to the guidelines contained in the “Habitat-Based Forest Silviculture” (9), forest types were used as units for forest site types. Forest types determine the general forest cultivation goals linked to the forest-forming roles of the trees found in a given habitat. Forest types were identified and classified based on the species composition of trees and the site potential determined by the edaphic conditions of a given forest community. The survey provided the basis for drafting of soil and habitat maps for the entire area of RNP at 1:10,000 and 1:25,000 scales as well as for publishing the Habitat Report, which contains a detailed descriptive part, tables, and documentation materials.

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RESULTS

The soil pattern of the Roztocze National Park is closely linked to the properties of the soil parent materials, the local hydrological system, and the land relief (2). The predominant soil materials are sands, which occupy more than half of the park's area. They are particularly abundant in the south and in the vicinity of the Wieprz River (1). These sands are locally wind-blown and some high dunes are present. Furthermore, a large area is occupied by clay materials, which are typically deposited on limestone detritus. Small areas of RNP are also covered with silty loesses, which underlie the most fertile soils and forest habitats. The parts of the park at lower elevations, especially in the south, are covered with moist organic sediments, which typically gave rise to peat and muck soils.

During the 2009–2010 survey, 28 soil subtype units (subsumed under 14 soil types) were identified and delineated in the field (Fig. 1). In terms of area, the pre-

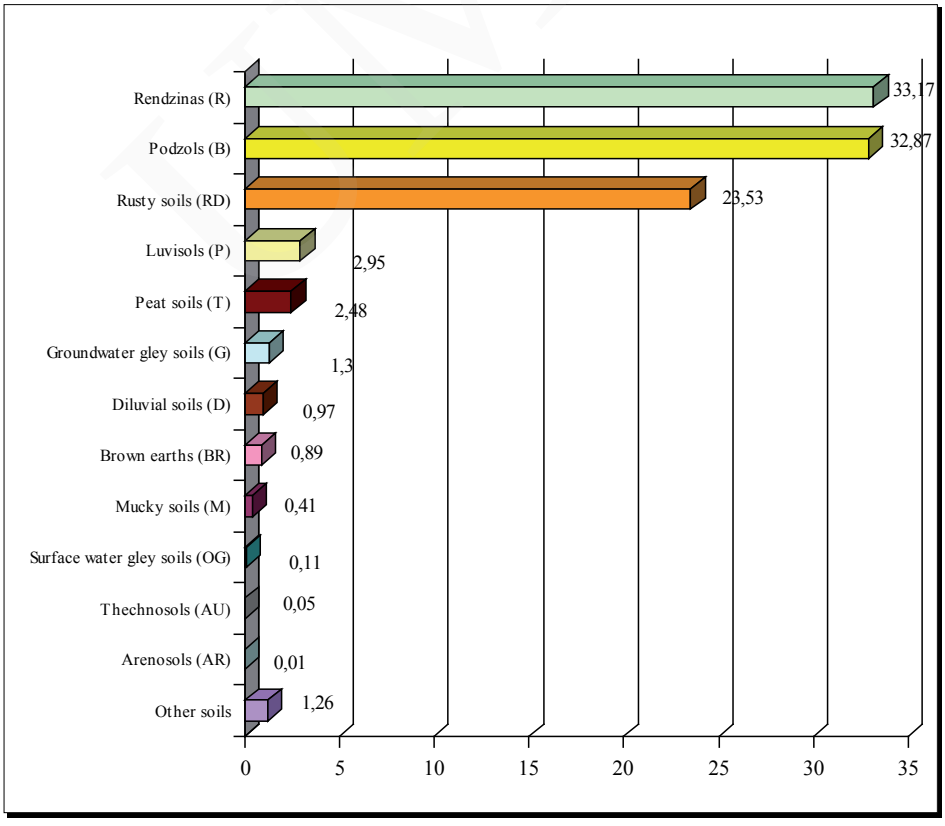


Figure 1. Percentage area of the various soil types in the Roztocze National Forest

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dominant soils are rendzinas (R), which cover 2764.94 ha (33.17%). These soils occur mostly on hilltops and other high terrain where limestone parent material is situated close to the surface. The rendzinas are subdivided into brown rendzinas (Rbr) with an area of 1779.91 ha (21.35%) and rendzinas proper (Rw) with an area of 985.03 ha (11.82%). Other major soils in RNP are podzols (B), with an area of 2739.87 ha (32.87%), and rusty soils (or entic podzols, RD), with an area of 1961.65 ha (23.53%). These soils arose on parent materials consisting of loose and weakly loamy sands. Other soils with an appreciable share in the RNP area are luvisols (P) which arose from loess silts – 246.11 ha (2.95%), peat soils (T) – 206.59 ha (2.48%), and groundwater gley soils (G) occurring in moist valleys and depressions – 108.44 ha (1.30%). The soil types occupying the smallest area in the park are brown soils (BR), diluvial soils (D), muck soils (MR), as well as surface water gley soils (OG), and arenosols (AR). The presence of some technosols (AU), modified by human activity, was also locally detected.

