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Front cover photography: Exploration of the collapse dolines, such as the one at the Small Natural Bridge in Rakov Škocjan, has enabled a deeper understanding of karst processes in recent years (photograph: Matej Lipar).
Fotografija na naslovnici: Raziskave udornice, kot je ta pri Malem Naravnem mostu v Rakovem Škocjanu, so v zadnjih letih omogočile globlje razumevanje kraških procesov (fotografija: Matej Lipar).

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SPATIAL CONFLICTS: ANALYZING A BURDEN CREATED BY DIFFERING LAND USE

Iwona Cieślak

Land use in the typical landscape of Warmia and Mazury in Poland.

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Spatial conflicts: Analyzing a burden created by differing land use

ABSTRACT: The article proposes a procedure for determining the location of potential spatial conflicts. The author presents issues concerning spatial conflicts which may arise as a result of different uses of spaces adjacent to each other. The proposed procedure has been tested on one of the districts of Poland's Warmińsko-Mazurskie Voivodeship, namely Nidzicki District. In order to determine the use of the space, CLC databases made available by the Chief Environmental Protection Inspectorate were used. Based on them, the use of fragments of space, which were also differentiated due to their natural value, was determined. For the thus described space, a map of burden of potential spatial conflicts was compiled. The proposed method may be used as a tool supporting the processes of space planning and monitoring the environmental changes.

KEY WORDS: spatial planning, spatial structure, spatial conflicts, uses of spaces, CLC, natural value

Prostorski konflikti: Analiza bremena, ki nastane zaradi različne rabe prostora

POVZETEK: V članku avtorica predlaga postopek za določanje lokacije morebitnih prostorskih konfliktov. Predstavi vprašanja, povezana s prostorskimi konflikti, ki lahko nastanejo zaradi različne rabe sosednjih prostorov. Predlagani postopek je avtorica preizkusila na primeru okrožja Nidzica v Varminsko-mazurskem vojvodstvu na Poljskem. Za določitev rabe prostora je uporabila podatke CLC (Corine Land Cover), ki jih je pridobila od glavnega poljskega okoljevarstvenega inšpektorata. Na podlagi teh podatkov je določila rabo posameznih delov proučevanega prostora, ki jih je ločila tudi glede na njihovo naravno vrednost. Za tako analizirani prostor je sestavila zemljevid bremen morebitnih prostorskih konfliktov. Predlagana metoda se lahko uporablja kot podporno orodje pri postopkih prostorskega načrtovanja in spremljanja okoljskih sprememb.

KLJUČNE BESEDE: prostorsko načrtovanje, prostorska zgradba, prostorski konflikti, raba prostora, CLC, naravna vrednost

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1 Introduction

Conflicts are a common phenomenon which always occurs between at least two entities, of which one strives to achieve benefits for themselves at the expense of the other party without its approval (Braun and Wimmer 2013). The notion of a conflict can be seen in various aspects, e.g. as a social, economic process in which one of the entities strives to achieve their own goals by either eliminating the other party of the conflict or establishing own domination over it. It should be noted that the above contradiction does not have to be real, and may result from the involved parties' conviction that the other party displays a hostile attitude (Kieslich and Hilbig 2014).

A conflict cannot exist if certain conditions distinguishing it from normal competition having no negative overtone are not satisfied. These conditions include:
- The existence of at least two parties;
- The main source of a conflict is the scarcity of goods;
- Conflict behaviour is aimed at either destroying the other party or at least establishing domination over it;
- Actions of the parties of a conflict are mutually opposed;
- An important aspect of conflict relationships is power;
- Conflict relationships are a social process, and have serious social consequences;
- Conflicts are characterised by a temporary tendency towards a split in relationships between the parties;
- Conflict relationships result in a change to expectations and standards prevailing in the existing system (Mack and Snyder 1957).

The first five of the above eight conditions are considered by the authors to be the main characteristics of the phenomenon in question.

In order to identify both the existing and possible future conflicts, it is crucial to determine potential sources of conflicts. Their basic categories were systematised by Bogetoft and Pruzan (1991). These authors conclude that conflicts may arise from one or several various factors which can be divided into four basic groups:

1 »Value system« factors:
- The parties have different values and aims;
- The parties take different measures to represent their aims;
- The parties have different preference hierarchies (e.g. different weights for different solutions).

2 »Effect distribution« factors:
- The parties may incur different costs and achieve various indirect benefits associated with the expected effects of actions;
- Breakdown of costs and benefits is perceived as uneven and unfair.

3 »Uncertainty« factors:
- The parties do not agree to the probable effects of an action;
- The parties are not certain of the effects of actions;
- The evidence and rationale as regards the benefits of the effects of actions may be insufficient or incomprehensible;
- The parties may have doubts about the relations between the effects of an action and different actions.

4 »Process« factors:
- The parties have difficulties in communicating with one another in terms of presenting one's values, aims, criteria, preferences, and expectations.

All these factors have a common denominator which is manifested by the contradictory actions of the entities, with each action located in the space. A significant percentage of conflict subjects are directly or indirectly associated with the space. The conflicts in which this relationship is direct are referred to as *spatial conflicts*. In terms of theoretical bases, spatial conflicts do not differ from the general concept of this phenomenon. They only set out the subject of a conflict, which always is the space. Usually, a source of spatial conflicts is the occurrence, within a particular area, of many different possibilities for the management and/or many various interests and aims, also those associated with the use of environmental goods (Wehrmann 2008; Bob and Bronkhorst 2011).

