

Ecological structure of Nasielsk commune in Poland

Beata Fornal-Pieniak, Maciej Żołnierczuk, Ewa Zaraś-Januszkiewicz
*Warsaw University of Life Sciences – SGGW, Department of Environmental
Protection*

Introduction

Green corridors have many ecological functions in rural areas. New settlements, not proper turistic activities, cutted forests are represented only in few examples, which could changed natural refuges and green corridors in rural commune. It is really important to shaping main green corridors including big and small natural refuges, which are represented by the forests, small group of trees or manor parks.

Background/Literature Review

Rural areas are focused mostly on agriculture aspects. The rural lanscape structure is included in many elements as forests, meadow, pasures, surface waters, rushes vegetation, peatbogs, river valleys, single trees, synantropical vegetation and settelemnts. The most important role have natural river valleys with many wet habitats, plant species and animals in rural landscape (Buček et al.1996, Żarska et al. 2014). ‘Green islands’, which are represented by old trees, manor parks, small forests, natural ponds with vegetation as remnants of biodivesity have got very important function in nature system of agricultural landscape (Hermy, Cornelis, 2000). In disturbed landscape ‘green islands’ should be protect and keep high nature aspects (Rylke 1987, Hermy, Cornelis 2000, Sikorski and Wysocki 2003, Żarska et al. 2014). The whole human activities should be including in sustainable development on rural commune.

Goals and objectives

The aim of the study was analysis of ecological structure, including ‘green corridors’ in Nasielsk commune (Poland).

Methods

The Nasielsk commune is located on north part of Mazovian voivodship. The surface of study area is 202,5 km². Accoring to physical and geographical division of Poland is belong to Ciechanowska Upland (Fig. 1).

The first step of research was focused on distinguished elements of landscape structure of Nasielsk commune, like river valleys, forests, meadows, pastures, fields and settlements as towns and villages. It was used Braun-Blinguet

important phytosociological method to recongized plant communities (Poore 1955, SAGLAM 2013). It was also grouped plant communities according to Matuszkiewicz (2012) classification and prepered assesment of their values. Degree of naturness vegetation was used as criteria of evaluation. The next stage of work was distinguished types and orders of ecological corridors using Źarska method (2006). It was aslo formulated directions for shaping landscape of Nasielsk commune.

