

# Analysis of Differences in the Area of Forest Land Disclosed in the Local Data Bank and the Register of Land and Buildings

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## Abstract

*The aim of the study was to demonstrate differences in the areas of forest land disclosed in two registers. For the analysis four land registration units in two neighbouring administrative districts were adopted. Analysis of forest land area data compared in two databases showed significant differences. The comparison was made for the databases of the Local Data Bank of the Central Statistical Office of Poland (BDL) containing statistical data and for the land and buildings registry containing data that constitute the basis for tax calculation.*

**Keywords:** area of forests, Database of the Register of Land and Buildings (EGiB), Local Data Bank of Central Statistical Office of Poland (BDL), District of Łęczna, District of Świdnik

## Introduction

The Act of 28 September 1991<sup>(1)</sup> defines a forest as a ground with compact surface area of at least 0,1 ha, covered with forest vegetation (forest cultivations)—trees and shrubs and vegetal cover—or temporarily deprived of it, and land related to forestry, occupied by buildings and structures, melioration devices, spatial forest division lines, forest roads, areas under power lines, forest nurseries and timber yards used for the purposes of forest husbandry, as well as land used for forest car parks and tourist devices. Currently, the area of forests in Poland, according to the Central Statistical Office of Poland (GUS), amounts to 9 163,8 thousand ha (data for 31 December 2013), of which 579,4 thousand<sup>(2)</sup> ha is in the Lubelskie Voivodship<sup>3</sup> (*Rocznik Statystyczny Rzeczypospolitej...* 2014; *Rocznik Statystyczny Województw...* 2014). Poland is one of the leading countries in Europe when it comes to the area of forests. They occupy 29,2% of the territory of the country. A straight majority in total forest area is national forests. The Ministry of Environmental Protection, Natural Resources and Forestry has developed a Program to Increase Forest Cover (KPZL), adopted by a resolution of the Council of Ministers in 1995, which is one of the instruments of State forestry policy that provides for an increase of the share of forests in the land use structure up to 30% in 2020 and to 33% in the year 2050 (Konieczna 2012).

The aim of the study was to examine and evaluate the differences between the two databases that contain numerical information on the area of forest lands. The comparison was made for the Local Data Bank Central Statistical Office of Poland (BDL) containing statistical data and for the Database of the Register of Land and Buildings (EGiB) containing information about the general area of lands covered by individual register units with division into land use types and soil quality

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1. See: Ustawa z dnia 28 września 1991 r. o lasach. DzU z 1991 r. nr 101 poz. 444.

2. [In the journal European practice of number notation is followed—for example, 36 333,33 (European style) = 36 333.33 (Canadian style) = 36,333.33 (US and British style).—Ed.]

3. One of the 16 of Polish administrative regions on NUTS 2 level situated in the east part of Poland bordering Belarus and Ukraine.

classes being the basis for tax calculations. In both cases, the data contained therein correspond to the definition of forests within the meaning of the law on forests. The comparisons were made on compilations of numerical and area data concerning forest lands at the level of two districts from which 4 communes were selected for detailed analysis. One of the most important source materials used in the study was the Database of the Register of Land and Buildings containing the areas of various plots and lands. The other source used was the Local Data Bank containing statistical data, available in on-line format, current for the day of 10th June, 2014.

BDL is an essential component of the statistical information system, offering its users annual and short-term data for individual thematic areas. Figures from the BDL concerning the total area forest lands for all forms of ownership, including the area of the forests and forest lands, were used in the research. According to the BDL it is an area covered with forest vegetation (forested) or temporarily deprived of it (non-forested) and area related to forestry. It also includes the area of nurseries of forest trees founded on woodlands and used for own needs of agricultural farms (non-commercial use), and also the area of cultivation of trees and fast growing shrubs on agricultural lands.

