

THE USE OF GEOINFORMATION METHODS AND DIFFERENT DATA SOURCES CONCERNING LAND USE STRUCTURE IN THE RESEARCH OF SMALL AND MEDIUM-SIZED TOWNS

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Introduction

Sustainable land use has been addressed by the Sustainable Development Goals of the 2030 Agenda for Sustainable Development. In view of the ongoing urban expansion, integrated approaches to planning the development of both urban and suburban areas should be supported to ensure sustainable land-use planning. The implemented policies should encourage sustainable management of the natural and urbanized environment to ensure that the existing resources are managed responsibly and meet the needs of the present and future generations.

Urban space continues to evolve rapidly. In studies dedicated to land use and changes in land-use patterns, urbanization is regarded as the main driver of change. The main reason for the progressive changes are the urbanization processes occurring intensively not only in small and medium-sized towns and large cities, but also in suburban areas. Land use structure research includes analyses of the use of specific types of land. Owing to that, it is possible to assess the state of spatial development as well as to determine the intensity of urban investment, and the impact of anthropopressure in the studied areas. Ensuring spatial order and appropriate proportions in the structure of land use and spatial management is one of the factors conditioning the sustainable development of cities and suburban areas.

Materials and methods, the aim of research and study area

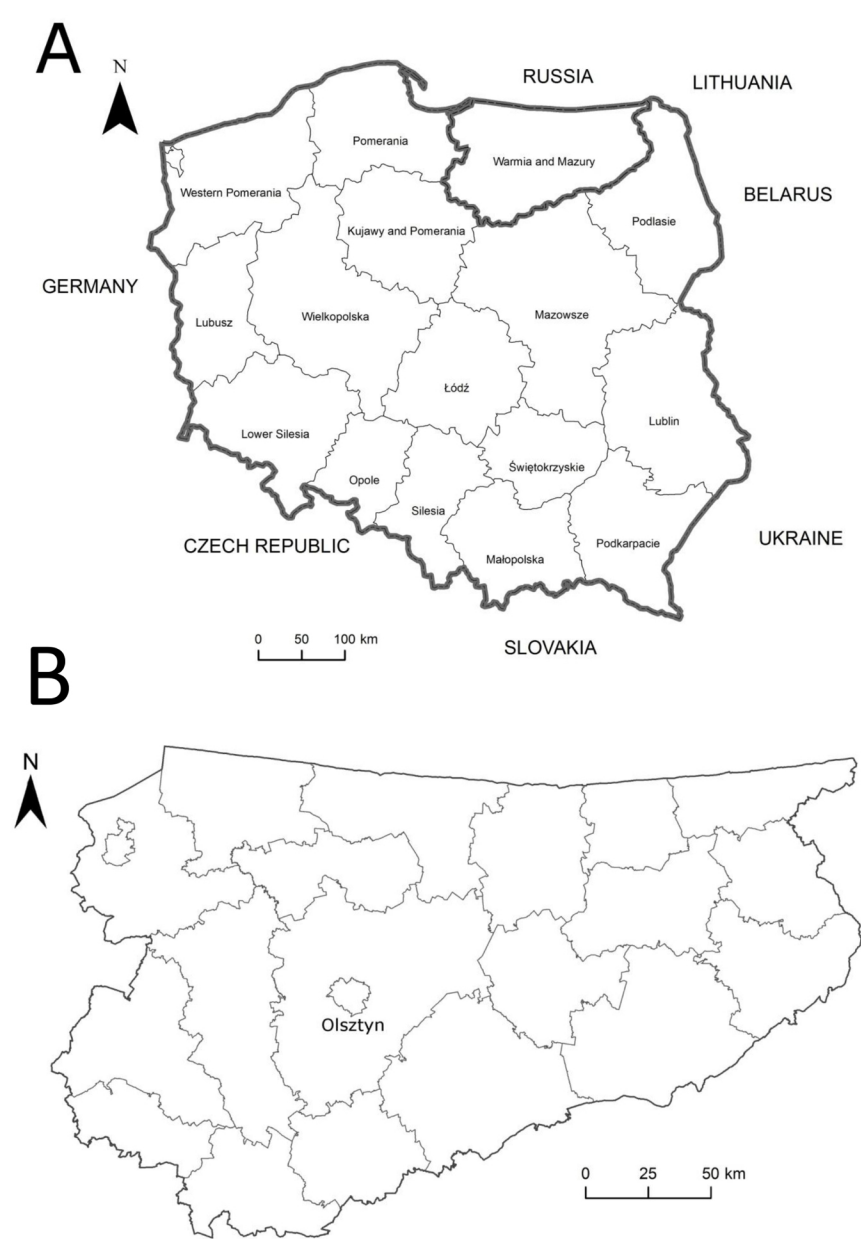


Fig. 1. Location of Olsztyn in Poland (A) and the Region of Warmia and Mazury (B).
 Source: own elaboration