Given the subject, spatial conflicts are of interest to spatial economy, including spatial planning (Bergstrom, Goetz and Shortle 2013). Spatial planning is a complex process. In most cases, it is associated with numerous expectations, high uncertainty level, and always a certain degree of a conflict (Alston, Libecap and Mueller 1999). Therefore, understanding the expectations, uncertainties and conflicts is necessary to reflect upon the way to improve the current planning practices (Domingo 2009; Nolon, Ferguson and Field 2013).

The planning process is usually perceived as less important than the development process (Smrekar, Hribar and Erhartič 2016). It should be borne in mind, however, that the role of a plan may be perceived as a »meeting point« for various, sometimes contradictory views, and as a framework for taking joint decisions (Hopkins 2001). Therefore, it is extremely important to identify potential spatial conflicts as early as at the planning stage. Minimisation of the probability of their occurrence leads to achieving sustainable development (Markuszewska 2018).

The main conflicts in achieving such development exhibit functional and economic, socio-cultural, or natural and ecological characteristics (Abdelgalil and Cohen 2007). Functional and economic conflicts result from the simultaneous occurrence of factors focusing and defocusing various functions of the space, which may lead to imbalance in the management (Glasson and Marshall 2007; De Groot 2006). They are usually associated with a significant disproportion in the development of adjacent areas, and thus tendencies towards excessive concentration (e.g. in towns and cities), and, at the same time, the establishment of peripheral, underdeveloped areas (Coppens 2011).

Social and cultural conflicts are associated with contradictory aspirations of managing entities as regards the use of the space (Hite 1998; Brown and Raymond 2014). Most often, these are conflicts associated with the existence or development of infrastructure, with opposition from local communities to unfavourable changes in their immediate vicinity (von der Dunk et al. 2011). A conflict situation may also arise from an opposite situation e.g. when local communities aim at the expansion of a certain type of infrastructure, and supra-local social groups benefiting from the use of the space in the existing state oppose to these aims.

A typical example of spatial conflicts are natural and environmental conflicts arising from the clash of the need for economic development and the necessity to protect the values of the natural environment (Young et al. 2005; Kennedy 2017). Such a division of conflicts is neither closed nor sharp. In many cases, these conflicts have characteristics of various groups listed in this paper. They are both social and economic conflicts, etc. (Braun and Wimmer 2013).

As has been emphasised, spatial conflicts are associated with a specific use of the space, and frequently arise from nothing else but the use of the space, or from the desire to change its use. At the stage of planning the management of the space, it is very important to recognise the fragments of the space where the probability of the occurrence of conflicts may be high (Biłozor and Renigier-Biłozor 2015). One of the factors to be analysed while searching for such spaces is an analysis of the variety of uses, and the identification of extremely different forms of the use of adjacent areas.

One of the stages in the procedure for determining the interaction of areas with different forms of use is to refer to their natural value. There are several methods for carrying out such an assessment. It may be carried out by expert research conducted directly in the field inventory of the area through fieldwork (Leedy and Ormrod 2005; Hrvatin and Perko 2008), or in-house inventory based on existing documentation of the land (Strumiłło-Rembowska, Bednarczyk and Cieślak 2014) or its aerial and satellite photographs (Joshi, de Leeuw and van Duren 2004). This is the most precise yet very laborious method, which is worth to follow for the purposes requiring research of great precision, carried out within a small area. Expert research may also concern the model of land i.e. maps and related documentation, providing knowledge of the value of the area. The assessment is based on in-house inventory of the area based on the existing documents (Figure 1). One of the ways to determine such a value is to use the existing soil valuation assessments of the natural value of an area, associated with its uses. This method is definitely less precise yet sufficient for achieving many research objectives, including those associated with spatial planning. Moreover, it provides a possibility for conducting analyses to people who are not experts in biological sciences.

An important stage of the analysis is to determine the relationships between adjacent areas, from which spatial conflicts may arise. These relationships may be determined using a description. However, for the needs of statistical analyses, and in order to simplify the inference process, the desired form is a numerical form. A reference to the steps described can be found in Figure 1.

The main objective of the research presented in the paper was to establish a procedure for identifying areas with high potential for spatial conflicts, referred to as land's burden. An important step in the work was the verification of the proposed procedure with the selected area as an example.

2 Methods

Monitoring the use of the space and the changes of occurring in this is became easier when spatial information bases began to be established. CLC (CORINE Land Cover) belongs to one of such bases.

The CORINE project (CO-ordinate of Information on Environment – Land Cover) was launched on the initiative of the European Community in 1985. In 2001, Chief Environmental Protection Inspector decided to incorporate Poland into the project (Cieslak, Szuniewicz and Czyża 2016; Corine Land Cover 2018).

The established database contains information on both the land cover and the land use. In the CLC, forms of land cover are hierarchically divided into three levels (Ciołkosz and Bielecka 2005). According to the CLC legend, five basic forms of land cover are distinguished (Table 1).

Table 1: Detailed expansion of land use forms in CLC (Internet).