## 1 Materials and methods

The area of the study included 4 administrative units (communes) situated in two districts of the Lubelskie Voivodship: the districts of Łęczna and Świdnik. Both districts are situated in the central part of the Lubelskie Voivodship (fig. 1). They were created in 1999 within the framework of administrative reform. The total area of the district of Łęczna is 633,75 km<sup>2</sup> and consists of six communes: Łęczna, Cyców, Milejów, Ludwin, Puchaczów, Spiczyn. The district of Świdnik covers 468,97 km<sup>2</sup> and it consists of five communes: Świdnik, Piaski, Mełgiew, Rybczewice, Trawniki. For a detailed analysis of the area of forest lands in Łęczna district the communes of Puchaczów and Ludwin were chosen, and in Świdnik district—Rybczewice and Piaski. The commune of Puchaczów is located in the central part of Łęczna district, while the commune of Ludwin—in its northern part. In Świdnik district, the commune of Rybczewice is situated in the southern part, and that of Piaski in the centre of the district.

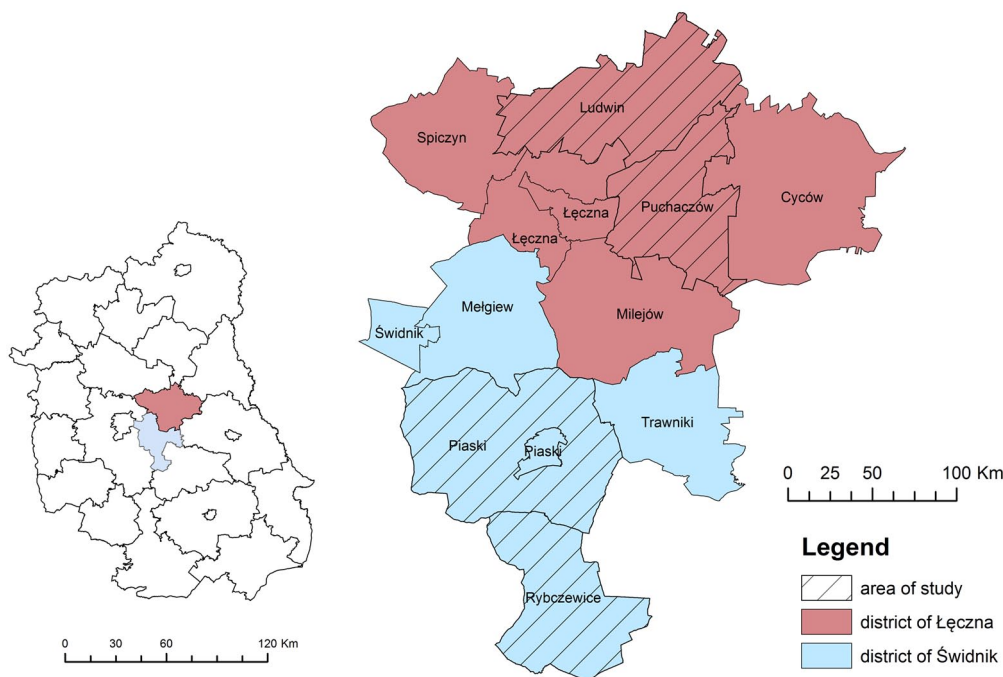


Fig. 1. Map of the location of the research area—districts of Łęczna and Świdnik

The data contained in the records of lands and buildings, marked as classification plots Ls and land Lz, were analysed. In accordance with the regulation on land and buildings,<sup>4</sup> a classification plot is a continuous area of land separated as a result of soil classification of lands, covering lands in one soil quality class. The research material used in this paper was collected primarily in the aspect of the quality and accuracy of the data presented in research analyses. The Register of Land Database is a reference data set, maintained by the chief official of a district, where every change of plot contour or land use requires its registration in the surveying and cartography resource. The BDL database has on-line access for each user, so that it is possible to obtain statistical information for the particular categories with division into selected territorial units, classified on the basis of TERYT code. In accordance with the geodetic and cartographic laws, information included in the documentation of land registry is public. The chief official of a district makes it available in the form of extracts from land registry, card indexes and indexes of this documentation, extracts of a cadastral plan, copies of the documents justifying the entries in the documentation of land registry database, computer files that are formatted according to the current interchange standard data and spatial data services.<sup>5</sup>

