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The primary aim of the journal and its mission are to spread information and guidance relevant both for authorities responsible for the effective land administration (local, regional and central), scientists and teachers.

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# A MICROSCALE STUDY ON PERCEPTION OF DANGEROUS PLACES. THE CASE OF GNIEZNO, POLAND

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## ABSTRACT

Research on the sense of security in Polish crime geography has been developed since the end of the 20th century. The studies conducted focus primarily on the overall assessment of a city or town, or its selected parts, using survey questionnaires. This study is an attempt to address the issue of the sense of security and, in particular, perception of dangerous places, at a microscale level. The focus of the paper is, first, to identify dangerous places in Gniezno using a survey and second, to analyse them using complementary methods: desk research, interviews with police officers, field inventory and photographic documentation. The research was carried out in the years 2017–2019. The sense of security, both regarding the city as a whole and selected urban spaces, was higher during the day. The places most frequently indicated by the respondents as dangerous, regardless of the time of day, were: Tajwan, Cierpięgi street, the Old Town and parks. Difficult past and the image of the place play a crucial role in the safety perception.

**Key words:** geography of crime, subjective research on crime, sense of security, threat of crime, medium-sized city

## INTRODUCTION

Research on spatial diversity of crime involves two directions related to the scale of the studies undertaken. The beginnings of research on geographical aspects of the phenomenon can be seen in the works of the nineteenth-century cartographic school, in which the issue of spatial diversity of crime was addressed by Guerry (1833) and Quetelet (1842). Guerry's work (1833) presented e.g. spatial differentiation of personal and property crime in individual departments of France. In turn, Quetelet in his 1842 publication provided a statistical analysis of the relationship between crime and age, crime and gender, as well as climate, education, and alcohol consumption in Belgium. The dominance of large-scale research, i.e. concerning countries, regions and cities, lasted for many years. The increase in researchers' interest in the phenomenon of crime on a smaller scale is associated with the increased availability of statistical data and with the development of geographical information systems which allow for advanced analyses of the phenomenon in the crime locations accessible. The interest in small-scale crime studies is also related

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to the development of research on the sense of security that dates back to the end of the 20th century.

There is one point to be emphasised in the context of studying the intensity of crime and the sense of security. Individual spatial units, for example a city or town, usually have a very diverse internal character. The same city comprises spaces with different housing types and functions, or inhabited by people with various demographic and social features. Due to these mosaics in the urban space, it seems that studies on crime and the sense of security should take these conditions into account and that an individual character of particular urban spaces should be considered in the analyses performed.

However, large-scale studies, e.g. those concerning an entire city, higher-order territorial division units, or the entire state, as well as public opinion surveys on crime and the sense of security among inhabitants of a single country, are still conducted.

Nevertheless, the world literature demonstrates a strong trend of departing from general research conducted on a large scale. Nowadays, more and more microscale-based studies appear within scientific disciplines dealing with the issue of the sense of human security in the urban space, e.g. city park (Iqbal and Ceccato 2016), school (Vagi et al. 2018), university campus (Cozens and Sun 2018), transportation systems (Abenoza et al. 2018), revitalized areas (Carter et al. 2003), or housing estates (Cozens et al. 2001). The same applies to studies using statistical data obtained by the police (e.g. Sypion-Dutkowska and Leitner 2017, Glasner et al. 2018).

This paper is an attempt to address the issue of the sense of security at a microscale level. Its purpose is to discuss the existence of dangerous places in Gniezno. The starting point for the discussion is the presentation of the results of a survey on the threat of crime in Gniezno, carried out among residents of the city. The focus was placed on assessing safety in Gniezno and its selected spaces during the day and at night. The next stage involved presentation of the most dangerous places in Gniezno, also in the day/night arrangement. The results of the study were expanded through desk research, interviews with police officers, an inventory of the areas indicated, and photographic documentation made during the evaluation. This allowed for confrontation of the survey results regarding the identification of dangerous places in Gniezno with the spatial development of these places (including the quality of space) and the opinions of police officers.

## SELECTED STUDIES ON THE SENSE OF SECURITY CONDUCTED TO DATE IN POLAND

A vast majority of Polish studies on the sense of security among city inhabitants analyse cities as a whole and distinguish basic urban spaces within those cities. Most of the works are focused on big cities. There are not many studies on the sense of security based on medium-sized cities. Rydz and Szymańska (2007) published a research on valorization of urban space, regarding also sense of security, in three cities of Pomerania: Lębork, Szczecinek and Wałcz. Researches on small sized-cities are also rare. One of the exceptions is an article by Szczepańska and Pietrzyk (2016) on the city of Morąg.

This paper presents examples of studies pertaining to two cities: Łódź and Poznań, where the subject in question was most often addressed in the Polish setting.

A substantial number of publications on the sense of security concern Łódź. Marcińczak and Siejkowska (2003) identified dangerous areas in Łódź and evaluated the safety of public places during the day and at night. Mordwa (2011), in turn, assessed the sense of security and the risk of victimization in Łódź in selected housing estates (Dąbrowa, Jagiełło-Czarnieckiego, Karolew, Kurak and Widzew-Wschód). Also, Mordwa (2012) was interested in the general threat of crime and offenses in Poland, in Łódź and in one's place of residence, with a special focus on the assessment of the sense of security in shopping centres (two selected ones: Manufaktura and Galeria Łódzka). His work from 2012 is one of the few Polish microscale studies. Mordwa's next study (2013) concerned crime risk assessment at various spatial


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levels, ranging from the area of entire Poland to the participants' place of residence. In-depth analyses were conducted in Łódź in the following city districts: Dąbrowa, Julianów-Marysin, Nowe Miasto and Wiskitno. They also involved identification of the most dangerous areas in the city and assessment of the risk of victimization. Mordwa (2014) also tackled the issue of spatial disproportions of selected social pathologies, including crime, in different areas of Łódź with various types of housing, functions and demographic characteristics of residents. In another study, Mordwa (2015) presented the perception of socio-spatial threats, subjective victimization risk and defensive behaviours in people aged 60+ in Łódź. Mordwa's subsequent study (2016) concerned a subjective sense of threat and defensive behaviours in the inhabitants of Łódź. The latest three studies by Mordwa (2014, 2015, 2016) were carried out based on questionnaire interviews conducted in the following areas: city centre (divided into northern and southern parts), Karolew, Radiostacja and Doły.

A study by Dolata and Kotus (2004, 2006) conducted in Poznań concerned the assessment of the sense of security in Poznań in several categories: staying at home, spending time in parks, walking around the neighbourhood during the day and after dark, staying in public places during the day and after dark. An attempt was also made to determine particularly dangerous places, distinguishing those located in the neighbourhood and in other parts of the city. Jabkowski (2005), in turn, assessed the sense of security during the day and at night in Poznań, at home, in the neighbourhood, at train and bus stations, tram and bus stops, in the city centre and city parks. A study by Jabkowski and Kilarska (2013) regarding the sense of security and crime level in Poznań is thematically extensive as it addresses numerous issues such as: the sense of security (in Poznań and its various spaces), victimization indicators, the perception of social problems, and the way actions taken by institutions responsible for ensuring order and security (police, local government, municipal police, prosecutor's office, courts) are perceived. However, research conducted on a group of city residents and high school students was not narrowed to the microscale level. In their publications, Bogacka (2009) and Bogacka and Siniecka (2016) assessed safety in Poznań districts (but only five of them: Grunwald, Jeżyce, Nowe Miasto, Stare Miasto, and Wilda, which renders the study very general).

## STUDY AREA AND METHODS

The subject of the case study presented is the city of Gniezno (Fig. 1). It is located in Wielkopolska Region (województwo wielkopolskie), in Gniezno District (powiat Gniezno). Gniezno is one of medium-sized cities in Poland, inhabited by 68,943 people, including 35, 874 women (52.0% of the total population). The area of the city is 40.6 $km^2$. The population density is 1,698 people/$km^2$ (data for 2017 by Statistics Poland). As for economically active inhabitants, 20.7% of them work in agriculture, 30.5% in industry and construction, and 48.8% in services. The unemployment rate is 7.0%. Gniezno is of great historical importance as it was the first capital of Poland.

In 2017, there were 995 criminal offences committed in Gniezno, i.e. the crime intensity was 14.43/1,000 inhabitants. These values are definitely lower than the values for Wielkopolska Region (16.50) and entire Poland (19.62). In turn, the crime detection rate in the city was 74.0%, which was comparable with the indicator for Greater Poland Province (74.60%) and higher than the value for entire Poland (71.70%)

The main source of information used in the study are the results of a survey on the threat of crime in Gniezno in the opinion of its residents. The survey was conducted by 25 students of Adam Mickiewicz University, Poznań in 2017 and 2018 during field classes in spatial development of cities and municipalities in Gniezno. As a result, 365 questionnaires were collected. Selection of respondents was random. The response rate was 40%. No major problems with people's reactions to surveyors were reported by students. The information provided in the questionnaires made it possible to establish the sense of security of the inhabitants of Gniezno, in particular spaces of the city during the day and at night, and to identify the most dangerous places in Gniezno during the day and at night. The findings were verified during the field inventory in June 2019 and supplemented with photographic documentation. An additional source of information used in the work were semi-structured interviews conducted with the officers of the District Police Headquarters in Gniezno, senior constable Krzysztof Socha and junior constable Arkadiusz Wieczorek, in 2017–2018.

