

Updated Land Use in the Modernization of the Cadastre – Analysis of the Surveying and Legal Procedures and the Financial Consequences

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Abstract. Land uses are features of the cadastral database. When carrying out the modernization of the cadastre, their update is necessary, according to the Regulation on the register of land and buildings, applicable in Poland. The Regulation sets out the principles for assigning land use categories to given land. The manner of land use carries specific consequences for the owner, namely, it is the determinant of the tax rate which, together with the surface area of the land, results in a specified amount of annual tax liabilities. For this reason, defining the type and extent of land use in the real estate cadastre raises intense feelings. Here, the affairs of land owners, who wish to incur the lowest possible costs associated with the possessed property, and of the municipality – the beneficiary of the property tax, are in contradiction.

The article presents the procedure for updating land uses during the modernization of the cadastre. According to the Regulation on the register of land and buildings, a digital description of the contour of land use may be drawn up, based on the results of field measurements, digitization of the analog map or the processed aerial photographs.

In the project, which is the basis of this article, the sources of information on the land uses included the cadastral map in the analog form as well as surveying and cartographic materials from individual surveying tasks. However, the content of the current orthophotomap, prepared for the modernization of the cadastre, and the data from the field surveys were of the greatest importance.

Keywords: cadastral database, modernization of the cadastre, photogrammetry, real estate cadastre.

Conference topic: Technologies of Geodesy and Cadastre.

Introduction

In 2014 in Poland, vector cadastral maps covered 95% of urban areas and 80% of rural areas. In rural areas, still about 14% of the territory is depicted on analog cadastral maps only (Busko, Meusz 2014; Balawejder *et al.* 2016), or in the studies related to the Land Parcel Identification System (LPIS) (Zygmunt *et al.* 2015). That is the reason why the modernization of the cadastral data is necessary for the rural areas (Bieda *et al.* 2014). The issue of the cadastral development concerns many countries which are less advanced in this respect (Lisec, Navratil 2014; Mourafetis *et al.* 2015; Skalos *et al.* 2012; Van Gils *et al.* 2014). The test object, which in 2015 was subjected to the modernization of the cadastre, and on the basis of which this article was prepared, is the commune of Łużna, situated in the southern Poland, in the Malopolska province. The commune of Łużna is a cadastral unit and consists of six cadastral districts. In three of these cadastral districts (Łużna, Biesna and Wola Łużańska), the modernization of the cadastre was carried out in 2015. The modernized districts are marked in Fig. 1 with a red line.

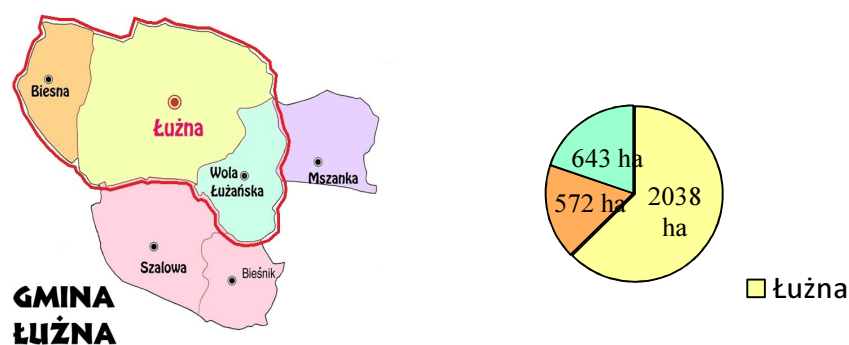


Fig. 1. The commune of Łużna divided into cadastral districts and their surface areas

The sources of information on land uses include: the cadastral map and individual materials collected at the District Geodetic and Cartographic Documentation Center. They must be verified with respect to the content of the orthophotomap and the actual situation in the field, identified during the field survey. The verification results are presented on the copy of the cadastral map.

Materials and methods

The primary source of the data defining the contours of land uses is the cadastral map and land surveys included in the database of the District Geodetic and Cartographic Documentation Center (PZGiK). The contours of the land uses specified on the cadastral map and in the land surveys are analyzed and verified. The analysis and verification involve the comparison of these sources with the content of the current orthophotomap, as well as with the factual status in the field, identified during the field survey (Brown, Raymond 2014).

The figures which are necessary to numerically describe the contours of land uses, the modernization contractor can obtain via:

- geodetic cartometric measurements made on the orthophotomap,
- the image of the cadastral map in the raster form, where the boundaries of cadastral parcels and the extent of land uses before the modernization are illustrated,
- geodetic photogrammetric measurements,
- geodetic field measurements.