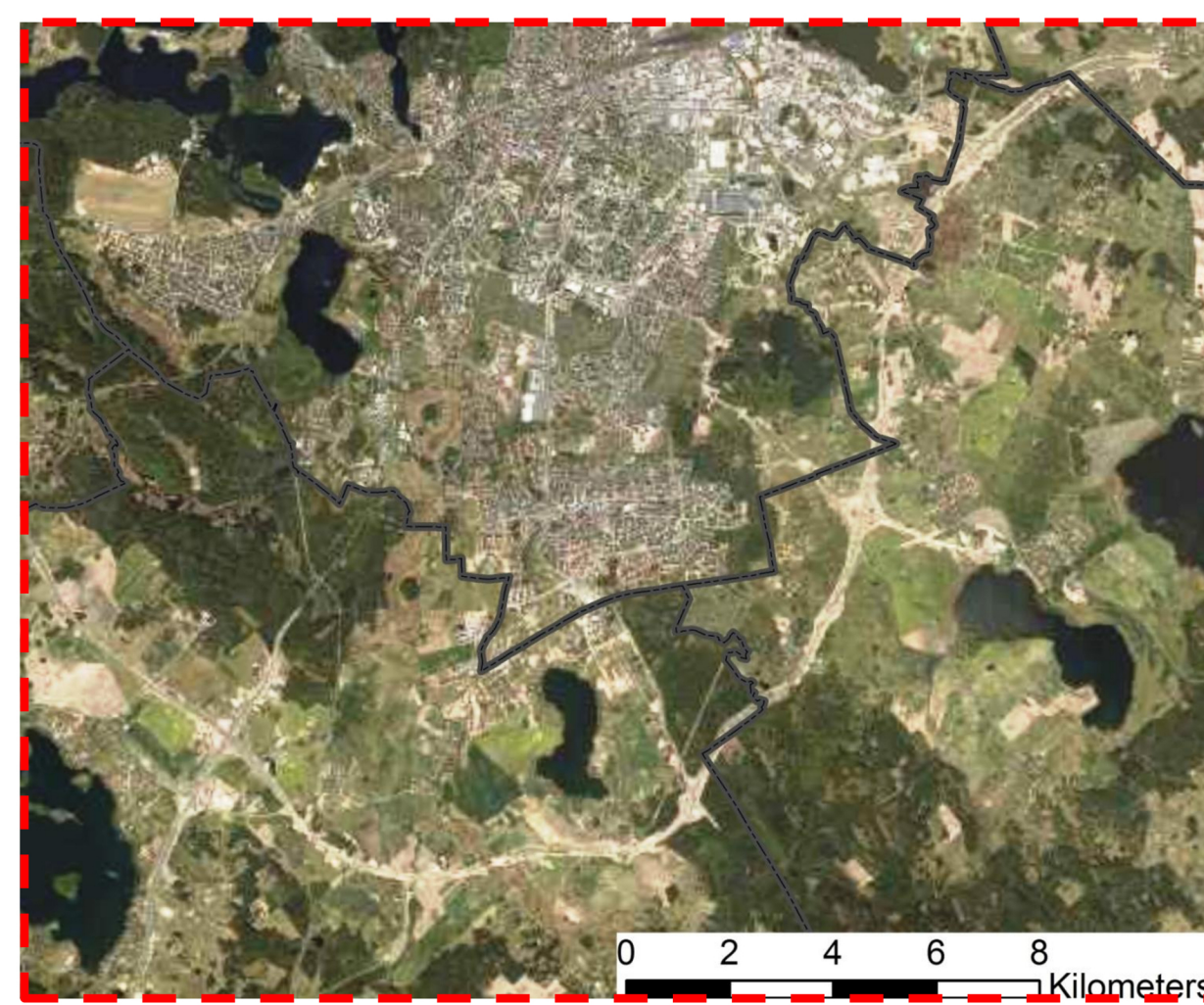


Fig. 2. Research area.
 Source: own elaboration

The purpose of the analyses was to examine the structure of urban land use, its distribution and concentration in the city space and suburban areas and to compare land-use spatial databases.

The study involved desk research and a comparative analysis of the collected spatial databases with the use of geoinformation tools. Spatial data were acquired from three publicly available databases: the Database of Topographic Objects (DBTO10k), Urban Atlas (UA), and CORINE Land Cover (CLC).

The Database of Topographic Objects (DBTO10k) correspond to topographic maps in 1:10,000 scale, and is available only for the territory of Poland (last update for research area: 2015). The Urban Atlas contains detailed information about land use/land cover for urbanized areas in Europe, and it covers the majority of European cities with a population higher than 50,000 (last update for research area: 2018). CORINE Land Cover (CLC) is one of the most common sources of data on land-use structure. The CLC program currently covers 39 countries (last update for research area: 2018).