LEVEL I	Description	LEVEL II
1 ARTIFICIAL SURFACES	Built-up areas used for residential, service, industrial or mining purposes, and green urban areas	1.1 Urban fabric 1.2 Industrial, commercial and transport units 1.3 Mine, dump and construction sites 1.4 Artificial, non-agricultural vegetated areas
2 AGRICULTURAL AREAS	Agricultural areas, permanent crops, meadows and pasture land as well as wooded land and bushland used for agricultural purposes	2.1 Arable land 2.2 Permanent crops 2.3 Pastures 2.4 Heterogeneous agricultural areas
3 FOREST AND SEMI-NATURAL AREAS	Areas covered with forest vegetation, or partially deprived thereof	3.1 Forests 3.2 Scrub and/or herbaceous associations 3.3 Open spaces with little or no vegetation
4 WETLANDS	Inland bogs, peatbogs, salt marshes, salines, and tidal marshes	4.1 Inland wetlands 4.2 Marine wetlands
5 WATER BODIES	Inland waters and marine waters	5.1 Inland waters 5.2 Marine waters

This paper uses data with the degree of generalisation to the 2nd CLC level. The data provided a basis for land with specific use within the area under study.

The main objective of the study was to establish a load factor for conflicting areas. The developed indicator was made dependent on the natural values of adjacent areas with different uses. The identification of areas with high potential for spatial conflicts was defined in the procedure whose diagram is provided in Figure 1.

The first stage of the procedure is to establish the limits of various forms of land use. This stage can be passed through using several methods. The most obvious appear to be field inventory, analysis of formal and legal documentation, and the use of currently broadly developed Geographical Information System databases. One of such bases is the CLC.

The second stage of research work required the differentiation of the natural values of areas with different uses. Compensation indicators which are used in the Federal Republic of Germany to determine the amounts of compensation for changes to the space use, were applied (NatSchAVO 1995). As part of the Saxony's environmental protection law, a compensation procedure aimed at both stopping the pointless degradation of the environment and ensuring high natural quality of the space was developed (SMUL 2009). As part of that procedure, on the basis of research into biodiversity and physical characteristics of the space, a scale of land assessment, assigned to specific forms of its cover, was developed (Cieślak, Szuniewicz and Gerus-Gościewska 2013). It organises the quality of an area based on the natural value, and specifies differences or proportions between the values of areas with different uses. The indicator (*ix*) taken from the planning system of Saxony, marked for the needs of the study as *ix*, are a simplified assessment of the quality of natural environment which result from the use of that space. The assessment in question (Table 2) may be useful while preparing a simplified assessment of the environmental value of the space; however, it should be borne in mind that it is based on a very simplistic approach, and its results are only illustrative.

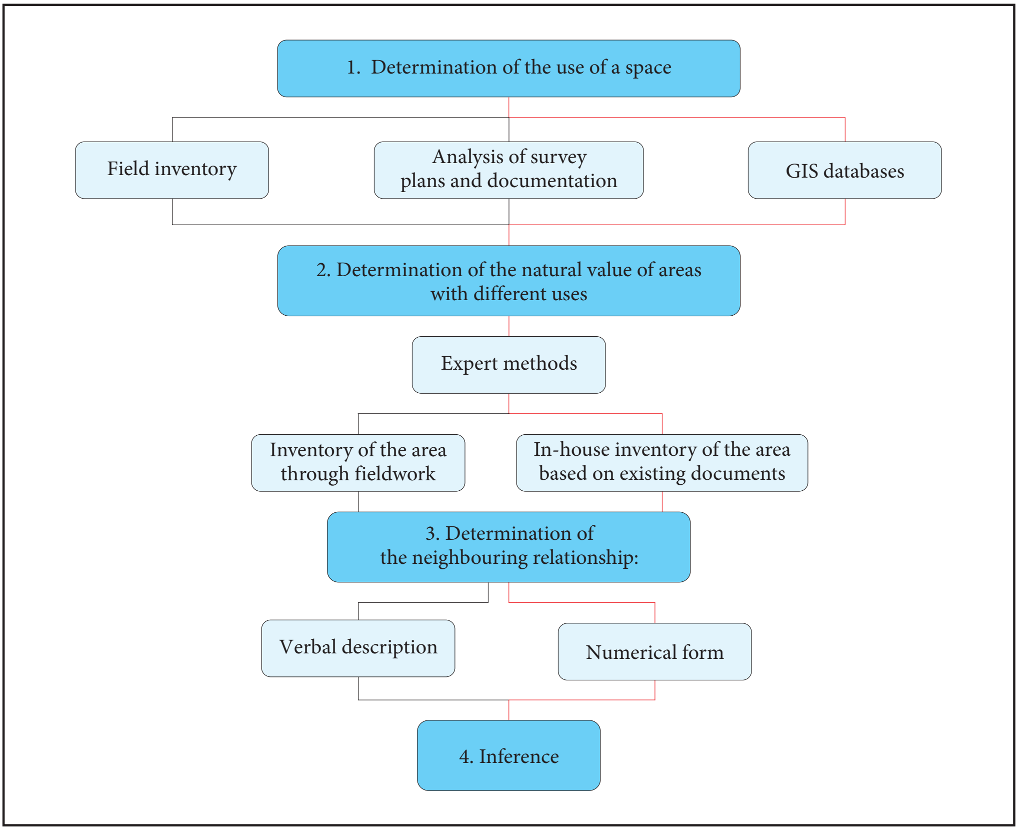


Figure 1: Two different concepts in analysing and procedure for the determination of the burden of potential conflicts within the space under study.