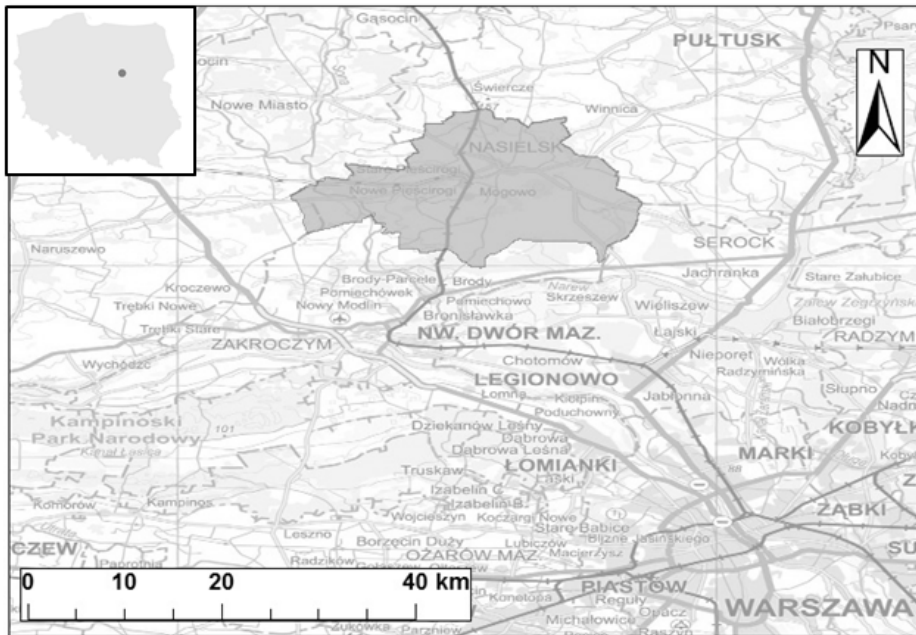


Figure 1. Location of Nasielsk commune

Types of vegetation and their evaluation

Agriculture areas are dominated, so semi-natural and synantropical vegetation are typical for Nasielsk commune. Forests, water and rushes plant communities as natural communities are occurred on study area, too. The biggest forests complexes are located on western, central and south-eastern parts of study area. It is also observed some groups of trees bushes and single trees growing on the fields, pastures and meadows. According to Matuszkiewicz (2012) plant species belong to *Quercus-Fagetea* Br.-Bl. et Vlieg. 1937, *Vaccinio-Piceetea* Br.-Bl. 1939, *Potametea* R.Tx. et Prsg 1942 ex Oberd. 1957, *Phragmitetea* R. Tx. et Prsg 1942, *Koelerio glaucae-Corynephoretea canescentis* Klika in Klika et Novak 1941, *Molinio-Arrhrntheretea* R.Tx. 1937, *Epilobietea angustifolii* R.Tx. et Prsg 1950 and

Artemisietea vulgaris LOHM., PRSG ET R. TX. IN R.TX. 1950 classes. Coniferous forests are dominated hereon upper terrains, and riparian forests, water and rushes communities are typical for floodplains areas and local depressions (Fig. 2). Small areas of Nasielsk community are occupied by oak-hornbeam forests. Oak-hornbeam forests prefer more fertile and fresh habitats. There are geophytes, characteristic life form plants in the spring period. Fragments of hornbeam forests are still in manor parks. No-forests communities are represented by meadows and pastures. Wet meadows (*Molinetalia caeruleae* W. KOCH 1926) prefer moist habitats with high groundwater level along river valleys. Fresh meadows (*Molinio-Arrhenathereta* R.Tx. 1937) are very decorative especially during the growing season. Ruderal vegetation occurs mainly in the settlements, ie. Towns and villages. Synanthropical communities are represented mainly by *Artemisietea vulgaris* LOHM., PRSG ET R. TX. IN R.TX. 1950 class.



Figure 1. The main ecological corridor represented by river valley with dominated riparian forests (Fornal-Pieniak 2015)

The most valuable areas (first category) are represented by river valleys with riparian forests, wet meadows, water and rushes plant communities. Vegetation on upper level as deciduous and coniferous forests and small local ponds (second category) (Fig. 3) with surroundings plants are classified to areas with high natural values.



Figure 2. Pond with vegetation as example of natural „green islands” in rural landscape (Fornal-Pieniak 2015)

Nasielsk commune has got agriculture character so fields and small fresh meadows are dominated here. These areas have got medium natural values (third category). Settlements as towns and villages are grouped to areas with low natural values (four category), because of too strong human pressure.

Analysis of ecological corridors and directions for landscape shaping

It was awarded the three orders and two types of ecological corridors as forests and water in river valleys (Fig. 4). The first order corridors are the most important connections in ecological network of commune. They are located on west, north and east part of Nasielsk commune. They are included in river valleys with forests and water. These corridors are really important for protection and migration of animals and collected plant species. The second and third orders of corridors are the most common on the study area. It was also recognized small refuges which are represented by small forests, wetlands, ponds and manor parks.

Agricultural land with small group of small forests as ‘green island’ is dominated here. Despite of this, there are several natural refuges, which are represented mainly by large forests, wetland areas (ecological aspects), small

areas with forests, ponds with water and rushes plant species and manor parks. These natural elements are as “green islands” with habitats for small mammals, insects, and valuable plant species in rural areas.