Taking into account the fact that access to data of interest for the ordinary user data is made easier through the use of forms proposed by BDL, an analysis of accuracy of the information contained therein was made. The work compares the existing data in the national register of land and buildings system which, in accordance with the geodetic and cartographic laws,<sup>6</sup> maintained in the whole country in a uniform way, regularly updated and reliable, is a public register that is a collection of information about lands, buildings, premises and their owners, and other natural or legal persons having control of the lands, buildings and premises.

In order to determine the area of forests contained in EGiB, a vector-descriptive registry database for the four selected registry units and ArcGIS software were used. Using the structured query language (SQL), objects with ID symbol Ls were selected, separately for the classification contours and lands databases, and then their surface areas were aggregated as class-lands which, in accordance with regulation,<sup>7</sup> are common parts of the land use contour and classification land contour within the boundaries of a registry unit. In that manner an area statement with division for each commune was created. In addition, for the purposes of control, these operations were repeated for forest and shrub-covered lands with ID Lz. A compilation of forest area for the individual registry units with division into soil quality without aggregated items is shown in table 1.

The responsibility of the institution which operates EGiB is to maintain the IT system hosting the registry databases in constant operating readiness, and current updating of the EGiB system on the basis of available documents and source materials. The updating of the EGiB database is effected by entering substantiated revisions to the registry database.<sup>8</sup> Therefore, it can be assumed that EGiB is the most reliable source of information about land contours and land use types. EGiB data sources are shown in figure 2.

The data contained in the BDL relate to all forms of ownership. The sources of data for BDL are the following: report on forests owned by the State Treasury, report on forests owned by individual and legal persons, administrative data from the Agricultural Property Agency (ANR), commune statistics: forestry and environmental protection (fig. 3). The obligation to submit reports is the responsibility of the individual organizational units. The report on State Treasury forests, with annex, must be submitted by legal persons and organizational units without legal personality, management of State Treasury forests, or temporary users and users in perpetuity: forest inspectorates of State Forests, Directors of national parks, entities subordinated to ministers and Province Governors using these forests under article 40 paragraph 1 of the law on forests. Reports

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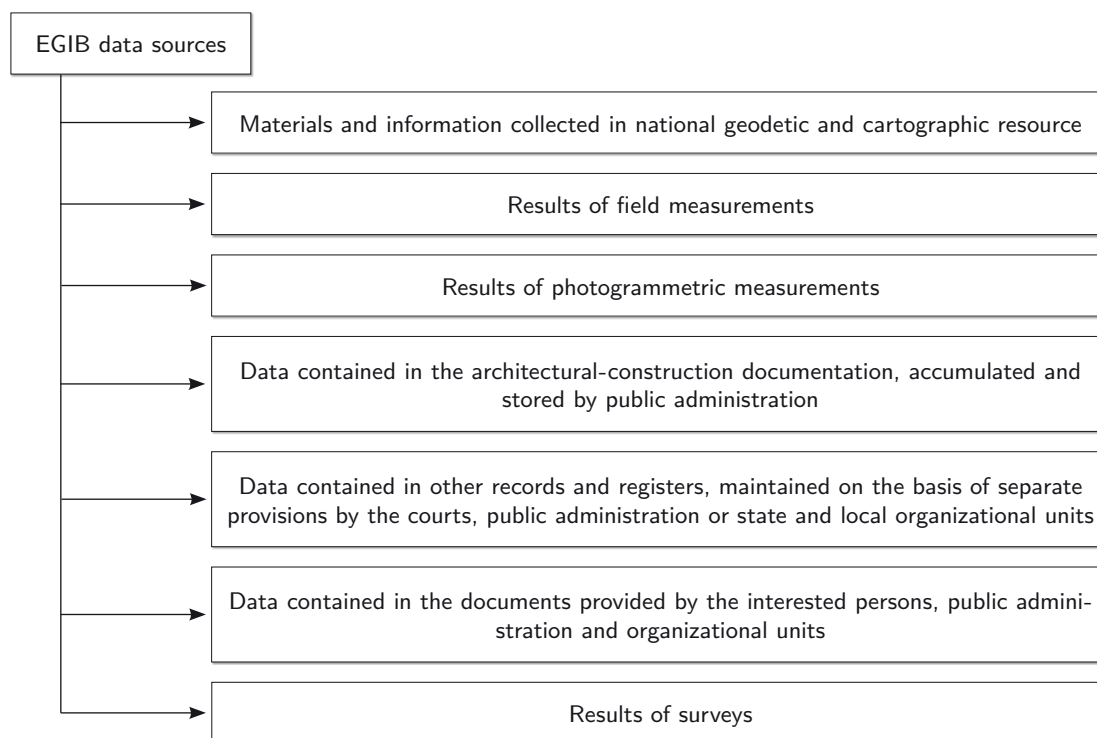
4. See: Rozporządzenie Ministra Rozwoju Regionalnego i Budownictwa z dnia 29 marca 2001 r. w sprawie ewidencji gruntów i budynków. DzU z 2001 r. nr 38 poz. 454.