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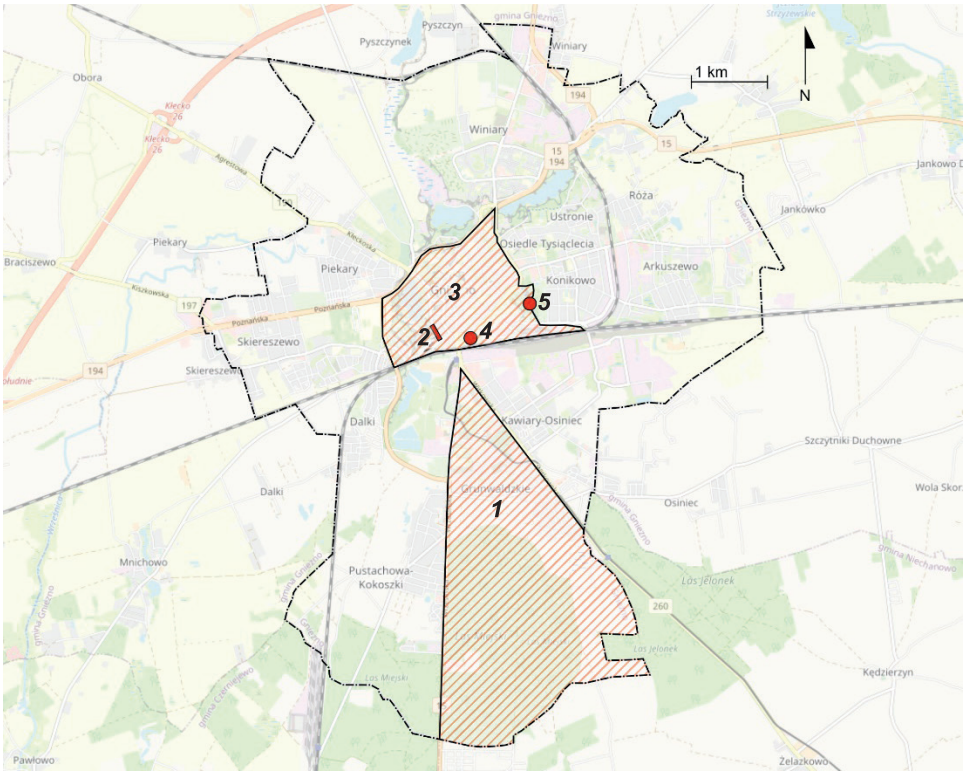


**Fig. 1.** Map of Gniezno with marked dangerous places: *1* – Tajwan; *2* – Cierpięgi street; *3* – Old Town; *4* – Tadeusz Kościuszko Park; *5* – General Anders City Park
*Source*: author's own compilation on the basis of openstreetmap.org.

## STUDY RESULTS

The respondents were asked to assess safety in Gniezno and the following urban spaces: their closest neighbourhood, their own flat/home, city centre, tenement houses, large-panel blocks of flats, single-family housing, city parks, shopping centres, streets, public transportation stops, and train and bus stations. The assessment was made separately for the day (Fig. 2) and night (Fig. 3). In the night safety assessment, shopping centres were excluded from the above list as being closed at this time.

The respondents assessed the spaces as safer during the day. Positive scores were assigned to a vast majority of the spaces analysed (answers 4 and 5combined). The following spaces were assessed as the safest: own flat/home (96.43% positive answers), shopping centres (90.08%), closest neighbourhood (86.81%) and single-family housing areas (85.92%). The exception was the area of tenement houses, which was the only one to have received less than half of positive responses (40.72%).

The sense of security was definitely lower at night. There were only three spaces with positive answers given by over half of the respondents: own flat/home (91.55%), closest neighbourhood (69.01%) and single-family housing areas (67.05%). City parks were the only space with a predominance of negative answers (61.54% of answers *1* and *2* combined). Most of the spaces analysed were rated as *3* in the assessment of safety at the night.

Table 1 presents central tendency measures, median and mode, assigned to the spaces analysed during the day and at night. The measures of each of the spaces where higher during the day. Only own flat/home got the highest scores. The lowest measures concerned tenement houses.

Each of the respondents was asked to indicate three most dangerous places in Gniezno during the day and at night. The respondents' answers are presented in Table 2. It is worth noting that 28.22% of the respondents did not indicate any dangerous places during the day and 13.70% of them did not indicate any dangerous places at night. The places most frequently indicated by the respondents, regardless of the time of day, were: Tajwan, Cierpięgi


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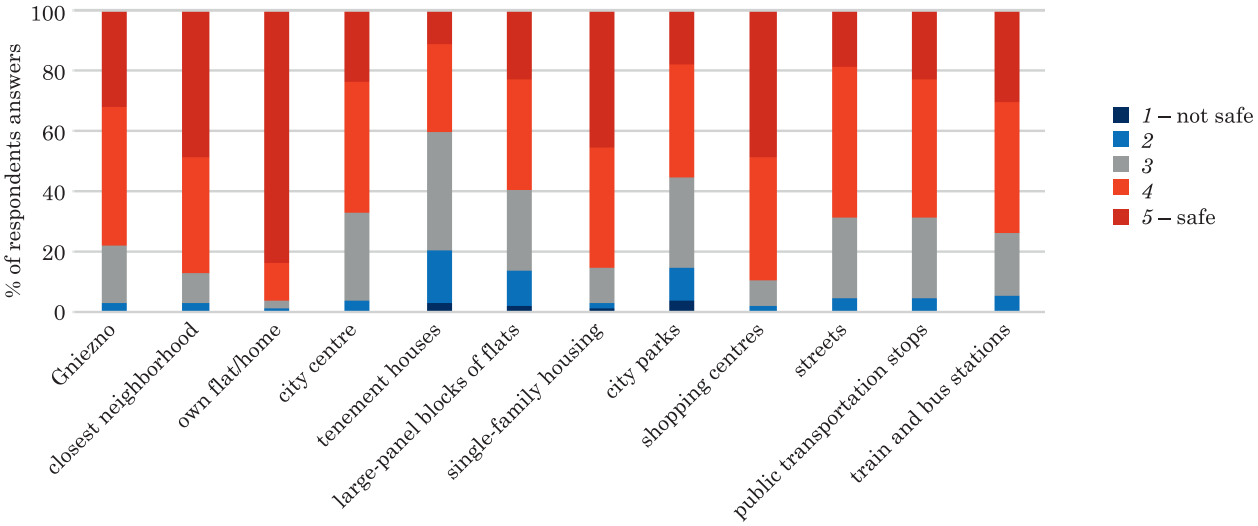


**Fig. 2.** Safety assessment of selected spaces in Gniezno during the day – structure of the respondents' answers
*Source*: author's own study based on the survey results

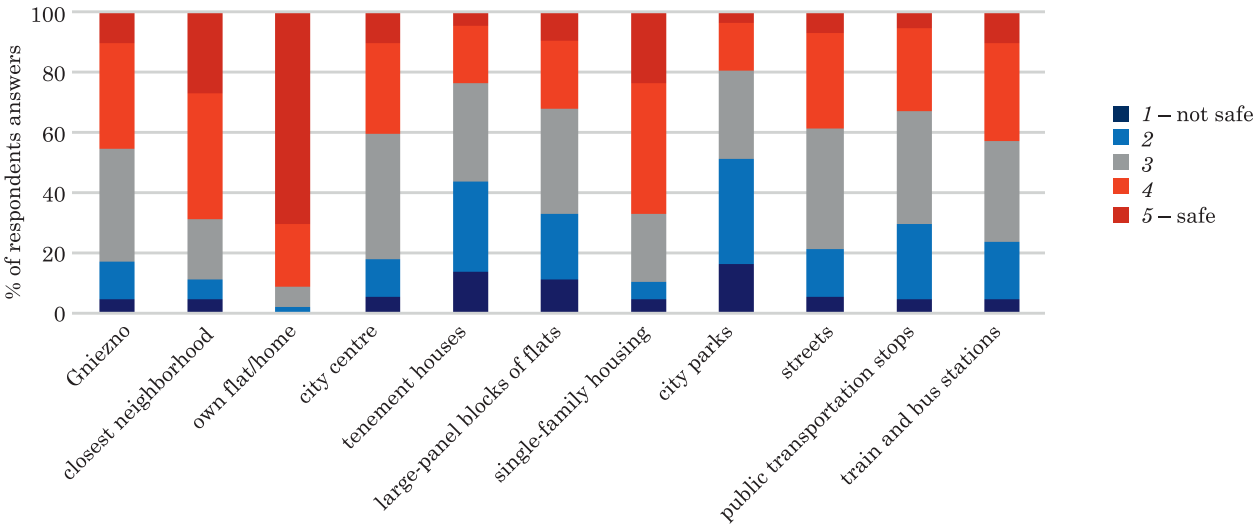


**Fig. 3.** Safety assessment of selected spaces in Gniezno at night – structure of the respondents' answers
*Source*: author's own study based on the survey results

street, the Old Town and parks (Fig. 1). These four places accounted for 57.4% of the respondents' answers as regards the day and 74.3% as regards the night. Cierpięgi street and some parks (in example parks commented in this article: Tadeusz Kościuszko Park and General Anders City Park) are located within the Old Town district.