Table 2: The value of the environmental coefficient.

Category of land	Land use	Coefficient *ix*	CLC
A0	Built-up area, impervious to water (roads, buildings, paved areas)	0.10	1.1; 1.2; 1.3
A1	Permeable surfaces, areas of greenery around buildings	0.10	– -
A2	Areas of greenery in residential quarters, allotments, orchards, greens	0.20	1.4
A3	Intensively cultivated agricultural land (arable land)	0.30	2.1
A4	Other intensively used areas (orchard plantations)	0.40	2.3; 2.4
A5	Watercourses and standing waters with a poor natural structure (regulated watercourses, fish farming ponds), including riparian and shallow-water vegetation and open spaces with little or no vegetation	0.50	2.3; 3.3
A6	Forest areas with an unnatural tree species composition, shrub vegetation communities	0.60	3.2
A7	Extensive land use areas (e.g. extensive grassland, extensive vineyards, areas which can be intensively cultivated in the long term), or succession areas	0.70	2.2
A8	Forest areas with a natural tree, forests on an open space, green areas with old trees, parks, pedestrian pathways, single trees	0.80	3.1
A9	Flowing and standing waters with a rich natural structure	0.90	5.1; 5.2. 4.1; 4.2
A10	A biotope as defined by environmental protection regulations (National Parks, nature reserves)	1.00	–

However, the use of such a grading scale may provide a basis for determining the location of many spatial phenomena, including the location of potential spatial conflicts (Cieślak 2012).

The assessment presented in Table 2 was transformed to include the forms of land cover available at the 2nd level of the CLC database (Cieślak et al. 2017).It was necessary to supplement both lists so that all forms of land cover could be evaluated during the analysis. Protected areas are not included in the CLC inventoried forms of land cover. Such an inventory is not possible with the use of an orthophotomap on which the CLC is based.

The 3rd stage of research work required the determination of relationships between adjacent areas, which could indicate an adverse interaction. For the purposes of the study, a conflict matrix was developed (Figure 2), which presents theoretical intensity of the contradiction in the use of a space marked as P^0_{Kp}. This contradiction may determine the occurrence of spatial conflicts for adjacent areas. The value of the indicator was calculated as a ratio of *ix* of a lower value to *ix* of a higher value for adjacent fields. Conditions for the calculation of particular matrix values are provided in the following equation:

$$If\ ix_i < ix_n\ then\ P^0_{Kpn} = \frac{ix_n}{ix_i}$$

$$If\ ix_i > ix_n\ then\ P^0_{Kpn} = \frac{ix_i}{ix_n}$$

where:
P^0_{Kpn} – an indicator of the intensity of a potential conflict between areas *i* and *n*,
ix_i – value of *ix* for field *i*,
ix_n – value of *ix* for field *n*.

The conflict matrix is a symmetric matrix. The indicator values presented in the matrix may range from 1.00 to 10.00. At a value of 1.00, the burden of a potential conflict does not, in principle, exist. When P^0_{Kp} is equal to 10.00, the neighbourhood of an area is extremely contradictory to its natural value, which may generate spatial conflicts. The developed matrix is a theoretical matrix which can be used universally. In the presented study, the values of P^0_{Kp} indicator may only range from 1.00 to 9.00. This results from no possibility of identification based on the CLC data concerning protected areas with *ix* equal to 1.00.

The values found in the matrix were divided into three classes of intensity of potential conflicts. The first class comprises areas for which the mutual neighbourhood results in a hazard of the occurrence of spatial conflicts at a minimum level (values ranging from 1.00 to 1.50). The second class of values was determined for areas with a medium level of the hazard of the occurrence of conflicts due to their mutual neighbourhood (values ranging from 1.60 to 3.50). The third class was determined for the values with high probability of the occurrence of spatial conflicts due to the extremely different natural values of the adjacent areas (values ranging from 4.00 to 10.00).

Based on the conflict matrix, real values of the burden of occurrence of spatial conflicts P_{Kp} were determined, which, in addition to the immediate neighbourhood of areas with different uses, takes their surface into account. P_{Kpi} for a selected area *i* is equal to the ratio of the sum of products of the surface of *N* areas adjacent to it, and the product of indicators *ix* consistent with the form of use of area *i* and areas *n*, to the total surface of areas *n* adjacent to *i*:

$$P_{Kpi} = \frac{\sum_{n=1}^{N} P^0_{Kpn} \cdot P_n}{\sum_{n=1}^{N} P_n}$$

where:
P_{Kp} – external burden of a spatial conflict;
i – the area of use under study;
n – the number of the area adjacent to area *i*;
N – number of the areas of use adjacent to area *i*;
P_n – the surface of the *n*-th area adjacent to area *i*;
ix – indicator of the natural value of area *i* or *n*.