5. See: Obwieszczenie Marszałka Sejmu Rzeczypospolitej Polskiej z dnia 8 października 2010 r. w sprawie ogłoszenia jednolitego tekstu ustawy — Prawo geodezyjne i kartograficzne. DzU z 2010 r. nr 193 poz. 1287.

6. Ibidem.

7. See: Rozporządzenie Ministra Rozwoju Regionalnego i Budownictwa z dnia 29 marca 2001 r....

8. Ibidem.



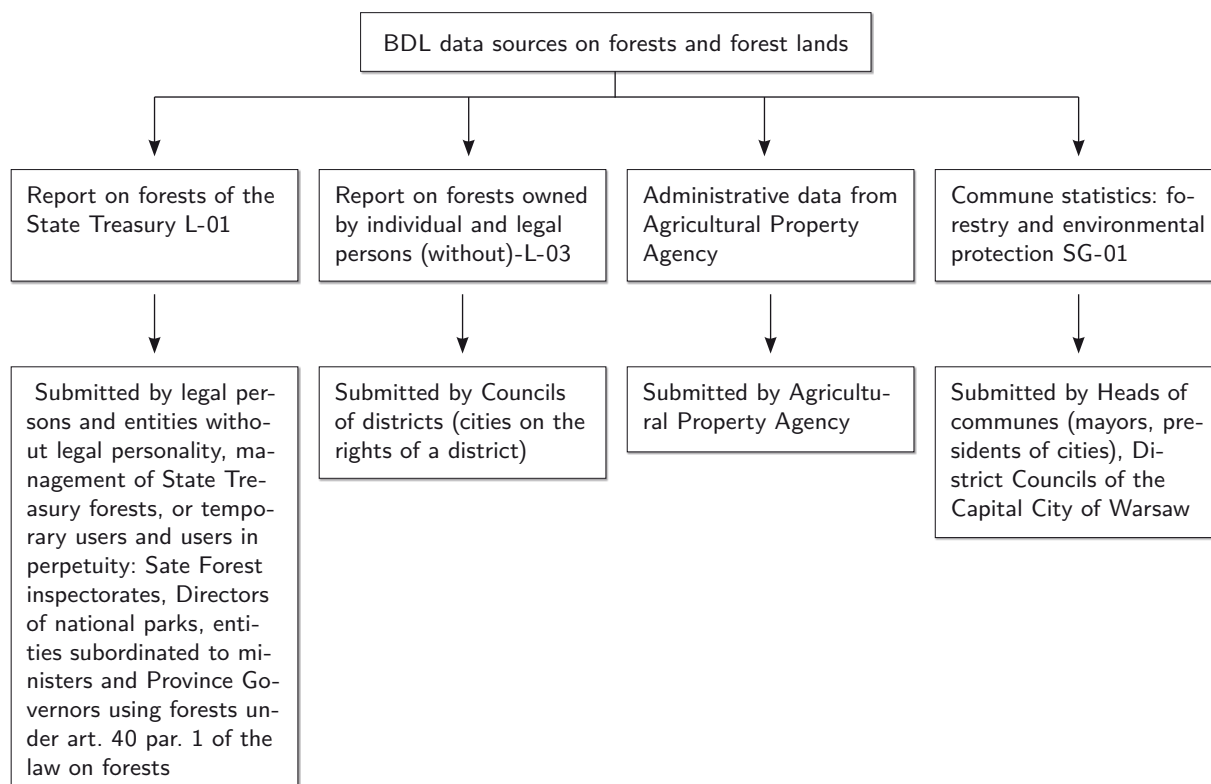
**Fig. 2.** EGiB database sources

on forests owned by individual and legal persons (without State Treasury) with annex, are required to be made by boards of districts. Reports on commune-level statistics: forestry and environmental protection, are prepared by Heads of communes (mayors, presidents of cities). Those entities, in accordance with the law on the protection of agricultural land and forestry,<sup>9</sup> provide information on area of forest lands and their exclusion from production, species and age structure of forest resources, categories of protective forests, objects and areas under legal protection, health and sanitary status of forests, forest fires; protective forests according to threat category, and major protected animals. These data are submitted to the relevant authority (i.e., the Main Statistical Office) in the form of statistical questionnaires, from which BDL acquires data and publishes them on its web site. For each organizational unit transmitting the data to the GUS there is a separate deadline for their submission. The report on State Treasury forests must be submitted in electronic form once a year, by 5 February. Reports on forests owned by individual and legal persons are submitted in electronic form once a year by 20 February. Commune statistics are drawn up in electronic form once a year, by 20 February. ANR information system transmits the data in electronic form once a year, by 31 January.