Tajwan (en Taiwan) is one of the 12 auxiliary units of Gniezno (its official name is Osiedle Grunwaldzkie – pl osiedle/en housing estate) located in the south of the city. It is inhabited by approximately 4,000 people. Tajwan is a housing estate built for the German army during World War II. After the war, it was occupied by the Polish People's Army and handed over to the city authorities, which created a workers' housing estate there. Initially, it operated under the name Osiedle Baraki, which was officially changed into Osiedle Grunwaldzkie in 1948. Over time, families in poor financial situation were placed there. The common name Tajwan is probably associated with the distance from the housing estate to the city centre (peripheral location) and the cultural mix of people with low social

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**Table 1.** Safety assessment of selected spaces in Gniezno during the day and at night – median and mode as central tendency measures (*1* – dangerous; *5* – safe)

| Space | Median measure | | Mode measure | |
|---|---|---|---|---|
| | day | night | day | night |
| Gniezno | *4* | *3* | *4* | *3* |
| Closest neighborhood | *4* | *4* | *5* | *4* |
| Own flat/home | *5* | *5* | *5* | *5* |
| City centre | *4* | *3* | *4* | *3* |
| Tenement houses | *3* | *3* | *3* | *3* |
| Large-panel blocks of flats | *4* | *3* | *4* | *3* |
| Single-family housing | *4* | *4* | *5* | *4* |
| City parks | *4* | *2* | *4* | *2* |
| Shopping centres | *4* | – | *5* | – |
| Streets | *4* | *3* | *4* | *3* |
| Public transportation stops | *4* | *3* | *4* | *3* |
| Train and bus stations | 4 | 3 | 4 | 3 |

*Source*: author's own study based on the survey results

**Table 2.** Dangerous places in Gniezno during the day and at night – respondents' answers [as %]

| Place | Day [%] | Night [%] |
|---|---|---|
| Tajwan | 17.85 | 25.45 |
| Cierpięgi street | 14.63 | 18.76 |
| Old Town | 12.86 | 15.33 |
| Parks | 12.06 | 14.85 |
| Other | 10.61 | 6.04 |
| Lakes | 10.45 | 10.11 |
| I don't know | 8.04 | 0.00 |
| Other districts | 5.14 | 5.22 |
| Winiary | 4.82 | 4.24 |
| Market | 3.54 | 0.00 |

*Source*: author's own study based on the survey results

status living there. The housing estate itself is currently an area with very diverse housing[1]. It features: multi-family buildings (including former German tenement houses and one-storey barracks from the 1940s – Fig. 4*a*), industrial and warehouse buildings (Fig. 4*b*) and single-family houses (villas from the 60s and 80s of the 20th century – Fig. 4*c*). The entire estate gives the impression of a chaotically developed area and has diverse functions.

**Fig. 4.** Gniezno's Tajwan: *a* – typical barracks; *b* – industrial and warehouse areas; *c* – single-family houses

*Source*: author's own photos

Tajwan is notorious and considered dangerous by a large part of Gniezno inhabitants, and such image of this area is reinforced by press reports. However, the Tajwan population and the police (that is, in fact, people who know the area best) deny this information.

Cierpięgi street (pl ulica Cierpięgi) has an interesting history dating back to the 15th century. The town of Cier-

[1] Information retrieved from Gnieźnieński Fyrtel.



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pięgi (also called Jędrzejów) was a place of everyday trade and regularly held fairs (especially horse fairs). According to old sources, executions were carried out there, and the hill situated in the town was called the Gallows Hill (pl Wzgórze Szubiennicze). The very name Cierpięgi is derived from the ancient Polish term for gallows – "cierpiączka". At that time, a softened version of the word was also used – "cierpięga" that has survived in this form until today[2].

Today, the street has a chaotic character. Modern multi-family housing is mixed with old tenement houses. There are spaces with greenery, but they are untidy and neglected (Fig. 5*a*), as well as fenced and undeveloped areas (Fig. 5*b*). The disorganized nature of the area is intensified by illegal car parks (Fig. 5*c*). Groups of young and elderly people who consume alcohol gather in the gates of tenement houses and in deserted green areas, especially in the evenings and at night, which discourages people from using this street.

Crimes that occur there are publicized in the press. For example, a body of a 28-year-old designer drug dealer was found in this street in 2018. Initially, assault and battery was indicated as the cause of death, but later it was excluded. There are more such examples, and they reinforce the notoriety of the street.

The Old Town (Stare Miasto) is an administrative district of Gniezno located in its central part. It is an area where tenement houses dominate and although some of them have been renovated, the others remain in a poor condition. Gniezno's most important historical buildings are located there (including the Gothic cathedral and other numerous churches, the City Hall etc.), there are numerous service points, and green areas (e.g. the Valley of Reconciliation – pl Dolina Pojednania). The Old Town hosts numerous events and is the centre of city life. It is basically a friendly space. However, there are some neglected places there, too. These include: parts of the town market located at the 21st January Square (Plac 21 stycznia) after business hours (Fig. 6*a*), run-down storage sheds for tenants of nearby buildings (Fig. 6*b*), or sporadic littering after binge drinking on the stairs of some tenement houses (Fig. 6*c*).

There are numerous parks in Gniezno. It is worth mentioning at least a few of them: General Władyslaw Anders City Park, Kościuszko Park, President Ryszard Kaczorowski Park, Piastowski Park (near Jelonek Lake), 25*th* Anniversary Park (Park XXV-lecia) (near Winiary Lake). Parks in Gniezno have undergone a major makeover in the last few years. Thanks to considerable investments, these once unkempt, disorderly, rarely frequented areas have become friendly, clean spaces attracting people to spend time there. A case in point is Kościuszko Park (Fig. 7 *a–c*), located near the railway station and the City Hall. It has appropriate infrastructure, i.e. benches, litter bins, bicycle parking racks (Fig. 7*a*), and features a playground. The greenery is well kept (Fig. 7*b*), and on hot days the fountain cools down the air (Fig. 7*c*).

**Fig. 5**. Cierpięgi street: *a* – thickets along the street; *b* – undeveloped area; *c* – illegal car park
*Source*: author's own photos

[2] Based on the information plate at Cierpięgi street.

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**Fig. 6.** Old Town: *a* – town market after business hours; *b* – run-down storage sheds for tenants of the nearby buildings; *c* – litter after binge drinking
*Source*: author's own photos

**Fig. 7.** Tadeusz Kościuszko Park: *a* – infrastructure in the park (benches, litter bins, bicycle parking racks); *b* – benches next to well-kept greenery; *c* – fountain
*Source*: author's own photos

The low scores assigned to parks by the study respondents could be related to the tragic gale that hit Gniezno in August 2017 (the survey was conducted in the years 2017 and 2018). At that time parks were rarely visited places. The effects of this storm in General Anders City Park are presented in Fig. 8 (*a*–*c*).

Police officers, during semi-structured interviews, admitted that many years ago the aforementioned places were in fact dangerous, especially Tajwan and Cierpięgi street. There were places of concentration of people with low socio-economic status. Thank to increased police efforts (especially prevention) and


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**Fig. 8.** General Anders City Park: *a* – destruction after a gale; *b* – typical paths in the park; *c* – litter
*Source*: author's own photos

inhabitants awareness, the situation was managed. Generally, the crime rates in the city of Gniezno are systematically decreasing. Nowadays police officers denied existence of places with much higher crime records than the others. The aforementioned places are considered dangerous by city inhabitants. Such image of these areas might be reinforced by media. Crimes and negative incidents are commented in the press and on the Internet.

## DISCUSSION

The sense of security of the inhabitants of Gniezno, both regarding the city as a whole and selected urban spaces, was higher during the day. As demonstrated by previous studies, the time of day is quite important in terms of the sense of security. Such results were also obtained by Dolata and Kotus (2004), and Bogacka (2009). Kotus (2005) believes that people feel safer during the day, especially when moving around their neighbourhood. City inhabitants feel the greatest threat of crime after dusk (Dolata and Kotus 2004, Kotus, 2005, Bogacka 2009). Researchers also note that the threat is greater in public places than in the immediate vicinity of their homes. This was confirmed by the present study carried out in Gniezno: the sense of security in one's own flat/home or in the close neighbourhood of one's place of residence was definitely greater than in the public spaces analysed, such as the city centre, city parks or streets.

The sense of security of the inhabitants of Gniezno in the centre can be described as quite high. Research to date has confirmed that the city centre is an area where people feel fairly secure. According to Guzik (2000), this is influenced by the familiarity with the place and the frequency of visiting it. He also notes that the presence of police in this area is also of some importance. Research by Rydz and Szymańska (2007) in Szczecinek corroborated such findings.

As for the sense of security and the type of housing, the residents assigned the highest scores to single-family housing areas, followed by large blocks of flats and tenement houses. The general tendency is as follows: areas located relatively further away from the city centre are considered more secure, which is largely determined by the type of buildings and community living in a given area (Marcińczak and Siejkowska 2003). A low threat of crime in areas with predominantly single-family housing has been confirmed by Guzik (2000), Bogacka (2009) and Rydz and Szymańska (2007). Housing estates comprising large-panel block of flats, on the other hand, have been negatively assessed in studies by Marcińczak and Siejkowska (2003) and Mordwa (2013). Finally, the Polish literature on the subject has demonstrated that

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residential areas with tenement houses are considered to be most dangerous (Marcińczak and Siejkowska 2003, Mordwa 2013).

Places considered dangerous by the respondents, namely: Tajwan, Cierpięgi street, the Old Town and parks, constituted a significant part of the answers, which suggests a fairly high level of agreement among Gniezno residents. The respondents indicated very different types of places: a single street, two housing estates in Gniezno and public spaces, such as parks. All these places are connected mainly by the chaos and building diversity (except for parks).

Places such as Tajwan or Cierpięgi street are characterized by a rather difficult past, which seems to affect the current perception of these areas. The existing spatial stereotypes may stem from stigmatization, which means that the opinion about some places is exaggerated as compared to the reality (Dolata and Kotus 2004). This situation can occur when "as a result of a certain event, a place (a housing estate, neighbourhood) gains notoriety and each subsequent incident occurring there is publicized. (…) In addition, in an area like this the police activity is more intensified, because it is a "difficult" area, and as a result more crimes are detected there than in other city districts" (Guzik 2000).