Figure 2 presents data from the sources listed above plotted on the orthophotomap. The boundaries and denotations of land uses were marked in green.

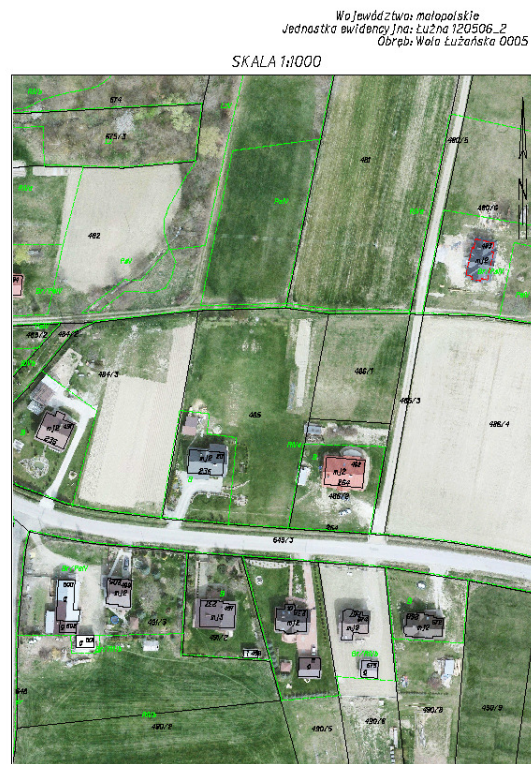


Fig. 2. Boundaries and land use denotations against the orthophotomap

The areas of land uses, contained in the descriptive section of the land register, are often recorded with an accuracy of just 1 hectare. Such a low precision of the entry was used before the modernization of the test object, which is the basis of this study. In addition, the surface areas of land uses were often given globally, combining several kinds of land uses and quality classes (Busko, Przewieźlikowska 2016). Table 1 contains value changes of land use areas in individual districts after cadastre modernization.

Basing on the comparison illustrated in Table 1, some regularity may be noticed. Thanks to the modernization in the cadastral districts, it was possible to update mainly these land uses which are associated with buildings, namely: land use B (residential areas) and Br (agricultural developed land) (Regulation of the Minister of Regional Development and Construction of 29 March 2001). Their area increased at the expense of arable land (R). In addition, the areas of the land uses related to communication increased as well, including roads (dr) and other communication areas (Ti, Tk). The last evident change in every cadastral district was an increase in the developed and urban areas, including industrial (Ba), residential (B), and other developed areas (Bi). Comparing to the data before the modernization, the

areas of these land uses have more than doubled in Łuzna, and increased by almost five times in the other two cadastral districts.

Table 1. The areas of land uses before and after the modernization of the cadastre

Land uses	Commune – Cadastral Unit: LUŻNA					
	Cadastral district of Łuzna		Cadastral district of Biesna		Cadastral district of Wola Łużańska	
	Before [ha]	After [ha]	Before [ha]	After [ha]	Before [ha]	After [ha]
R	1216	1054.2855	338	285.0846	300	313.5468
Ł, Ps	259	375.6238	52	91.4559	145	109.0945
Br	69	87.0950	19	18.4444	20	27.5131
Other agricultural land	25	4.0929	5	2.7294	11	4.2331
Ls, Lz	383	398.4245	134	142.6098	140	152.1031
B, Ba, Bi	12	30.5331	1	4.2337	2	10.0514
dr, Tk, Ti	54	59.8293	17	18.6879	21	21.137
W, Wp, Ws	11	25.7351	6	9.6043	4	5.1015
Other	9	5.5752	0	0.2719	0	0.0724
TOTAL	2038	2041.1944	572	573.1219	643	642.8529

Discussion

Currently, in Poland, there are three types of taxes for property owners:

- real property tax,
- agricultural tax,
- forest tax.

The taxes are paid to the local government units, such as the communes. This paper analyzes the changes in the tax receipts in the commune of Łuzna, after the modernization of the cadastre in the cadastral districts located within this commune.

One of the two most important factors affecting the changes in tax receipts is updating land uses in the modernized cadastral districts. Another factor affecting the amount of tax receipts for individual communes are tax rates. In the case of agricultural and forest tax rates in a given year, they are the same for the whole Poland. The rate of agricultural tax is determined on the basis of the statement of the President of the Central Statistical Office on the average purchase price of rye for the period of 11 quarters preceding the quarter of the preceding fiscal year (Art. 6 section 1 of the Act on Agricultural Tax (The Act of... 1984). The rate of forest tax is determined based on the average selling price of wood, obtained by forest inspectorates in the first three quarters of the year preceding the fiscal year (Art. 4, section 1 of the Act on Forest Tax (The Act of... 2002). In the case of real property tax, covering the remaining land, the tax rates are determined individually for each commune, based on the resolution of the communal council (Art. 5, section 1 of the Act on Local Taxes and Fees (The Act of... 1991).