The study was performed in central and southern part of Olsztyn and suburban areas outside the southern and eastern administrative borders of the city.

Results

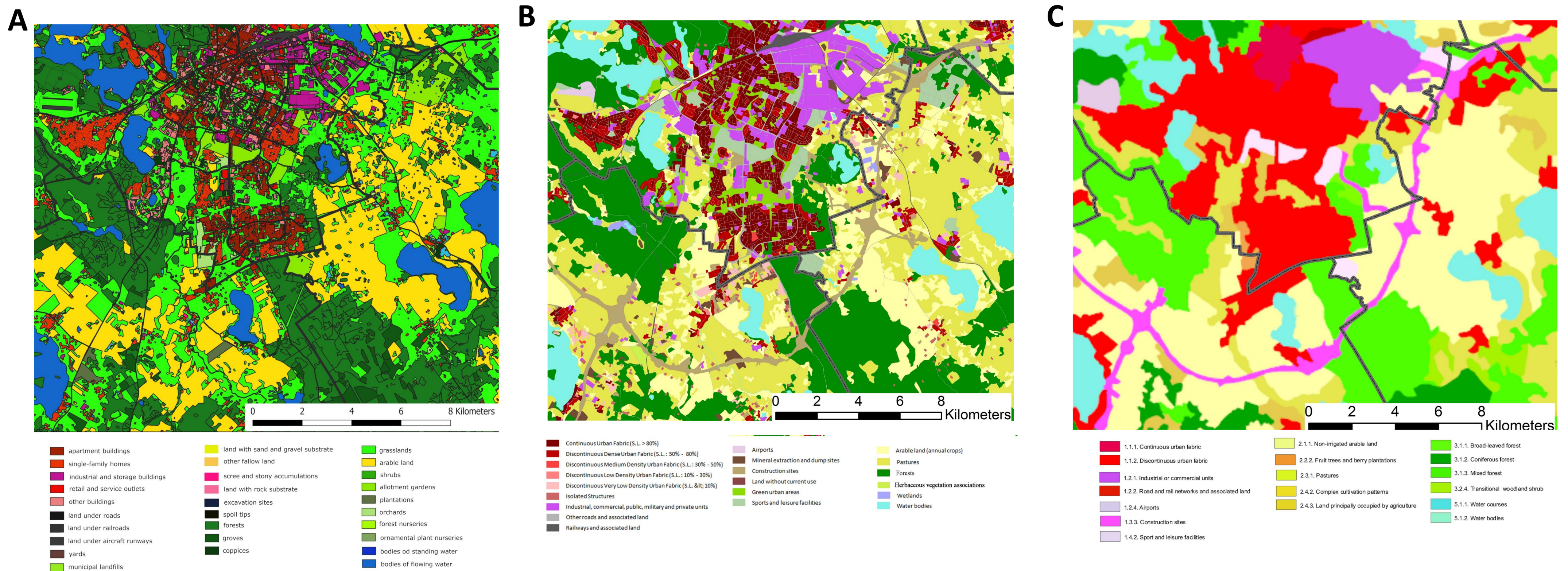


Fig. 3. Land-use maps generated based on: A) Database of Topographic Objects (DBTO10k), B) Urban Atlas, C) CORINE Land Cover.
 Source: own elaboration

Significant differences in land-use structure were observed. The DBTO10k (Fig. 3 A) contains the most detailed data and the largest number of land use categories however it is the least up-to-date. The Urban Atlas (Fig. 3 B) contains highly accurate data, but its level of detail is lower than that of DBTO10k. The CLC contains highly generalized data and the lowest number of land use categories. The largest number of land use types occurring in the study area is in DBTO10k (29 land use categories), followed by Urban Atlas (21), and the lowest is CLC (18).

Particularly in the case of small and medium-sized towns, where databases with an appropriate up-to-date and level of detail are not available, it is important to adopt other survey methods.

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Summary and conclusions

- The existing databases don't always meet the requirements of land use structure in the research of small and medium-sized towns, and not always include data that are up-to-date, detail and adjusted to the researcher's needs.
- In order to obtain the most precise and reliable results, there is a need to study the land use structure in small and medium-sized cities using more time-consuming and labor-intensive methods. High accuracy and timeliness of data can be obtained by using method relies on spatial inventory and generally available photogrammetric data. Spatial inventory is the most up-to-date source of information. The time and place of the inventory are selected by the researcher; he isn't dependent on the existing data sources. The spatial inventory allow for gaining the highest topicality of data as well as adjusting the classification of land-use types and the degree of their generalization to the researcher's needs.
- The results of the comparative analyses indicate that in large-scale studies requiring high data detail, the use of CORINE Land Cover data can raise doubts due to their high generalization.
- Accurate knowledge of the land use structure allows for making reliable and precise comparative analyses of land use between settlement units.