The image of the place seems to be very important issue. Tracing back to broken windows theory (Wilson and Kelling 1982), the visible signs of criminal activity, anti-social behaviour and general disorder create environment that encourages even more crimes and disorder. Maintenance, litter, vandalism, rundown places in the places recognized as dangerous by respondents affect their images. General Anders City Park after tragic gale was in total disorder – destroyed benches, bins, paths, not well-maintained greenery, and therefore avoided by passers-by. Well-maintained greenery and proper park infrastructure, like in Tadeusz Kościuszko Park, encourage inhabitants to use it. Tajwan, Old Town (with Cierpięgi street) has also many spots that can contribute to the low perceived safety by inhabitants.

However, it should be noted that a large percentage of the respondents did not indicate any dangerous places in Gniezno at all. With respect to safety during the day, this was over a quarter of the answers. A significant percentage of Gniezno residents feel completely safe. As for safety at night, the lower percentage may result from the fact that decidedly fewer people leave the house after dark and may simply not have an opinion on this subject.

## CONCLUSIONS

The present study, whose aim was to address the issue of the impact of space on the sense of security at a microscale level, provided some information that may be useful in further research in this field.

First, general information regarding the sense of security of Gniezno inhabitants, such as the assessment of the entire city or various types of spaces within this city, is a valuable basis for and an introduction to more detailed considerations.

Secondly, the use of various research methods allows for a multi-faceted approach to the issue of the sense of security and a more complete implementation of the research goal assumed. It should be emphasized that triangulation of research methods requires more time and effort than using a single research method. Yet, it yields valuable results. The research methods used in this study, i.e. a survey, field inventory (along with photographic documentation), semi-structured interviews, and desk research, complemented each other and made it possible to collect interesting information.

Thirdly, research conducted at a microscale level, in this case in places considered dangerous by the respondents, allows for capturing the specificity of a given place and a better understanding of the concerns expressed by the respondents. It should also be noted that it is much easier to conduct supplementary research in the context of dangerous places with regard to a single street (Cierpięgi street) than across the entire administrative district (Tajwan, i.e. Osiedle Grunwaldzkie and the Old Town). Obtaining information through a survey, with respondents completing the questionnaire themselves, has some limitations. "A place" can mean different things to different people:


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a street, housing estate, part of a housing estate, town market, or simply all parks in the city.

Fourthly, the results of this microscale study can be useful in improving the situation in the areas indicated. They can be used not only by the services responsible for crime prevention, but also by individuals who influence spatial development. Even if a given place is not dangerous at all and there is no crime there, as confirmed by police statistics, and yet people associate it with a low sense of security, actions should be taken to eliminate this threat. It seems that paying particular attention to spatial order is of key importance in this aspect.

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# ASSESSMENT OF NATURAL VALUES AND ENVIRONMENTAL THREATS – A CASE STUDY: EASTERN PART OF THE GÓRA KALWARIA COMMUNE, POLAND

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## ABSTRACT

Natural evaluation is carried out in order to assess or update the assessment of the natural values of studied area. This method is necessary when implementing investments as well as when planning conservation measures and shaping the landscape and minimalize negative impact of environmental threats. The purpose of this work was perform natural evaluation and diagnose environmental threats on east-part of Góra Kalwaria commune for regional and local planning policy. It was used natural assessment according to Żarska (2006) and Fornal-Pieniak et al. (2018) with modification. Modification in whole process of assessment was connected with purpose and character of studied area. The purpose of this paper was to present assessment of natural values and environmental threats of the eastern part of the Góra Kalwaria commune in middle part of Poland. East part of Góra Kalwaria commune is characterized by very diversified landscape form natural forests, wet meadows, water and rushes plants along Vistula river up to anthropogenic areas as villages, towns and agriculture areas as fields, orchards. The stages of natural evaluation were included: field researches, divided areas into spatial-landscape units, formulated criteria to assessment, evaluation, distinguished areas with diversified types of natural values. It was distinguished four types of spatial-landscape units as: *L* – spatial-landscape units with forest dominated; *S* – spatial-landscape units with orchards and agricultural areas (fields) dominated; *Z* – spatial-landscape units with built-up areas dominated; *W* – spatial-landscape units with surface waters dominated. From the whole spatial-landscape units (areas) 10 areas are represented high natural values, 17 areas with medium values and 8 areas with low natural values. It was recognized threats, which have got negative impact on values of landscape. It was presented possibility of solutions how to minimalize negative impact of threats. Used natural evaluation is usefulness for shaping landscape by planners, ecologists and landscape architects including mosaic character of landscape elements of commune.

**Key words:** evaluation, natural values, commune, environmental threats, Poland

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## INTRODUCTION

The interest of researchers has recently, in last decades, increased in such issues, including landscape evaluation as a base for rational planning (Żarska et. al 2014, Oliveira Paiva et al. 2015). Natural evaluation is the assignment of previously studied areas of ranks or categories describing their natural value. Documents containing natural evaluation contain information for the entrepreneur who should avoid areas of valuable natural value when planning investments. The document containing evaluation is often the key stage of consultation in the process of environmental decisions (Radlińska 2013). The main task of evaluation is to assign to landscape elements (Hopfer et al. 1982, Radlińska 2013, Antolak and Małkowska 2019). To perform natural evaluation, an inventory of the current state of natural elements must be carried out in advance. Inventory stages were developed, among others by Kassenberg (1986), Richling and Solon (1996). To perform evaluation of the landscape, the study area is divided into spatial-landscape units. By using the term spatial-landscape it's mean a surface unit to which one can unambiguously attribute a certain value obtained in assessing the environment. This value characterizes the entire surface of this field (Bajerowski 2007). Evaluation can be divided into stages. They are: defining the purpose and scope of the study, data collection and field research. During these stages, the area under development is divided into spatial-landscape units. Then performing the evaluation sets the methodology for assessing the value of the units created (Bajerowski et al. 2007). Natural evaluation is limited by access and information. They are often not sufficient to determine landscape units, which dictates the selection of features and values that are the basis for evaluation in the studied area (Litwin et al. 2009).

Matysiak (2012) describes the methodology of environmental evaluation. He states that independent but complementary indicators should be used. One of the evaluation criteria it presents are elements of nature called 'special care'. Relate to rare species whose protection is the responsibility of the state. Another method of environmental evaluation is Paprzycka's methodology (2005). The author emphasizes the essence of information which is the degree of landscape saturation. It is a method based on determining the surface share of naturally saturated areas falling into a separate landscape unit. Protected areas such as national parks, Natura 2000 Areas, etc. are particularly valuable (Du et al. 2015). Work on the evaluation methodology has led to a comparison of methods to determine which ones better reflect the value of the areas studied. One of the works is the group development of in situ methods and cartographic methods. The first one is based on detailed field research covering terrain, flora and fauna, sounds, views, etc. The second one involved the use of maps and information available on them, which saved time. The result of the work was the statement that the cartographic method is sufficient for evaluation, however, it can be used only with sufficiently accurate and information-rich maps (Pasto et al. 2006). Most evaluation methods combined data from soil, climate, vegetation or landform analysis. From this information, it is possible to define and evaluate terrain units. They are more objective than methods using sensations or impressions when describing nature. Still, they are not perfect due to the fact that they also need to be selected in which variables will be evaluated (Fairbanks and Benn 2000). The way of valuing landscape elements is point bonitation. It consists in assigning points to environmental attributes (Bajerowski et al. 2007).

Environmental threats may disturb the natural balance or cause degradation of natural elements (Olson and Rejeski 2018). It is a term covering a wide range of natural disasters as well as anthropogenic factors. The most basic examples of natural threats to the environment are tsunamis, earthquakes or cutting down trees. They have a significant impact on large areas of the natural environment. When it comes to anti-pathogenic sources, they are most often pollutants with certain substances or failures in industrial crushers (Prandecki and Sadowski 2010). Environmental threats are most often changes in the form of use or more intensive use of land


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for human needs. The research on the Apennine Peninsula described by Antrop (2006) presents a trend that has been appearing all over Europe over the last several years. The greater demand for food, as well as the low interest shown by tourists for traditional farms, caused changes in the forms of use. Currently, most of the land is characterized by intensive agriculture that meets the economic pressure of the region. This resulted in the loss of the unique landscapes of traditional agriculture (Antrop 2006).

Road transport is one of the main sources of emissions of carbon dioxide, hydrocarbons, nitrogen oxides as well as heavy metals and particulates. The emission of these pollutants increases the risk of human diseases and illnesses. The natural environment is also exposed to the negative effects of these compounds. One of the problems created by transport is acidification of the environment by sulfur oxides or nitrogen oxides. Deposition of pollutants hinders the proper growth and vegetation of plants, especially in forests (Badyta 2010). Agricultural spraying is the second major problem. Commonly used plant protection products such as pesticides can be a major threat to living organisms, including humans. They can migrate to the aquatic and soil which increases their range of toxic effects in environment (Kociołek-Balawejder and Stanisławska 2012). However, they are widely used in the fight against pests in agricultural areas, which can cause death of organisms in the surrounding areas, especially if pesticides get into the water. Natural floods are caused by big river and its periodic high states are also a significant threat. They cause flooding of basements and interruption of embankments, which is associated with social and economic start-ups in the event of crop destruction (Źróbek 2009). Environmental protection is taking measures to restore nature's balance. This balances the negative effects of environmental threats and allows for restoring the proper state for individual natural elements (Environmental Protection Law 2001, Olson and Rejeski 2018). Evaluation is therefore a tool for spatial planning. Interpretation of terrain diversity and functional ecological structure is necessary for further management (Stola 1993, Fornal-Pieniak and Żarska 2014).

The purpose of this work was perform natural evaluation and diagnose environmental threats on east-part of Góra Kalwaria commune. It was also formulated directions shaping and protection landscape of this area for regional and local planning policy.

Hypothesis: Góra Kalwaria commune has got areas with valuable natural values which should be proper protection and shaping.