Basing on the summary reports drawn up annually by the District Office in Gorlice for the Marshal Office of the Malopolska Region, the change in the structure of land uses in the modernized commune of Łuzna was presented. The surface areas of these land uses were determined for the day of 1 January 2015, as the state before the modernization of the cadastre, and the day of 1 January 2016, which is after the modernization and supplying the information system with the cadastral data from the modernized cadastral districts (Table 2)

In order to visualize the data contained in the tables above, comparative diagrams for the specific years before the modernization (2015) and after the modernization (2016) were drawn up (Fig. 3).

Table 2. Summary of the surface areas of land uses in the commune of Łužna

Type of land use		2015	2016
		area [ha]	area [ha]
Agricultural land	Agricultural developed land (Br)	239	262
	Other agricultural land	3957	3832
Forest land		1211	1255
Developed and urbanized land	Residential areas (B)	12	35
	Industrial areas (Ba) other developed areas (Bi)	8	20
	communication areas (dr, Tk)	153	160
	Other areas	17	8
Land under water	Still surface water (Ws)	0	0
	Flowing surface water (Wp)	25	43
Σ		5622	5615

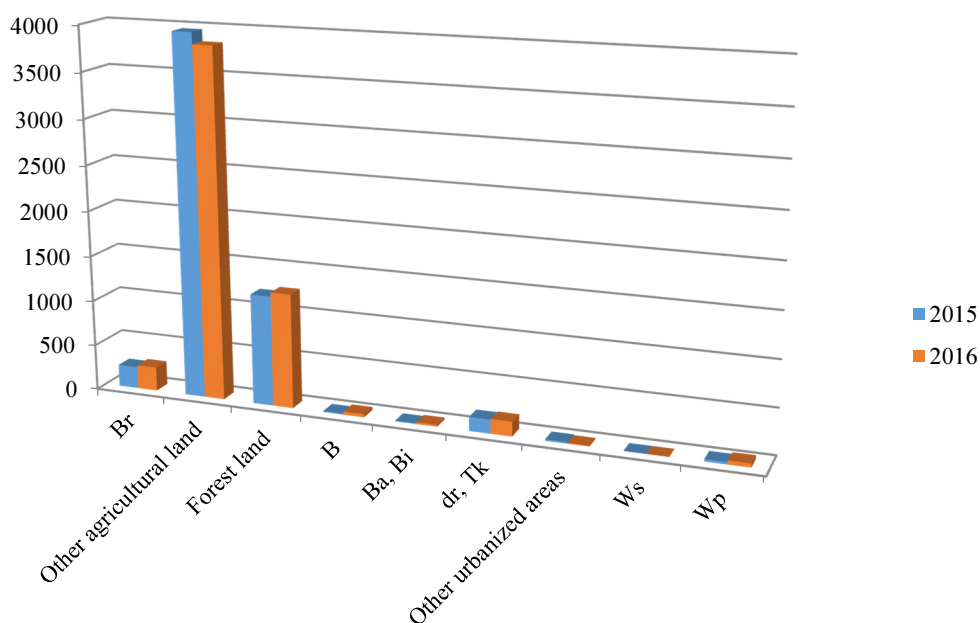


Fig. 3. Comparison of the changes in the surface areas of land uses due to the implementation of the modernization procedures in the commune of Łužna

As it appears in the bar chart 3, the surface area of the developed agricultural land (Br) in the commune has increased, and the surface area of the remaining agricultural land has decreased. This is mainly due to the development of the commune, where more and more houses are being built, and large farms are being replaced by smaller farms, concentrated around residential buildings. In addition, an increase in the surface areas of developed and urbanized land (B) was observed. These changes are primarily associated with the development of non-agricultural economic functions in the commune, i.e. services, tourism, single-family housing, forestry, and even industry. The developing free market economy has created favorable conditions for the development of the businesses which are not related to agriculture in rural areas, where a rapid development has been observed in recent years.

Basing on the determined surface areas of specific land uses and tax rates, the approximate receipts from agricultural, forestry and land taxes were determined. When calculating the surface area of specific land subjected to the

above-mentioned taxes, the land occupied by the rights-of-way of public roads and land under surface flowing waters were not included, because pursuant to Article 2 section 3 of the Act on local taxes and fees, they are not subject to taxation. Table 3 illustrates the values of the receipts from various types of taxes in 2015 (before the modernization of the cadastre) and in 2016 (after the modernization).