## 2 Results

According to the data from the EGiB database, analysed forest lands are located in the five soil quality classes (tab. 1). Class I soils of forest land do not appear on any of the test objects. The largest area of forests is situated on soils of class III. They occupy an area of 1 337,1950 ha, which represents 33% of the total forest area in the analysed area. Whereas, the smallest area of forest is situated on soils of class VI; this is an area of 20,1903 ha, which represents 0,5% of the total forest area in the study area. 218,7304 ha of forests situated in the commune of Rybczewice has no assigned soil quality class. The total area of forest under IP classification outline is 4 018,3172 ha. The largest size area is found in the commune of Piaski and it is 26,9% of the total area of the analysed forests. Further places are occupied by the communes of Rybczewice (25,5%), Puchaczów (23,8%), Ludwin (23,7%). Data specifying the soil quality classes on which forests are situated can be obtained only from the EGiB database, BDL does not provide such information.

9. See: Ustawa z dnia 3 lutego 1995 r. o ochronie gruntów rolnych i leśnych. DzU z 1995 r. nr 16 poz. 78.



**Fig. 3.** Data sources for BDL database

**Tab. 1.** Area of forestland with division into soil quality classes (ha)

| Commune    | I | II       | III        | IV       | V          | VI      | Without sqc <sup>a</sup> | Total      |
|------------|---|----------|------------|----------|------------|---------|--------------------------|------------|
| Ludwin     | 0 | 0        | 43,8890    | 371,4204 | 536,3945   | 1,3179  | 0                        | 953,0218   |
| Puchaczów  | 0 | 2,1568   | 86,4151    | 387,8530 | 480,2802   | 1,1359  | 0                        | 957,8410   |
| Piaski     | 0 | 300,5276 | 653,9767   | 66,3727  | 43,4051    | 17,7365 | 0                        | 1 082,0186 |
| Rybczewice | 0 | 110,9063 | 552,9141   | 88,7429  | 54,1420    | 0       | 218,7304                 | 1 025,4357 |
| Total      | 0 | 413,5907 | 1 337,1950 | 914,3889 | 1 114,2218 | 20,1903 | 218,7304                 | 4 018,3172 |