## STUDY AREA AND METHODOLOGY

The Góra Kalwaria commune is located in the central part of the Mazowieckie Voivodeship, 20 km from Warsaw in Poland. The commune has an area of 145 $km^2$, while the eastern part of the commune has an area of 39 $km^2$ (Fig. 1).

The analysis were conducted only on east part of Góra Kalwaria commune not on the whole commune as a case study, because this part of commune has got very diversified landscape form natural forests, wet meadows, water and rushes plants along Vistula river up to anthropogenic areas as villages, towns and agricultural areas as fields, orchards as well as connecting and dividing them by roads.

The methodology are included field and indoor studies in year 2018–2019. First stage of landscape evaluation was collection of information about studied areas. Next stage was divided area into spatial-landscape units, where the main criteria of division was dominated types of land form-use. It was distinguished areas in different categories: *L* – spatial-landscape unit with forest dominated; *S* – spatial-landscape unit with orchards and agricultural areas (fields) dominated; *Z* – spatial-landscape unit with built-up areas dominated; *W* – spatial-landscape unit with surface waters dominated. Natural evaluation according to Żarska (2006) and Fornal-Pieniak et al. (2018) was used and modified by Koźma (2015) taking criteria of percentage cover of forests. It was also analyzed environmental threats according to Spellman (2016). The next stage including nature evaluation with seven assessment criteria, i.e. the degree of naturalness of vegetation, percentage coverage of forests, surface waters,

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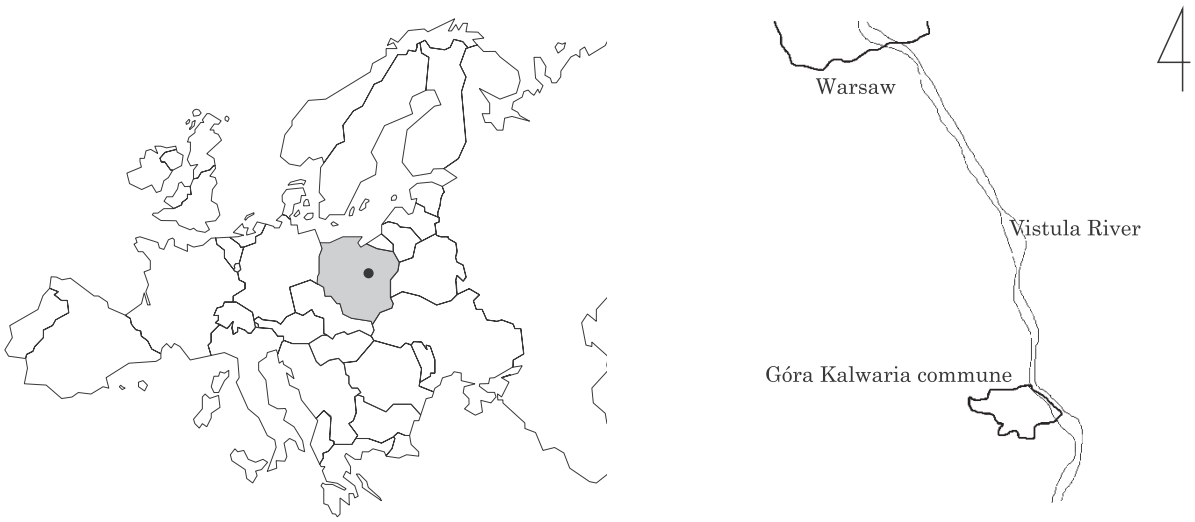


**Fig. 1.** Location of Góra Kalwaria commune (central part of Poland, nearby Warsaw) in Poland (schemate)
*Source:* authors' own work

meadows, trees or groups of shrubs, Natura 2000 Areas, types of environmental threats. It has been applied bonitation points from 1 point up to 3 points for assessment (Table 1). It was used criteria as:
– the degree of naturalness of vegetation (according to Matuszkiewicz, 2019) as natural vegetation (3 points), semi-natural vegetation (2 points) and synanthropical vegetation (1 point);
– percentage cover of forests (according to Koźma, 2015) with a breakdown into: from 61% to 100% (3 points), from 25% to 60% (2 points), from 1% to 24% (1 point) and no forest (0 points);
– surface waters where a large reservoir or river occurring (3 points), a local small reservoir (2 points) small artificial reservoirs (1 point), and the lack of surface water (0 points);
– meadows occurring (fresh, floodplains etc.) – 1 point;
– trees or groups of shrubs occurring – 1 point;
– Natura 2000 Areas occurring – 1 point;
– environmental threats occurring – from 0 points to 3 points (Table 1).

Environmental threats are defined as undesirable effects affecting changes in the natural environment (Spellman 2016). They are also burdensome for the development of human civilization that exist and grow together with technological and cultural progress (Żółtowski and Kwiatkowski 2012, Olson and Rejeski 2018).The criterion for assessing how the absence of threats means that there is no infrastructure (road and residential) in the studied area (spatial-landscape units). Small threats are the presence of unpaved roads that are rarely used or abandoned buildings. Medium threats are built-up areas and paved roads, as well as agricultural areas where spraying or plant protection products are used. Cities, compact rural buildings and major transport routes present major threats (according to Kocur-Bera 2012, Żółtowski and Kwiatkowski 2012 with authors modification). The research area was divided into spatial-landscape units based on the criterion of land cover. Each spatial-landscape units was subject to environmental assessment and the occurrence of threats to the natural environment was recognized. The threats are distinguished during the filed analysis.

The result of the evaluation was to distinction of areas (spatial-landscape units) with different natural values:
– spatial-landscape units with low natural values (from 1 point up to 5 points);
– spatial-landscape units with medium natural values (from 6 points up to 10 points);
– spatial-landscape units with high natural values (from 11 points up to 16 points).


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**Table 1.** Assessment criteria and bonitation points – according to Żarska (2006) and Fornal-Pieniak et al. (2018) with modification

| Criteria | | Bonitation points |
|---|---|---|
| The degree of naturalness vegetation (according to Matuszkiewicz 2019) | natural (forest, water and aquatic, peat bogs vegetation) | 3 |
| | semi-natural (grasslands, pastures, meadows) | 2 |
| | synanthropical (ruderal and segetal vegetation) | 1 |
| Percentage cover of forests (according to Koźma 2015) | from 61 to 100% | 3 |
| | from 25 to 60% | 2 |
| | from 1 % to 24% | 1 |
| | no occurring | 0 |
| Surface waters occurring | large local water reservoirs/ contact with the Vistula river | 3 |
| | local watercourses | 2 |
| | small artificial reservoirs | 1 |
| | no occurring | 0 |
| Meadow | occurring | 1 |
| | no occurring | 0 |
| Trees or groups of shrubs, including orchards | occurring | 1 |
| | no occurrence | 0 |
| Natura 2000 Areas | occurring | 3 |
| | no occurring | 0 |
| Environmental threats | no occurring | 3 |
| | low threats occurring | 2 |
| | medium threats occurring | 1 |
| | big threats occurring | 0 |

*Source:* authors' own work

It was formulated direction to landscape shaping and minimizing environmental threats on studied areas. for strategic regional and municipality programs. The spatial-landscape units and result of natural evolution were presented also on graphic version. It was used maps in scale – 1: 50 000.

## RESULTS AND DISCUSION

It was distinguished 34 spatial-landscape units (eleven units dominated by forests, nine units dominated by orchards and agricultural areas, twelve units dominated by built-up areas and three units dominated by surface waters). The following designations for types of spatial-landscape units were used (Fig. 2):

*L* – spatial-landscape unit with forest dominated;
*S* – spatial-landscape unit with orchards and agricultural areas (fields) dominated;
*Z* – spatial-landscape unit with built-up areas dominated;
*W* – spatial-landscape unit with surface waters dominated.

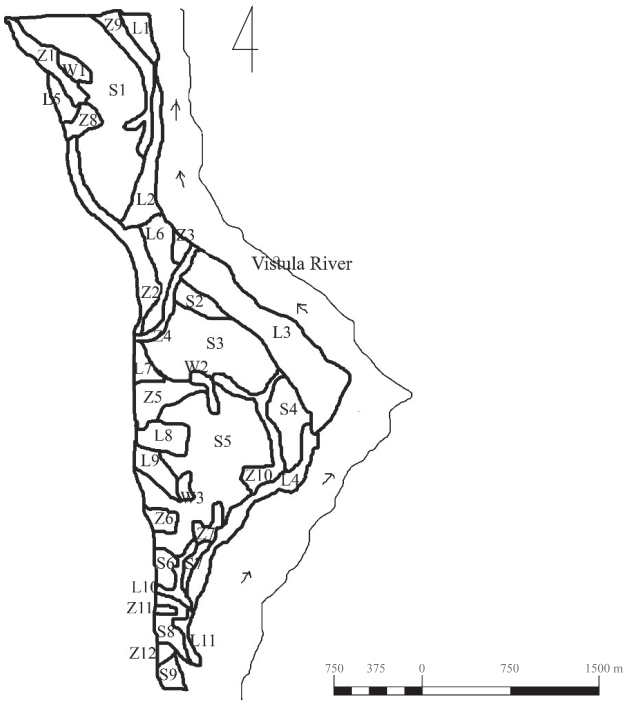


**Fig. 2.** Types of spatial-landscape units – a case study: eastern part of Góra Kalwaria commune – schemate
*Source:* own work

Based on the evaluation, spatial-landscape units with high (10 areas), medium (17 areas) and low (8 areas) natural values have been distinguished (Tab. 2). The spatial-landscape units with high (L1, L2, L3, L4, L6, L10, L11, W1, W2, W3) natural values are mostly located on the Natura 2000 Areas, in the eastern part of the studied area. Surface water was also found which, despite the proximity of agricultural areas with low natural values, retains the functions of natural habitats for flora and fauna (Tab. 2).