Table 3. Tax rates in the commune of Lužna

Type of tax		2015			2016		
		Rate [PLN/ha]	Surface area [ha]	Tax [PLN]	Rate [PLN/ha]	Surface area [ha]	Tax [PLN]
agricultural	Agricultural land developed agricultural land (Br)	306.85	239	73 337.15	268.75	262	70 412.50
	Other agricultural land	306.85	3957	1 214 205.45	268.75	3832	1 029 850.00
forest	Forest tax forest land	41.55	1211	50 317.05	42.19	1255	52 948.45
real estate	Real estate tax industrial areas (Ba) and other developed areas (Bi)	8000	8	64 000.00	6500	20	130 000.00
	Still surface water	4.58	0	–	0.5	0	–
	Residential areas (B)	3000	12	36 000.00	1500	35	52 500.00
	other	3000	17	51 000.00	1500	8	12 000.00
			Σ	1 488 859.65		Σ	1 347 710.95

When analyzing the data contained in Table 3, it should be emphasized that the rate of the real estate tax for residential areas (B), industrial areas (Ba) and other developed areas (Bi), in the resolution of the Communal Council, were significantly reduced for the Fiscal Year which is directly after the modernization of the cadastre. Therefore, despite the fact that the surface area of this land has greatly increased, the tax receipts in 2016 will be smaller. Lowering the tax rates was probably supposed to calm the taxpayers down and to inform them that the modernization of the cadastre is not intended to increase tax liabilities for the citizens. It is expected, however, that such reduced tax rates are only temporary. Probably, in the next few years, the tax rates will gradually increase. If they reach the same level as before the modernization of the cadastre, the receipts for the communal budget will increase almost two times (from 151,000 PLN before the modernization to the value of 289,000 PLN after the modernization, as a result of updating the types and surface areas of land uses) – Table 4.

Table 4. Changes to the real estate tax rates as a result of the modernization of the cadastre

	Rate [PLN/ha]	Surface area [ha]	Tax [PLN]	Rate [PLN/ha]	Surface area [ha]	Tax [PLN]
Ba, Bi	8 000	8	64 000	8 000	20	160 000
B	3 000	12	36 000	3 000	35	105 000
Other	3 000	17	51 000	3 000	8	24 000
Total			151 000			289 000

Conclusions

The taxes which are entirely included in the budgets of local government units are as follows: the tax on civil law transactions, the tax on inheritance and donations, agricultural tax, forest tax, real estate tax, motor vehicles tax, personal income tax in the form of a tax card. The beneficiaries of these whole taxes are the communes as units of local self-government in Poland.

As a result of the performed modernization, the communes update all the cadastral data (Przewieźlikowska, Busko 2014), including types of land uses and their coverage (Dawidowicz, Żróbek 2014). Such a comprehensive update of land uses usually leads to an increase in residential areas, industrial areas and other developed areas, for which there are higher tax rates. However, the modernization of the cadastre, despite the increase in the surface areas of these land uses, did not result automatically in the increased receipts for the communal budget. In the years 2015 and 2016 they remained at a similar level. It should be emphasized, however, that these comparable values result mainly from the adoption of a new resolution of the Communal Council, which quite significantly lowered tax rates on residential, industrial and other developed areas for the year 2016. In addition, this slight decrease in tax receipts is associated with a significant decrease in the rate for the agricultural tax on agricultural land, which is uniform throughout the country. It should be emphasized that, in the presented commune, the agricultural land accounts for about 70% of the total area of the commune.

If this rate remained unchanged, there would be a significant increase in tax receipts for the communal budget. This increase would amount to nearly 200%. It is expected that the Communal Council will raise tax rates to the previous level, which will be profitable for the communal budget. Taking into account that the surface area of the land for which the taxes are the highest (developed land B, Ba, Bi) is increasing, in the long term, the tax authorities of the communes will reap significant financial benefits associated with an increase in the relevant tax receipts.

In conclusion, it should be emphasized that cadastral works covering large areas, such as reparcelling (Dudzińska 2015; Dudzińska, Kocur-Bera 2014; Mika, Len 2016) or modernization of the cadastre, should be carried out with the active participation of the owners. They must be properly informed about the scope, purpose and benefits of this type of surveying works. Active participation of land owners, both in the modernization and reparcelling of land, is the basis for the development of good practices, resulting in a conflict-free course of this work.

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