Figure 2: The conflict matrix of the contradiction in the use of a space. ➤ p. 50

ix		1.00	0.90	0.90	0.80	0.80	0.70	0.60	0.50	0.40	0.40	0.40	0.30	0.20	0.10	0.09	0.09
	clc	**6,0**	**5,2**	**5,1**	**4,2**	**4,1**	**3,1**	**3,2**	**3,3**	**2,4**	**2,3**	**2,2**	**2,1**	**1,4**	**1,3**	**1,2**	**1,1**
1.00	**6,0**	1.00	1.11	1.11	1.25	1.25	1.43	1.67	2.00	2.50	2.50	2.50	3.33	5.00	10.00	10.00	10.00
0.90	**5,2**	1.11	1.00	1.00	1.13	1.13	1.29	1.50	1.80	2.25	2.25	2.25	3.00	4.50	9.00	10.00	10.00
0.90	**5,1**	1.11	1.00	1.00	1.13	1.13	1.29	1.50	1.80	2.25	2.25	2.25	3.00	4.50	9.00	10.00	10.00
0.80	**4,2**	1.25	1.13	1.13	1.00	1.00	1.14	1.33	1.60	2.00	2.00	2.00	2.67	4.00	8.00	8.89	8.89
0.80	**4,1**	1.25	1.13	1.13	1.00	1.00	1.14	1.33	1.60	2.00	2.00	2.00	2.67	4.00	8.00	8.89	8.89
0.70	**3,1**	1.43	1.29	1.29	1.14	1.14	1.00	1.17	1.40	1.75	1.75	1.75	2.33	3.50	7.00	7.78	7.78
0.60	**3,2**	1.67	1.50	1.50	1.33	1.33	1.17	1.00	1.20	1.50	1.50	1.50	2.00	3.00	6.00	6.67	6.67
0.50	**3,3**	2.00	1.80	1.80	1.60	1.60	1.40	1.20	1.00	1.25	1.25	1.25	1.67	2.50	5.00	5.56	5.56
0.40	**2,4**	2.50	2.25	2.25	2.00	2.00	1.75	1.50	1.25	1.00	1.00	1.00	1.33	2.00	4.00	4.44	4.44
0.40	**2,3**	2.50	2.25	2.25	2.00	2.00	1.75	1.50	1.25	1.00	1.00	1.00	1.33	2.00	4.00	4.44	4.44
0.40	**2,2**	2.50	2.25	2.25	2.00	2.00	1.75	1.50	1.25	1.00	1.00	1.00	1.33	2.00	4.00	4.44	4.44
0.30	**2,1**	3.33	3.00	3.00	2.67	2.67	2.33	2.00	1.67	1.33	1.33	1.33	1.00	1.50	3.00	3.33	3.33
0.20	1,4	5.00	4.50	4.50	4.00	4.00	3.50	3.00	2.50	2.00	2.00	2.00	1.50	1.00	2.00	2.22	2.22
0.10	1,3	10.00	9.00	9.00	8.00	8.00	7.00	6.00	5.00	4.00	4.00	4.00	3.00	2.00	1.00	1.11	1.11
0.10	1,2	10.00	10.00	10.00	8.89	8.89	7.78	6.67	5.56	4.44	4.44	4.44	3.33	2.22	1.11	1.00	1.00
0.10	1,1	10.00	10.00	10.00	8.89	8.89	7.78	6.67	5.56	4.44	4.44	4.44	3.33	2.22	1.11	1.00	1.00

An example of the arrangement of adjacent fields is presented in Figure 3. The Figure is linked to Table 3. The Table also contains subsequent calculations which enable the determination of the final value P_{Kpi} for field No 7 ($i = 7$), and for field No 324 ($i = 324$) (Figure 3).

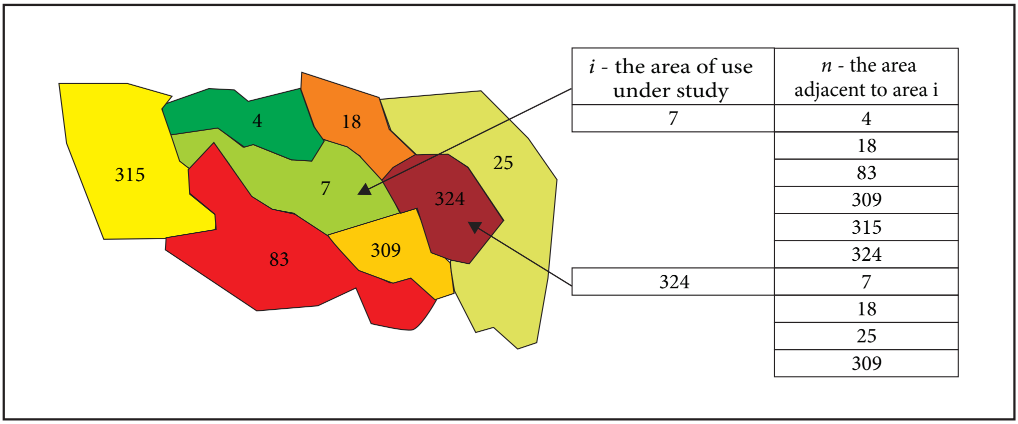


Figure 3: An example of the adjacency defined for fields No 7 and 324.