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**Table. 2.** Results of natural evaluation (own research)

| No of spatial--landsape units | Type of spatial--landscape unit | The degree of naturalness of the vegetation | Percentage cover of forests | Surface waters | Meadow | Trees or groups of shrubs | Natura 2000 areas | Occurrence of environmental threats | | Results of natural evaluation |
|---|---|---|---|---|---|---|---|---|---|---|
| Bonitation points: | | 1–3 | 0–3 | 0–3 | 0–1 | 0–1 | 0–3 | 0–3 | | |
| 1 | L1 | 3 | 2 | 3 | 1 | 1 | 3 | 3 | **16** | High natural values |
| 2 | L2 | 3 | 3 | 3 | 0 | 1 | 3 | 3 | **16** | |
| 3 | L3 | 3 | 3 | 3 | 1 | 1 | 3 | 2 | **16** | |
| 4 | L4 | 3 | 3 | 3 | 0 | 1 | 3 | 2 | **15** | |
| 6 | L6 | 2 | 3 | 3 | 1 | 1 | 0 | 1 | **11** | |
| 10 | L10 | 2 | 3 | 2 | 1 | 1 | 0 | 2 | **11** | |
| 11 | L11 | 3 | 3 | 2 | 0 | 1 | 0 | 2 | **11** | |
| 33 | W1 | 3 | 1 | 3 | 1 | 1 | 0 | 2 | **11** | |
| 34 | W2 | 3 | 1 | 3 | 1 | 1 | 0 | 2 | **11** | |
| 35 | W3 | 3 | 1 | 3 | 1 | 1 | 0 | 2 | **11** | |
| 9 | L9 | 2 | 3 | 0 | 1 | 1 | 0 | 2 | **9** | Meadow natural values |
| 5 | L5 | 2 | 3 | 0 | 0 | 1 | 0 | 2 | **8** | |
| 7 | L7 | 2 | 3 | 0 | 0 | 1 | 0 | 2 | **8** | |
| 23 | Z3 | 3 | 1 | 3 | 0 | 1 | 0 | 0 | **8** | |
| 8 | L8 | 2 | 2 | 0 | 1 | 1 | 0 | 1 | **7** | |
| 14 | S3 | 1 | 1 | 2 | 1 | 1 | 0 | 1 | **7** | |
| 16 | S5 | 1 | 1 | 2 | 1 | 1 | 0 | 1 | **7** | |
| 20 | S9 | 2 | 2 | 0 | 0 | 1 | 0 | 1 | **7** | |
| 25 | Z5 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | **7** | |
| 28 | Z8 | 2 | 1 | 1 | 0 | 1 | 0 | 2 | **7** | |
| 12 | S1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | **6** | |
| 18 | S7 | 1 | 1 | 2 | 0 | 1 | 0 | 1 | **6** | |
| 26 | Z6 | 2 | 1 | 0 | 1 | 1 | 0 | 1 | **6** | |
| 27 | Z7 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | **6** | |
| 30 | Z10 | 2 | 1 | 0 | 1 | 1 | 0 | 1 | **6** | |
| 31 | Z11 | 2 | 1 | 0 | 0 | 1 | 0 | 2 | **6** | |
| 32 | Z12 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | **6** | |
| 13 | S2 | 1 | 0 | 0 | 1 | 1 | 0 | 2 | **5** | Low natural values |
| 15 | S4 | 1 | 0 | 2 | 0 | 1 | 0 | 1 | **5** | |
| 19 | S8 | 1 | 1 | 2 | 0 | 1 | 0 | 0 | **5** | |
| 29 | Z9 | 1 | 1 | 0 | 0 | 1 | 0 | 2 | **5** | |
| 17 | S6 | 1 | 0 | 2 | 0 | 1 | 0 | 0 | **4** | |
| 21 | Z1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | **3** | |
| 22 | Z2 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | **3** | |
| 24 | Z4 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | **2** | |

*Source:* authors' own work


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The natural evaluation has shown that the majority of the designated spatial-landscape units fall within point intervals corresponding to average natural values (Tab. 2). It is caused by a significant predominance of agricultural areas in the developed area, and hence, a small part of the area covered with forests or other green areas. The occurrence of monoculture forests and limited diversity of plant communities has often been found, which reduces the value of these studies of landscape and spatial units, ruderal vegetation predominates in combination with vegetable and orchard cultivation. The most common threat is road transport, and thus pollution and the slogan that cars generate. Environmental threats in the described area are represented mainly by traffic in particular transport, as well as agricultural management dominating in this area. The problem of road transport affects the studied area because of the location. Being on the communication route between eastern and western Poland, as well as being in the fruit-growing region, the natural environment in the commune of Góra Kalwaria is affected by constant emission of pollutants.

Potential harmful effects of plant protection products are another threat. It can not only adversely affect the soil and water in a given outskirts, but also through surface and groundwater to get to other areas. An equally big problem is the cultivation of organic plants, which cannot function properly in neighboring crops undergoing spraying. Development of new built-up areas was found in most agricultural areas. Fragmentation of forests were also classificated as the environmental threats (Tab. 3).

The evaluation was generaly conducted using diffent matching methods which help to achived the best results. (Żarska et al. 2014, Oliveira Paiva et al. 2015). The similar approach it was presented by Authors of this paper. It was presented evaluation mathod which could be used on areas with mixed types of lans uses, with different antropogenic pressure – from natural to semi-natural vegetation on areas (as Natura 2000 areas ) up to areas transfomed by man (agricultural areas with fields, orchards and settelemets). The quality of landscape is influenced by both natural and anthropogenic (man-made) elements (Jokimäki 2017). The presented natural evaluation by Authors of this paper is focused on landscape protection and planning.

In Poland it was distinguished diffrent level of protection. Among of these forms, one of the

**Table 3**. Types of spatial-landscape units with location, characteristics and environmental threats (existing and potential in future)

| No | Location of spatial-landscape units | Characteristic of units | Threats – existing and potential |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| L1 | north-eastern part of the analyzed area | riperian forest with low density, large surface of floodplain meadows | the proximity of agricultural areas and built-up areas |
| L2 | central part of the analyzed area | riparian forests, individual buildings from the city side | the nearby of agricultural areas |
| L3 | central-eastern part of the analyzed area | mosaic of riparian forests, city beach and dirt roads | the nearby of agricultural areas |
| L4 | a narrow strip from the center from the south on the eastern border of the area | mosaic of riparian foretss | the nearby of agricultural areas, small part with vegetation |
| L5 | north-west border of studied area | disturbanced pine forets | adjacent to main road |
| L6 | central part of the studied area | mosaic of riparian forests, urban greenery and buildings | – |
| L7 | central part of the studied area | pine forests, single buildings | new build up areas |
| L8 | central-northern part of the studied area | pine forests cutted by agriculture areas | fragmentation of forests |
| L9 | central-northern part of the studied area | pine forests separated by single buildings | fragmentation of forests |

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cont. Table 3

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| L10 | northern part of the studied area | mixed forest landscape | new build up areas, nearby agriculture areas |
| L11 | north-eastern part of the studied area | reperian forests | nearby agriculture areas |
| S1 | north part of the studied area | orchards and agricultural areas dominated | nearby the main road |
| S2 | central part of the studied area | orchards and agricultural areas dominated | nearby the main road |
| S3 | central part of the studied area | orchards and agricultural areas dominated | increasing built-up areas, improper application of fertilizers |
| S4 | eastern part of the studied area | orchards and agricultural areas dominated | increasing built-up areas, improper application of fertilizers |
| S5 | central-northern part of the studied area | orchards and agricultural areas dominated | increasing built-up areas, improper application of fertilizers |
| S6 | north-west part of the studied area | orchards and agricultural areas dominated | nearby the main road |
| S7 | north-eastern part of studied area | orchards and agricultural areas dominated | improper application of fertilizers |
| S8 | northern part of studied area | orchards and agricultural areas dominated | nearby the main road |
| S9 | northern part of studied area | orchards and agricultural areas dominated | nearby the main road |
| Z1 | north-west part of the studied area | mosaic of dense up build up areas with gardens and meadows | more build up areas |
| Z2 | central part of the studied area | compact urban buildings with accompanying vegetation | – |
| Z3 | central part of the studied area | build up areas dominated | pen removal from the bottom of the Vistula, nearby main roads |
| Z4 | central part of the studied area | build up areas dominated, main road | noise and pollution |
| Z5 | central part of the studied area | compact village buildings, | more build up areas |
| Z6 | north-west part of the studied area | buildings, orchards and field | increasing built-up areas, cutting down roadside trees |
| Z7 | north-eastern part of the studied area | compact buildings, meadow, lake | more build up areas |
| Z8 | north-west part of the studied area | build up areas dominated | improper spraying and fertilizer management |
| Z9 | north-eastern part of the studied area | mosaic of buildings, forests and agricultural areas | building density, deforestation |
| Z10 | central-eastern part of the studied area | rural buildings with gardens, fragments of orchards and greenhouses | building density, deforestation |
| Z11 | southern part of the studied area | rural buildings with gardens, fragments of orchards | increasing built-up areas |
| Z12 | southern part of the studied area | gas station area, individual farms, meadows and orchards | increasing built-up areas |
| W1 | northern part of the studied area | water reservoir surrounded by single trees and dense rushes | the nearby of arable fields and orchards |
| W2 | central part of the studied area | water reservoir – Czerskie Lake, along with surrounding trees and riparian vegetation | the nearby of arable fields and orchards |
| W3 | Czarna River | part of river | increasing built-up areas, adjacent agricultural areas |

*Source*: authors' own work


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most important protected forms are represented by national parks, nature reserves and Natura 2000 areas (Badorau 2014). Natura 2000 Arease are located on east part of Kalwaria commune. Natura 2000 Areas (spatial-landscape units no L1, L2, L3 and L4) should be protected including: separation of places for rest and water sports, reduction of organized events during the breeding season of protected birds, as well as monitoring of newly emerging investments in terms of their impact on the protected area, stopped forest fragmentation (spatial landscape-units as L8 and L9) by controlling expanding villages and agricultural areas, develop organic farming to reduce the consumption of plant protection products (e.g. pesticides). In many regions of the world, the only remaining natural habitats are fragments embedded in landscapes dominated by agriculture.