<sup>a</sup>Without soil quality class

Comparing the data contained in the BDL and the EGiB it can be concluded that the forest areas in the areas being compared are not identical (tab. 2). The smallest difference can be observed in the commune of Rybczewice, where it amounts to 1,9112 ha. In this case the forest area listed in the BDL database is smaller than that given in the EGiB. The biggest difference in forest area occurs in the commune of Puchaczów where it is 149,1263 ha. In the commune of Ludwin the difference is 119,7683 ha, and in Piaski—10,4810 ha. The observed discrepancies in three communes (Ludwin, Puchaczów, Piaski) have a greater surface area of forest land in the data obtained from BDL. Only in the case of the commune of Rybczewice the area obtained from BDL is smaller than that indicated in EGiB.

**Tab. 2.** Comparison of forest land area

| Commune    | Area of forest land according to data from BDL (ha) | Area of soil quality classes according to data from EGiB | Difference (ha) |
|------------|---|--|-----------------|
| Piaski     | 1 667,85  | 1 657,3690   | 10,481          |
| Rybczewice | 1 034,14  | 1 036,0512   | -1,9112         |
| Ludwin     | 1 798,90  | 1 679,1317   | 119,7683        |
| Puchaczów  | 1 106,98  | 957,8537   | 149,1263        |

### 3 Discussion

The differences observed on the basis of collected data and conducted research in the forest areas given in EGiB and BDL are considerable, the biggest in the communes of Ludwin and Puchaczów. In an attempt to make a comprehensive analysis of the data contained in BDL it was found that the information contained in that registry come from reports and data transmitted to GUS by legal persons, organizational entities without legal personality, District Councils, Agricultural Property Agency, Heads of communes (mayors, presidents of towns), while the data contained in EGiB are constantly updated by the institution maintaining that database. In the study an attempt was made to find the causes of such large discrepancies between the two major databases. Firstly, it was examined whether the forests data from the Local Data Bank take into account areas of wooded and bushy lands with index Lz. The values in table 3 show that the sum of Lz lands and those of the combined land contours Ls far exceed the data shown in the Local Data Bank.

**Tab. 3.** Forest area (Ls) and wooded and bushy land (Lz) (in ha)

| Commune    | Lz       | Ls         | Total      |
|------------|----------|------------|------------|
| Ludwin     | 395,7569 | 1 679,1317 | 2 074,8886 |
| Puchaczów  | 169,6352 | 957,8537   | 1 127,4889 |
| Piaski     | 167,6794 | 1 657,3690 | 1 825,0484 |
| Rybczewice | 430,0144 | 1 036,0512 | 1 242,7031 |

Databases of classification contours in the communes under analysis do not coincide with the databases on land use type areas. This is also visible when comparing tables 1 and 2. In the case of the commune of Ludwin the area of lands of class Ls according to EGiB is 1 679,1317 ha, while the area of classification contour Ls is equal to 953,0218 ha. It is evident that in the land and buildings registry itself there are errors in the values of forest area. In addition, the database of the registry of land and buildings was analysed on the example of its graphic form. The results observed, presented in EWMAPA FB11 program, are shown in figure 4. Green characters X mean the description of land use Ls, and the red cross sign means the description of classification contour Ls. Here we can see a clearly presented situation in which there are shortages of the description of the contour Ls, while land use Ls is marked on a non-described classification contour. But not always these databases must overlap, because the classification contour Ls may include other types of land use (e.g., ditches). However, in this case the actual lack of this description was noted.