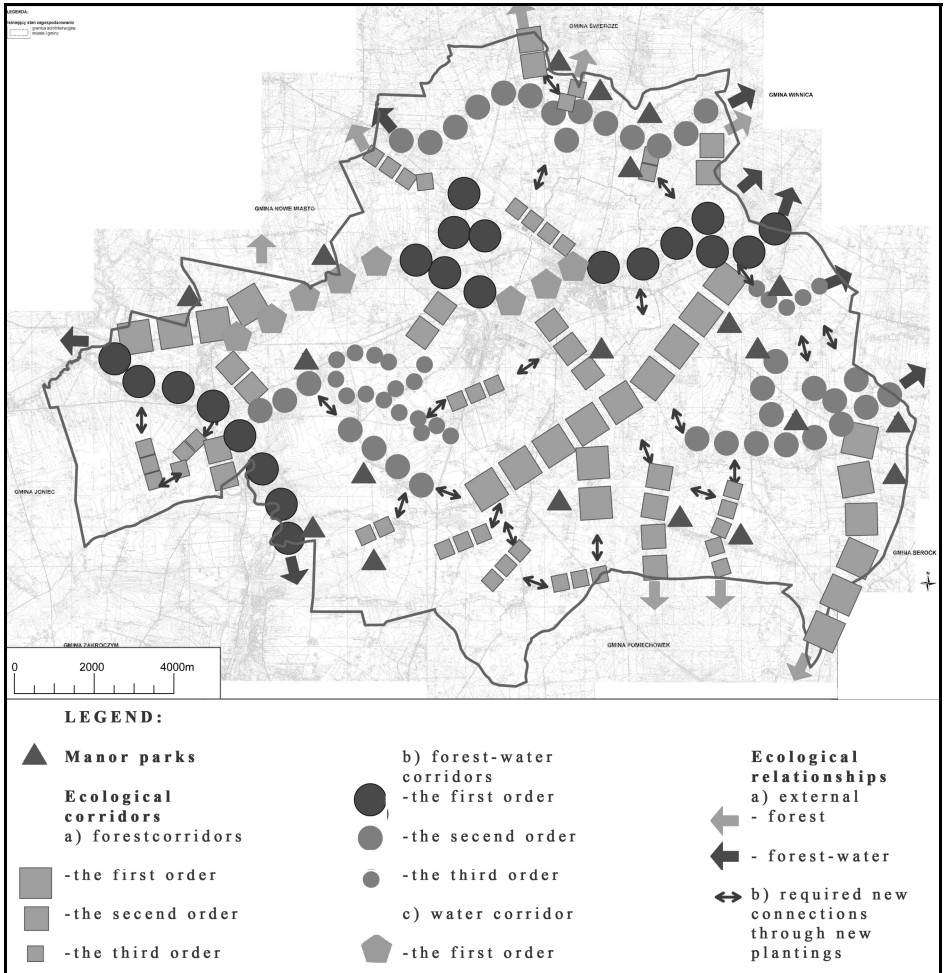


Figure 3. Analysis of existing ecological corridors and directions for landscape shaping (our research)

Orchards and soliters (Fig. 5) are also occurred there. These landscape elements also play a lower-level of biodiversity reservoirs.



Figure 4. Soliter in rural landscape (Fornal-Pieniak 2015)

The most important direction is to improve the functioning of ecological corridors and keep natural refuges (riparian forests, aquatic and rushes habitats). It is a priority to protecting these habitats because of their unique and small percentage cover not only in Nasielsk commune but in whole country. Many times it was observed that ecological corridors have not got proper structure. They are cutted by settlements or the other human managements. It is recommended new plantings of trees, which will strengthen the existing ecological structure and keep biodiversity of landscape commune.

Discussion

Nowadays changes in landscape structure and green corridors observed in rural areas in many countries (Le Cour et al. 2002, Marshall and Moonen 2002, Jim 2004, Orlowski and Nowak 2007).