Table 3: An example of the calculation of the value P_{Kpi} for fields No 7 and 324 (Figure 3).

i	ix_i	N	n	ix_n	P_n	P^0_{Kpn}	$P^0_{Kpn} * P_n$	$\sum_{n=1}^{N} P^0_{kpn} \cdot P_n$	$\sum_{n=1}^{N} P_n$	P_{Kpi}
7	0.6	6	4	0.8	30.80	1.33	41.07	695.75	239.76	2.90
			18	0.3	17.08	2.00	34.16			
			83	0.4	63.49	6.00	380.94			
			309	0.4	27.11	1.50	40.67			
			315	0.5	58.29	1.20	69.95			
			324	0.3	42.99	3.00	128.97			
324	0.5	4	7	0.6	56.24	3.00	168.72	419.36	168.75	2.48
			18	0.3	17.08	1.50	25.62			
			25	0.5	68.32	2.50	170.80			
			309	0.4	27.11	2.00	54.22			

In this way determined indicator indicates the intensity of contradiction in the use of adjacent areas. If these are areas of high natural values, the impact of adjacent areas with more intense pattern of use needs to be mitigated.

The procedure described was tested within the area of Nidzicki District situated in Warmińsko-Mazurskie Voivodeship. The district covers an area of 961 km^2. This is a very interesting area as in addition to its significant natural values, it is a rapidly developing administrative unit of the voivodeship.

ArcGis software tools were used to complete the calculation stages, and to present the analysis results.

3 Results

The Nidzicki District belongs to the Mazurian Lake District. The area is characterised by a hilly landscape with numerous post-glacial lakes, and heavily wooded. Because of the natural and cultural assets, many nature reserves and landscape parks have been established within the district. On the other hand, the district has many attributes conducive to the development of the economy. The area is very well connected internally. Economic entities operate there in the trade, service, and manufacturing sectors, yet it is agriculture that is the main branch of the economy. Due to the natural and economic determinants, the spatial structure of the district is very varied, and susceptible to spatial conflicts. In accordance with the proposed procedure, 411 areas with various uses consistent with the 2nd CLC level were identified within the district. Their area varies from 0.25 m^2 to 4327.31 m^2. Based on the analysis of the cover of these areas, natural values *ix* were assigned to them in accordance with the rule provided in Table 2. Even though the area under study includes protected areas, it was possible to assign the maximum value of 0.9 to them based on the forms of land cover identified using the CLC.

The results of this operation are presented in a chorogram (Figure 4).

The chorogram indicates intensely used locations (shades of red) indicate those used by humans, which are mainly located in the urbanised space. It can also be noted that within the area under study, many naturally valuable areas are located (shades of green).

In the next step, for each of 411 areas marked as *i*, areas which are directly adjacent to them were identified (*n*). Based on the data, indicator P_{Kp} was calculated for each area. This indicator illustrates the area's burden of potential spatial conflicts resulting from different uses of the adjacent areas, with account taken of their surface. The value of indicator P_{Kp} within the area under study ranged from 1.00 to 8.00. An average value for the area is 2.07 at a standard deviation of 1.14.

The values of the indicator were classified in accordance with the procedure presented in the Methods. The thus calculated area's burden of the occurrence of conflicts for all fields enabled the development of a chorogram of the potential occurrence of spatial conflicts for the area under study (Figure 5).

An analysis of the chorogram provides a possibility for the identification of areas with high potential for spatial conflicts (3rd class) as well as areas for which such a hazard does not exist (1st class).

For 411 analysed areas, the indicator values were ranging from 1.00 to 8.00. They were divided into three classes in accordance with the adopted procedure described in section 2. In class 1, for which the burden of conflict is not significant, 127 areas are included. 79 of them are such areas for which the values of indicator *ix* took values of 0.4, 0.5, and 0.6. Therefore, their natural value is average. For 48 areas of this class, indicator *ix* is very high (0.8, 0.9).

In the second class, 272 areas are included. In this class, the differentiation of the natural value was high. The areas were described by indicator *ix* within a range from 0.1 to 0.9.