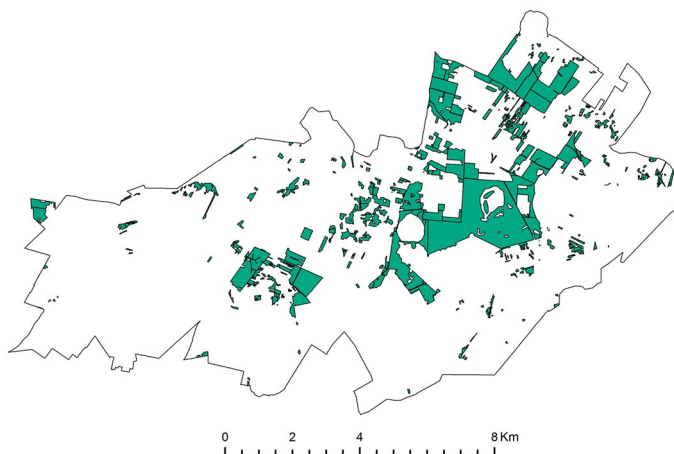


**Fig. 4.** An excerpt from the a vector-descriptive analysis of database of land and buildings registry in the commune of Ludwin

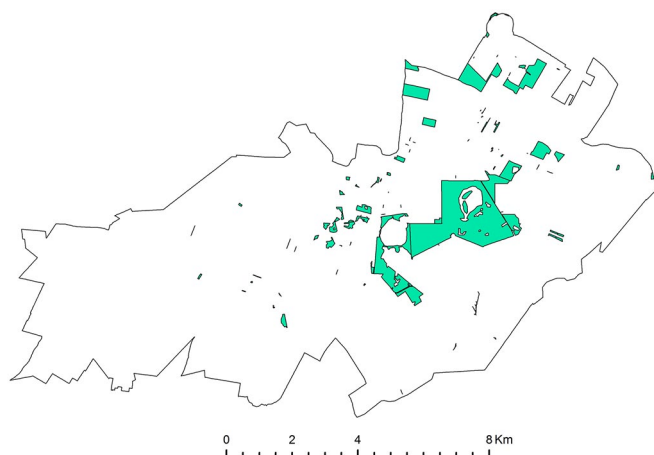
The analysis uses the integration of existing databases of grassland or forest, implemented in ArcGIS. Fig. 5 shows the surface contours of forest classification on the example of the commune of Ludwin. Figure 6 shows the forest lands in the same commune. One can see that the areas of the contours and of the forest lands differ. Figure 7 shows the differences between the two databases generated in ArcGIS.



**Fig. 5.** Classification contours of forests in the commune of Ludwin



**Fig. 6.** Forest lands in the commune of Ludwin



**Fig. 7.** Differences in classification contour and forestland databases in the commune of Ludwin

The analysis shows that in some places the area of the classification contours shown in EGIB does not coincide with the area of forestland. Differences in the areas may partly result from discrepancies in the dating of the data presented in both of the databases analysed. Data on forests in BDL are presented as up-to-date in December 2013, while EGIB data are current as of 30th April 2014. This difference is 4 months, therefore it was examined whether during that time any land classification was made in the individual communes. The interview at the appropriate District Centres of Geodetic-Cartographic Documentation shows that in recent years no comprehensive modernisation of the contours and forestland was performed in the analysed communities, nor any comprehensive consolidation of lands.

## Conclusions

Comparison of selected data from both registries showed significant differences in the areas of the land use type studied. The observed discrepancies in three districts (Ludwin, Puchaczów, Piaski) have a greater surface area of forest land in the data obtained from BDL. Only one in the commune of Rybczewice the area obtained from BDL is smaller than that indicated in EGIB. It was noted that the BDL data are not updated directly on the basis of the database of the land and buildings registry. In addition, it has been shown that in the records of land and buildings registry there are errors related to the inconsistency of the positioning of classification contours and Ls lands. It seems necessary to achieve a uniform structure of both records. A proposal for changes that could cause an improvement of quality of the databases analysed would be comprehensive modernisation of the land and buildings registry, preferably preceded by a comprehensive consolidation of lands. This process would provide a way to determine the limits of standard plots and to perform new calculation of the surface area.

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