National, EU and international legal requirements as well as necessity of the implementation of green economy in the framework of adaptation to climate change implementation, sustainable development is very beneficial (Dogaru 2013, Żarska et al. 2014).

Ecological balance in the landscape is one of the stage of environmental protection in management of sustainable development, strictly connected with land use planning (Żarska 2005, Benedict and McMahon 2006, Żarska et al. 2014). It is important to shaping ecological corridors, which help to keep biodiversty of landscape. Authors of paper gave directions of new afforestations, which would lead to enlargement of forest complexes and creation of more compact forest areas (spatial-landscape units no L8 and L9) and keep existing forests as potential ecological corridors (spatial-landscape units no L5, L7).

The protection of the natural environment is strictly connected with proper activities on agricultural areas as fields and orchards (Pretty et al. 2018, Zilberman et al. 2018). It is nesesery to realization sustainable development of agricultural ecosystems and increase the the relationship between a farmer and the environment (Piwowar 2020). Smart Farming is a type of farm management based on data which can increase the productivity of these farms and reduce environmental pollution (Saiz-Rubio and Rovira-Más 2020).

Agricultural pollution depends on many factors, so solutions such as vegetated buffer zone around farms and water bodies, as well as other interventions along the landscape, cancomplement on-farm practices for water pollution control. A high level of consumption of mineral fertilizers, especially nitrogen and phosphorus fertilizers, can cause adverse changes in soils and waters (Wang et al. 2017). Buffer zones are as filters that stop the movement of sediments, nitrogen, phosphorus, pescides into water basin adjacent to fields, orchards and pollution from roads (Bentrup 2008, Mateo-Sagasta and Albers 2018). The other sollution to minimalize water pollution is controlled drainage. It is used successfully in many countries The results are enhance water productivity and to reduce pollution (Skaggs et al. 2012, Peng et al 2013, Lu et al. 2016). Water quality parameters with high-resolution satellite imagery are recommend analyses in different study areas at different seasons of the year in order to get a wider range of values of water quality (Yigit Avdan et al. 2019). All these propositions could be used on studded areas, especially on plots adjacent to surface waters (spatial-landscape units as W1, W2, W3), taking care of vegetation at existing watercourses and water reservoirs located in agricultural areas.

## CONCLUSIONS

East part of Kalwaria commune is characterised by mosaic types of land use from natural to antropogenic ones, which have got impact on values of natural elements of landscape.

The Authors confrmed the hypohesis that commune has got areas with valuable natural values which should be proper protected and shaping. It was formulated directions how to minimalize the negative impact of anthropogenic pressure on studied areas. Formulated directions could be used on similar analysis area.

It was presented in literaturę very usefulness natural evaluation methods, but they are not constans in whole application. Some stages of evaluation should be modificated becouse of the purpace of evaluation or types of landscape elements, what it was presented

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in this paper. The proper modification of evaluation method, and sucessful approach give many information about natural values important for regional and local planning policy.

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# TAX SUBSIDIES FOR ENTREPRENEURS IN CASE OF PROPERTY TAX

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## ABSTRACT

In Polish tax law, real estate is subject to taxation. Property tax rates depend not only on the type of property but also on the taxable person. Thus, as far as persons conducting business activity are concerned, real estate in their possession is taxed at a higher rate than that of natural persons. The amount of the tax payable annually may exceed the income of the trader concerned, since it does not depend on the taxable person's financial situation (as is the case with other taxes, e.g. personal income tax). Due to this fact, a catalog of tax reliefs and exemptions, i.e. the so-called tax subsidies, as well as the possibility of spreading the tax in instalments and deferring its payment date is an important role in real estate tax. The state, including municipalities, may create this form of aid, as long as it does not conflict with the provisions of the Act on State Aid and similar provisions in force in the European Union, which are designed to observe free competition in the market. The purpose of this Article is to indicate what are the current forms of assistance to entrepreneurs on the example of property tax.

**Key words:** tax system, tax subsidies, tax rates, property tax, state aid, doing business

## INTRODUCTION

The real estate tax has been functioning in the Polish legislation since 1991. It is one of the oldest regulations among all other taxes. Such a situation may indicate that the provisions on property tax do not give much doubt and are not the subject of abuses which could lead to a reduction in municipal budgets or an excessive burden on taxpayers. The veracity of this thesis can be verified by confronting the number of tax cases in the administrative courts concerning property tax. From the Central Database of Administrative Courts' Rulings we learn that the number of disputes that concerned property tax over the last 10 years amounted to 10561 cases. When we look at the number of cases, it turns out that these regulations are not as obvious and indisputable as it would seem. One of the biggest tax problems in real estate tax concerns all exemptions and reliefs, which are mainly regulated in Article 7 of the Local Taxes and Fees Act (Journal of Laws of 2019 item 1170). This article will focus on these regulations concerning allowances and exemptions, but in a narrow circle, this issue has been raised only in the context of entrepreneurs who, with their help, can somehow improve their financial situation by applying the so-called tax optimization.

The selective provision of financial benefits to a given company or group of companies, accompanied by the creation of a financial burden on the

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part of public finances, is referred to as public aid (Judgment of the Court in the case T-55/99). This burden may occur in the form of spending public funds on enterprises or reducing the public law burden on enterprises. In the second case, it is primarily about tax exemptions and remissions – i.e. tax subsidies and deferrals of public levies (Podsiadło 2016).

The above mentioned forms of public aid granted to entrepreneurs are connected with the tax system, which is defined as the entirety of taxes existing in a given place and time. Moreover, the system should form a uniform whole in both legal and economic terms (Pahl 2017). According to the statutory definition, a tax is a public, gratuitous, compulsory and non-returnable financial benefit to the State Treasury, voivodeship, county or municipality, resulting from the Tax Act (Pahl 2017).

Already from the above definition it can be concluded that taxes play a special role in the state budget economy, both as far as the State Treasury and local government budgets are concerned. The origin of taxes can be combined with the development of state structures and the emergence of a centralized redistribution of public funds (Chojna-Duch and Litwińczyk 2009)

Depending on what kind of tax we are discussing (be it a state or local tax) it can perform many functions in the economy. This is mainly due to the fact that taxes cover almost every natural and legal person. Because of this, taxes, and through them the state, easily influence the shape and condition of the economy (Jaszczyński 2017).

The oldest function common to all taxes is the fiscal function, which stipulates that taxes are to provide the state and local governments with income in such an amount that all public expenditure can be covered. Naturally, as the economy develops, the fiscal function of taxes increases. In the current state of tax law, the amount of tax burden, it is necessary to apply tax reliefs and exemptions in certain sectors in order to stimulate their operation and not to burden them with a tax liability beyond measure. Fiscal function of taxes, is very visible in local taxes (Cieślukowski 2012).

Of particular importance, given this aspect is the property tax regulated by the Local Taxes and Fees Act (Journal of Laws of 2019 item 1170). It brings the greatest tax revenue to local budgets. However, this is not a rule, as municipalities with a high degree of industrialisation receive relatively high influence compared to rural municipalities. This is largely due to the proper classification of land in the land register and tax revenue on buildings and structures related to business activity. The rate of this tax differs significantly when it comes to corporate and personal taxation, when it comes to entrepreneurs it is several times higher. In doing so, it is important whether it is a municipality or a rural (Pahl 2017). Therefore, it can be concluded that land and buildings occupied in connection with business activity are of the greatest importance in the income of municipalities (Tab. 1).

The table above shows that in the structure of real estate taxation, the largest share of revenue was recorded from the taxation of buildings, especially as regards taxes collected in municipalities, where they jointly accounted for 54.55% of income.

However, as far as land taxation is concerned, it is not difficult to notice that the most significant are the revenues from the taxation of land related to business activity, as they constitute 10.65% of the revenues from the property tax for all municipalities (from 13.4% in rural-type municipalities to 8.12% in cities with district rights), i.e. 59% of the total revenues from land taxation. Similarly as in the case of land, the highest share in the revenue from the taxation of buildings is represented by the revenue from the taxation of buildings related to business activity amounting to 38.48% of the revenue from the property tax for all municipalities (from 45.94% in urban municipalities to 26.86% in rural type municipalities), i.e. 82.1% of the total revenue from the taxation of buildings.

In conclusion, on the basis of the table above, it is possible to establish the truth of the thesis according to which the proceeds from the taxation of immovable property held by the entrepreneur represent a significant percentage of the municipality's income.