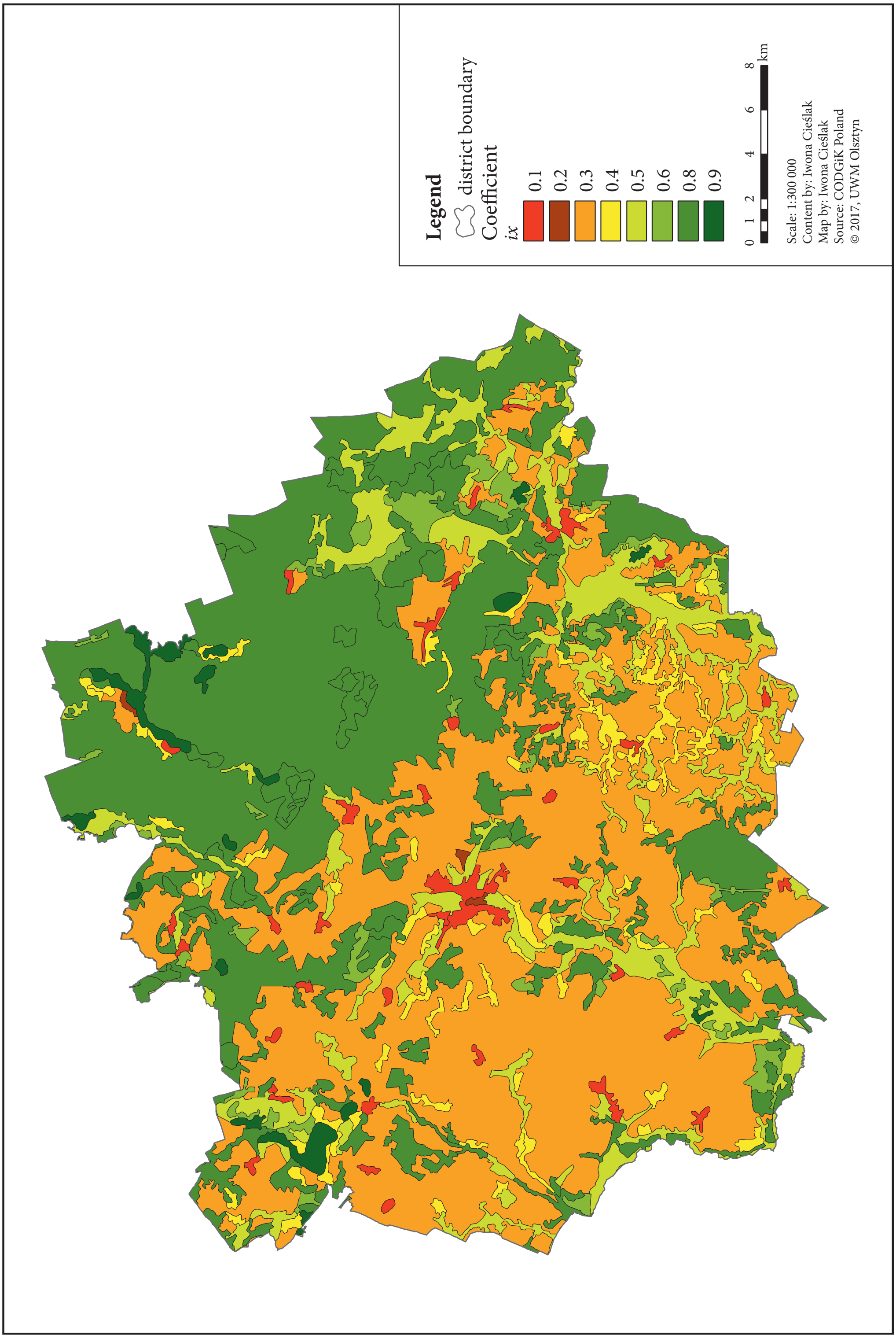
The smallest class in terms of numbers was the third class including only 13 areas. An interesting fact is that all of them have a relatively small surface area, and a very low natural value. All of them are described with indicator *ix* having a value of 0.1.