It is observed landscape fragmentation and big pressure of human activities in natural, valuable areas also in Poland. So that's why is demanded good management to keep natural refuges and ecological corridors for proper function of rural landscape. Generally too high touristic pressure is very dangerous for plant species and animals. External and internal ecological connection should be exist in rural communities. It is very important for biodiversity of landscape shaping and improve ecological corridors in

agricultural communes (Żarska 2006, Żarska et al. 2014). What is observed old forests do not take a large areas so new plantings should be design in rural landscape (Liro and Szacki 1993, Shields et al. 2000). Polish river valleys are very valuable with riparian forests, water and rushes vegetation, so they should be protected (Żarsak B. et al. 2014). The ecological structure is not strong in Nasielsk commune. It is example of polish rural commune where agricultural areas are dominated. The problem of human pressure are still actual here. The proper landscape shaping and management have to be done to protected natural and seminatural areas.

Conclusions

1. Ecological structure need proper shaping to improve existing ecological corridors.
2. River valleys and local ponds should be protected and keep birds, animals and plant species which are occurred in wet habitats. It is really important for landscape biodiversity.
3. River valleys are the most important ecological corridors because of the highest percentage cover of natural plant communities in Nasielsk commune.

References

- Buček A., Lacina J., Michal I. (1996). An ecological network In the Czech Republic. *Journal of Nature Conservation*. 10. Veronica, Brno.
- Hermý M., Cornelis J. (2000). Towards a monitoring method and number of multifaceted and hierarchical biodiversity indicators for Urban and suburban parks. *Landscape Urban Planning*, 49, 149-162
- Jim C. Y. 2004. Spatial differentiation and landscape-ecological assessment of heritage trees in urban Guangzhou (China). *Landsc. Urban Plan*, 69, 51-68
- Le Cour D., Baudary J., Burel F., Thenail C. (2003). Why and how we should study field boundary biodiversity in an agrarian landscape context? *Agric. Ecosyst. Environ*, 89, 23-40.
- Liro A., Szacki J. (1993). Korytarz ekologiczny – przykład problematyki. *Człowiek i środowisko*, 17: 4, 299-312
- Matuszkiewicz W., 2012. Przewodnik do oznaczania zbiorowisk roślinnych Polski. *Guidebook to Recognized Plant Communities in Poland*. Warsaw PWN. Warszawa 1-537
- Marshall E. J., Moonen A. (2002). Field margins in northern Europe: their functions and interactions with agriculture. *Agric. Ecosyst. Environ*, 89, 5-21
- Orłowski G. Nowak L. (2007). The importance of marginal habitat for the conservation of old trees in agricultural landscape. *Landsc. Urban Plan*, 79, 77-83

- Poore T M. E. D. 1955. The Use of Phytosociological Methods in Ecological Investigations: I. The Braun-Blanquet System. *The Journal of Ecology*, 43, (1) 226-244.
- Rylke J. 1987: Wartości starych parków. Wyd. SGGW. Warszawa
- SAĞLAM C. 2013. A phytosociological study of the forest, shrub, and steppe vegetation of Kızıldağ and environs (Isparta, Turkey) *Turkish Journal of Botany* 37: 316-335
- Shields D. F., Simon A. J., Steffen J. L. 2000. Reservoir effects on downstream river channel migration. *Env. Con.*, 1 (27), 54-66.
- Sikorski P. Wysocki J. (2003). Charakter zmian struktury i składu gatunkowego zadrzewień parków wiejskich na przykładzie Podkrainy Zachodniomazurskiej. *Acta Scientiarum Polonorum Formatio Circumiectus*, 2 (1), 71-86.
- Żarska B. (2006). Modele ekologiczno-przestrzenne i zasady kształtowania krajobrazu gmin wiejskich. Wyd. SGGW, Warszawa.
- Żarska B., Fornal-Pieniak B., Zaraś-Januszkiewicz E. (2014). Landscape protection and planning. Selected issues. Wyd. SGGW