The 2009–2010 site types and soil survey identified 17 types of forest site types in RNP (Fig. 2), including 12 types of lowland and 5 types of upland forest

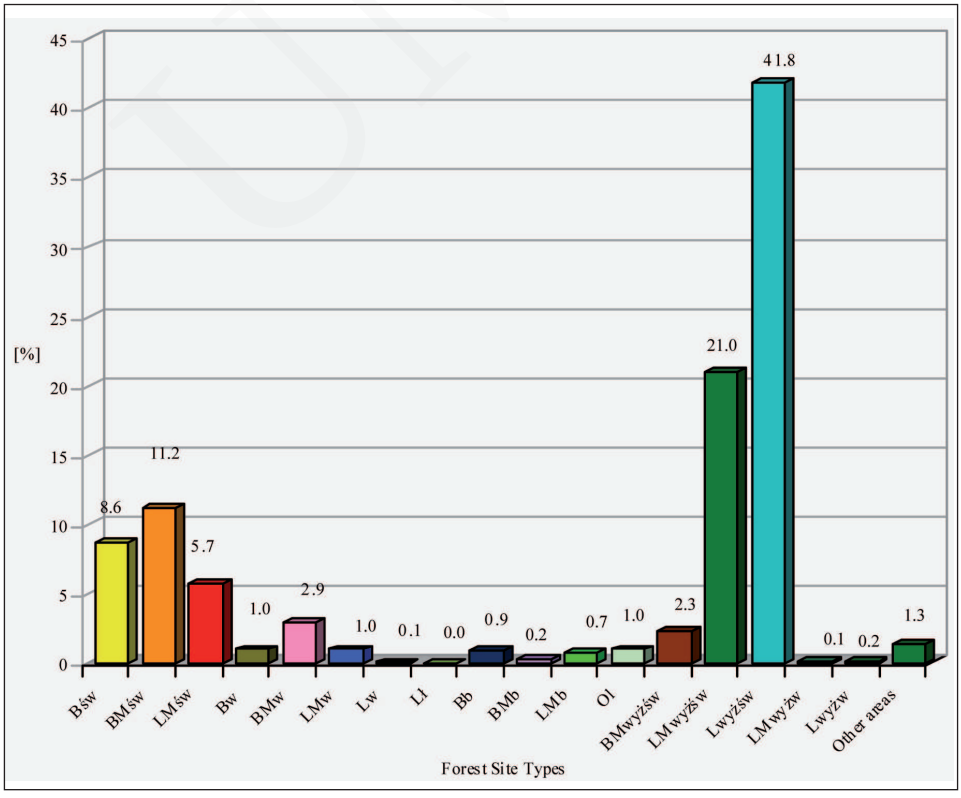


Figure 2. Percentage area of the various forest site types in the Roztocze National Forest

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site types. The park contains 878.72 ha of coniferous forest site types, 1387.37 ha of mixed coniferous forest site types, 2372.54 ha of mixed broadleaved forest site types, and 3590.91 ha of broadleaved forest site types.

Fresh forest site types are by far the most abundant, covering 7555.00 ha, which accounts for 90.58% of the park area. Moist forest site types occupy a total of 438.65 ha, or 5.26% of the area of RNP. Boggy forest site types occur on an area of 236.75 ha. In terms of area, the most predominant forest site types are upland habitats: upland fresh broadleaved forest (Lwyżśw – 3487.51 ha – 41.84%) and upland mixed broadleaved forest (LMwyżśw – 1747.04 ha – 20.96%). Other major forest site types include fresh mixed coniferous forest (BMśw – 937.01 ha – 11.24%), fresh coniferous forest (Bśw – 720.89 ha – 8.65%) and fresh mixed broadleaved forest (LMśw – 475.07 ha – 5.70 ha). The least abundant forest site type is flooded broadleaved forest (Ł), which was identified on an area of 0.86 ha.

Most of the forest site types identified in Roztocze National Park are in a natural state (N1) – 4550.06 ha, (approx. 54%) or a near-natural state (N2) – 2385.77 ha (approx. 28%). Distorted forest site types (Z1) cover an area of 1291.05 ha (approx. 15.49%), while degraded site types (D) occupy only 3.52 ha.

CONCLUSIONS

1. The state of knowledge of the soil cover and forest site types in Roztocze National Park is satisfactory from the point of view of the needs of ecosystem protection.

2. The methodology and scope of the present forest site types and soil survey of RNP are similar to those of the surveys conducted for the other forest areas in the Roztocze region, which are at the disposal of the management of the "State Forests" National Forest Holding.

3. Taking into consideration the natural changes to forest ecosystems occurring in RNP as well as the measures undertaken under the Protection Plan and leading to tree cover transformation, it would seem advisable to update the present forest and soil survey in the future.

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