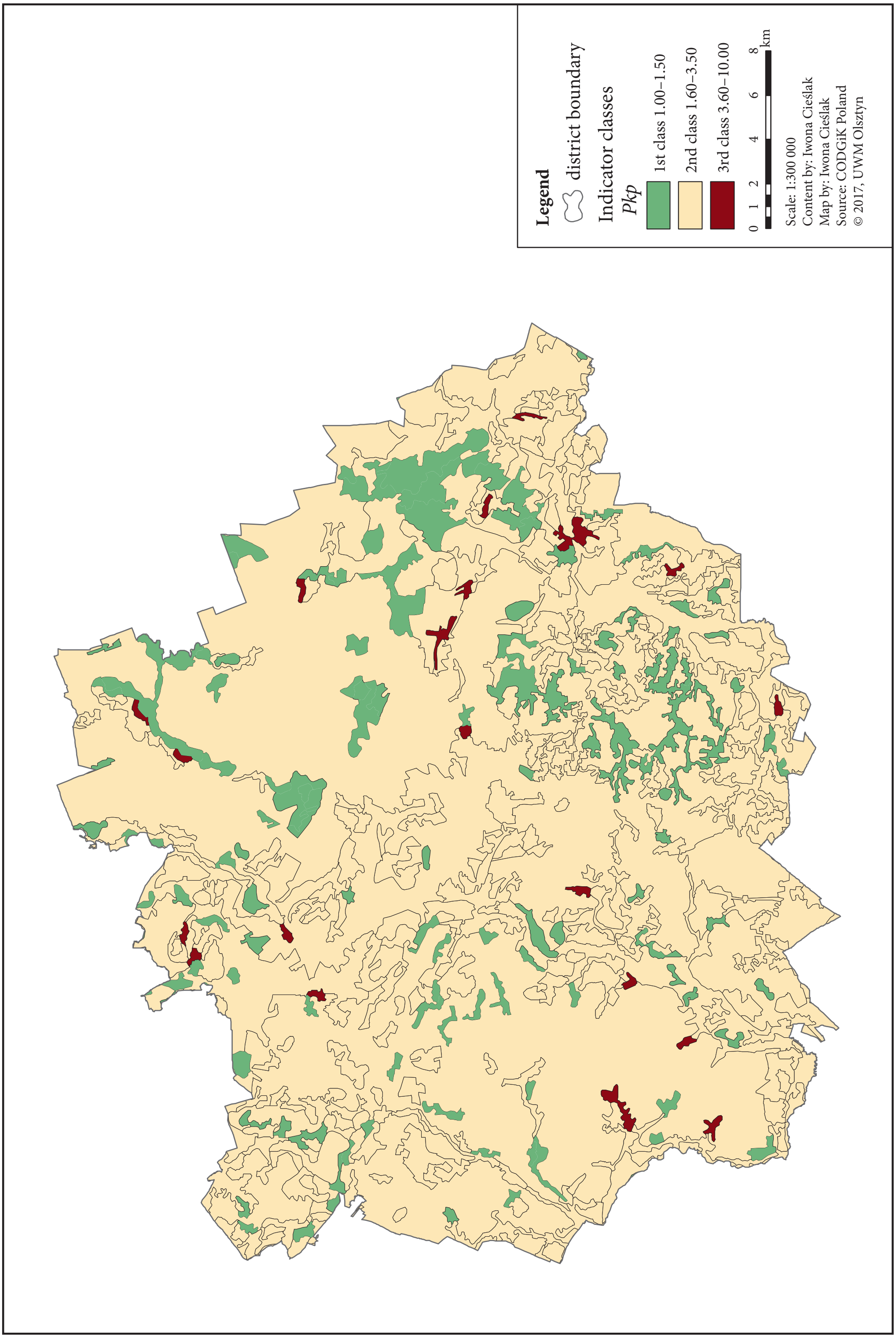
4 Discussion

While pursuing the main aim of the research, which was to establish a procedure for identifying areas with high potential for spatial conflicts, referred to as land's burden, a study was conducted, which enabled the establishment of a procedure for identification of the location of potential spatial conflicts resulting from the proximity of different forms of space use. To this end, the index of external burden of a spatial conflict P_{Kp} was determined.The obtained results confirm that the CLC can be used to identify potential spatial conflicts resulting from the immediate vicinity of areas with adverse impact. An important advantage of these data is their universal nature. These data have a uniform structure and present large areas. This makes the analysis results comparable for various areas and on variety of scales. However, their significant disadvantage is their low validity (the latest data are for 2012), and limitations resulting from the method of obtaining these data (orthophotomaps). While using such results it should be borne in mind, that the databases obtained based on satellite images do not contain information on the legal aspects of land use. Therefore, the obtained results cannot indicate conflicts concerning areas which are e.g. legally protected.

We can conclude that the space in question is relatively well used. This is evidenced by the average value of indicator P_{Kp} obtained for the entire area (2.07), and its standard deviation (1.14). Within the district,

Figure 4: Chorogram with various indicators of the natural value *ix* for the area under study. ➤ p. 53
Figure 5: Chorogram of the potential occurrence of spatial conflicts for the area under study. ➤ p. 54


Legend
district boundary
Coefficient
ix
0.1
0.2
0.3
0.4
0.5
0.6
0.8
0.9
0 1 2 4 6 8
km
Scale: 1:300 000
Content by: Iwona Cieślak
Map by: Iwona Cieślak
Source: CODGiK Poland
© 2017, UWM Olsztyn


Legend
district boundary
Indicator classes
Pkp
1st class 1.00–1.50
2nd class 1.60–3.50
3rd class 3.60–10.00
0 1 2 4 6 8 km
Scale: 1:300 000
Content by: Iwona Cieślak
Map by: Iwona Cieślak
Source: CODGiK Poland
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there are not many places for which the probability of the occurrence of a spatial conflict due to extremely different forms of use of adjacent spaces is very high. For most of the area under study, the burden of the occurrence of conflicts is heightened yet not very high (the second class).

An interesting result concerns locations of spatial conflicts. They are only formed in proximity to very intensely used areas (a natural indicator for the third class of the external burden of spatial conflicts amounts to 0.1 for all areas). It follows that such areas appear frequently in the immediate neighborhood of naturally valuable areas. The indication of such places enables the location of areas in need of special attention, which should be permanently monitored.

The developed procedure for the determination of indicator P_{Kp} is an useful tool supporting of spatial planning, and for monitoring the implementation of the assumptions outlined in the process.

5 Conclusion

In accordance with the established and described procedure, it was found that the most efficient method for obtaining data on the diversity of uses of the district land was the use of the existing spatial databases. This is a method that does not require a lot of work and time, which determines its high level of efficiency. However, the conducted study proves that based on monitoring the forms of land cover, it is possible to determine the location of potential conflicts resulting from their inadequate neighbourhood. This provides an opportunity for the identification of areas for which a thorough and in-depth analysis should be conducted in order to identify the adverse impact of neighbouring areas. This confirms the need for maintaining such databases, their updating and integration with other geoinformation databases.

Results of the conducted analysis demonstrated that within the analysed space there is a risk of the occurrence of spatial conflicts, mainly due to the immediate neighbourhood of areas intensely used by humans and naturally valuable areas. The indication of the location of areas for which this neighbourhood may be particularly controversial can become an important element of preventing conflicts through improving the spatial planning process.

The proposed method for identifying areas with high potential for spatial conflicts is a novel approach in the description of the phenomenon of conflicts. It is based on the values of indices which are a good carrier of information on the phenomena occurring within the space. Not only do they provide an opportunity to identify places with an elevated risk of the emergence of conflicts but also to dynamically monitor such phenomena.

However, the access to spatial data may become a threat to such an approach. The data used in the described research are rarely updated. What is more, geodatabases are characterised by a low level of homogeneity. For various spaces, they are collected and described in a different way.

However, it is necessary to take into account the development of methods for collecting and processing data, which will certainly contribute to an improvement of this situation, thus providing an opportunity to deepen and improve the established procedure.

The rate of spatial phenomena requires that tools for identifying adverse events within a space, to which spatial conflicts certainly belong, should be developed.

The proposed procedure may certainly be modified depending on the objective of analyses, the nature of the area under study, and the access to spatial data bases. On the other hand, it can be a tool supporting the processes of planning and monitoring sustainable development of the space.

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