Therefore, this Article will discuss the provisions of tax law in the field of property tax, namely the provisions enabling the trader to apply tax exemptions and allowances, as well as the possibility of deferring


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**Table 1.** The structure of the 2018 real estate tax revenues related to the taxation of land and buildings intended for business activity is presented in percentages

| Type of subject matter of taxation | Total municipalities [%] | Cities with district rights [%] | Municipalities [%] | Rural communities [%] | Urban rural municipalities [%] |
|---|---|---|---|---|---|
| Land related to running a business activity regardless of the method of qualification in the land and building register | 10,65 | 8,12 | 10,07 | 13,40 | 12,52 |
| Total other land* | 7,39 | 5,02 | 6,84 | 10,16 | 8,93 |
| Buildings connected with conducting business activity and residential buildings or parts thereof occupied for conducting business activity** | 38,52 | 44,48 | 46,02 | 26,90 | 34,97 |
| Other buildings*** | 8,35 | 7,69 | 8,53 | 8,8 | 8,88 |
| Buildings | 35,08 | 34,69 | 28,55 | 40,73 | 34,70 |

Explanations:
* including land under lakes, occupied for retention bodies or hydroelectric power plants, others, including those seized for the conduct of public benefit activities for a fee by non-built-up public benefit organizations covered by the revitalization area;
** including land seized for the conduct of business in the field of marketing of certified seed;
*** including those relating to the provision of health services within the meaning of the provisions on medical activities, seized by the providers of those services and seized for the performance of public benefit activities for a fee by public benefit organizations

*Source*: Own elaboration on the basis of Bieniaszewska et al. (2019) – parts *A* and *B* of the report

the payment of the tax. In particular, the author will indicate how much real estate tax reliefs and exemptions are possible to operate as public aid to entrepreneurs, as well as what new regulations have been introduced in connection with the Covid-19 pandemic. The purpose of this Article is therefore to identify the possibilities available to a trader who wishes, first, to optimise the rate of property tax and, secondly, what forms of State aid he can use in this regard. It should be noted, however, that although tax optimization[1] may have negative associations with many people, it is absolutely not tax evasion. The goal of tax optimization is "intelligent application of regulations", which in effect will lead to a reduction in the tax burden. This is the so-called "tax intelligence" (Iwin-Garzyńska 2016).

## TAX ON REAL ESTATE OWNED BY THE ENTREPRENEUR – GENERAL ISSUES

Real estate tax has been functioning in the Polish legal system since 1991, which makes it one of the oldest regulations among all taxes. It is regulated by the Local Taxes and Fees Act (Journal of Laws of 2019 item 1170) hereinafter l.t.f.a. According to art. 1 a sec. 1 point 3 of the said Act, the real estate tax covers, among others, land, buildings and structures connected with conducting business activity, i.e. land, buildings and structures owned by the entrepreneur or another entity conducting business activity, subject to sec. 2a, which states what does not fall into this category.

It is also worth pointing out how to understand business activity. In this context, the l.t.f.a. Act refers us to the Act of 6 March 2018 – The Law of Entrepreneurs (Journal of Laws 2019 item 1292) hereinafter l.e. According to the wording of the provision of Article 3 l.e.: "economic activity is an organized gainful activity, performed on its own behalf and in a continuous manner". As far as the definition of an entrepreneur is concerned, which is equally

[1] Tax optimisation is not a legal concept. However, it is carried out by the taxable person in the exercise of his powers, which is why it is referred to as „the right of the taxable person to shape the amount of the tax liability" (Werner 2013).

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important from the point of view of this article, it is a natural person, a legal person or an organizational unit which is not a legal person, to which a separate act grants legal capacity, performing economic activity, as well as entrepreneurs are considered to be partners of a civil partnership within the scope of their economic activity.

Interestingly, among the many definitions in the l.t.f.a., we don't find a definition of real estate that seems to be crucial when we're talking about property tax. It would therefore be appropriate here to refer to Article 46 of the Civil Code (Journal of Laws of 2019 item 1145), which states that "real estate shall be parts of the earth's surface constituting a separate object of ownership (land), as well as buildings permanently connected with the land or parts of such buildings if, under special provisions, they constitute a separate object of ownership from the land". At first glance, however, it is clear that this definition has nothing to do with the subject of real estate tax under the l.t.f.a. Act. It is therefore necessary to refer to another law, in this case Bulding Law (Journal of Laws of 2020 item 471) to which the l.t.f.a. refers anyway, the definition of real estate includes land, buildings or parts of buildings, structures or parts of buildings related to business activity.

Formally, real estate tax should be included in property type taxes (Kosikowski and Ruśkowski 2003). Although in some situations it exhibits the characteristics of income tax (derives from actual or presumed income in the course of its creation in a preliminary manner) or consumer (when the subject of the tax is a residential building or a recreational plot) (Hanusz 2009). Its object is a specific part of the taxpayer's assets. It can also be pointed out that in a certain sense this tribute has features of income tax, because the real estate tax rates vary, depending on, among other things, whether the property is related to business activity. Unfortunately, in this case, it does not matter whether the property yields revenues from its economic use. In this tax, what matters is the potential revenue opportunity alone, not the actual revenue generation (Grabowicz 2014).

The basis for taxation is the land indicated above (also the one underneath the building), buildings or parts of buildings and structures or parts of structures related to business activity. Depending on which of these elements we are dealing with, we will apply a different measure for the tax base. In the case of land, it will be the area, in the case of buildings or their parts, the usable area expressed in $m^2$, while for the last category, i.e. for structures or their parts connected with conducting business activity, it will be the value referred to in the income tax regulations, determined as at 1 January of the tax year, constituting the basis for calculating depreciation in that year, not less depreciation write-offs, and in the case of fully depreciated structures – their value as at 1 January of the year in which the last depreciation was made (Krajewska et al. 2016).

For the purposes of this article, the author will describe only those tax rates that are related to running a business activity. The following rates are also the maximum rates according to the announcement of the Minister of Finance of 24 July 2019 on the upper limits of specific taxes and local fees for 2020. For land connected with running a business activity, regardless of the method of qualification in the land and building register, the maximum rate is 0.95 PLN from 1 $m^2$ of area, from buildings or their parts – 23.90 from 1 $m^2$ of usable area.

As indicated above, these rates are as high as possible to determine the. It is the duty of the Commune Council to determine each year by way of a resolution the amount of real estate tax rates within the limits indicated in the above mentioned announcement. Importantly, the property tax for a given tax year is determined by decision of the tax authority competent for the location of the subject matter of taxation (Dowgier and Etel 2013). It is worth noting that with such high real estate tax rates, within a dozen or so years the entrepreneur will pay the tax authority the tax corresponding to 100% of the value of real estate acquisition.

Therefore, the recognition of a land, building or structure as being related to business activity is


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important for the amount of real estate tax burden. This tax is based on the solution that taxed objects related (and sometimes seized) to business activity are taxed at a rate many times higher than real estate not related to such activity. Interestingly, in the case of a building, it is even required to be occupied for business activity so that it can be taxed with this tax. At this point it is worth mentioning that this state of affairs has been taking place since January 1, 2016, when the Act of June 25, 2015 amended Article 1a, paragraph 2 and 2a l.t.f.a (Morawski and Banasik 2018).

According to the explanatory memorandum to the draft law, the legislator intended to clarify the concept of „technical considerations" on which the taxation of real estate belonging to the entrepreneur was dependent. In fact, this clarification consisted in removing this concept, which has resulted in such a simplification that regardless of whether or not the building acquired by the entrepreneur is suitable for business. Finally, it should be noted that the exception provided for in Article 1a(2a)(3) of the l.t.f.a. is an illusion, since its scope does not correspond in any way to that of facilities which the taxable person cannot use for various reasons (Morawski and Banasik 2018).

## THE PROVISIONS OF COMMUNITY LAW ON STATE AID TO UNDERTAKINGS

Such high tax rates often exceed the financial capacity of entrepreneurs. In order to maintain their existence, it becomes necessary to provide assistance from the State, i.e. to apply the so-called state aid. EU competition law, due to the negative effects of public aid on competition on the market, has introduced a general ban on public aid. Art. 107 ust. 1 The Treaty on the Functioning of the European Union (Official Journal UE, C 83, 30.03.2010) (hereinafter TFUE) stipulates that: "Save as otherwise provided in the Treaties, any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods shall, in so far as it affects trade between Member States, be incompatible with the internal market". The prohibition formulated in this way is interpreted broadly. Although EU law does not define the concept of "state aid", it has been assumed in the jurisprudence that it is any benefit obtained by an enterprise from public authorities, either through obtaining funds or exempting, even partially, from financial obligations (Craig and Búrca 2003).

State aid within the meaning of Article 107(1) TFEU confers an economic advantage on certain undertakings or the production of certain goods to the exclusion of others. A measure cannot be considered as State aid where it does not confer any advantage on the entity to which it is addressed (CJEU judgment in Case T-55/99, paragraph 40). State aid can therefore be defined as the selective granting of a financial advantage to a given undertaking or group of undertakings, accompanied by the creation of a financial burden on public finances. This burden may be in the form of public spending on companies or reducing the public law burden on companies. In the first case, it will be aid granted through active support instruments such as grants, interest rate subsidies on bank loans, refunds, soft loans and conditional waivers, guarantees and loan guarantees. In the second case, it will be aid granted through tax exemptions and write-offs (tax subsidies), the conversion of the company's debts into capital or the postponement of the payment of certain public subsidies.

Bearing in mind the above-mentioned EU regulations, in 2018 the Polish legislator amended the Act of 30 April 2004 (Journal of Laws of 2018 item 362) on proceedings in matters concerning public aid by adjusting to the European Union regulations concerning information submitted by entities applying for public aid, specified in Commission Regulation (EU) No. 1407/2013 of 18 December 2013 on the application of Articles 107 and 108 of the Treaty on the Functioning of the European Union to de minimis aid and Commission Regulation (EU) No. 651/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty. The amendment of the Polish Act adjusts the nomenclature and references contained therein to the binding provisions

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of EU law, i.e. TFEU, Council Regulation (EU) No 2015/1588 of 13 July 2015 on the application of Articles 107 and 108 of the Treaty on the Functioning of the European Union to certain categories of horizontal State aid, Council Regulation (EU) No 2015/1589 of 13 July 2015. laying down detailed rules for the application of Article 108 of the Treaty on the Functioning of the European Union and Commission Regulation (EU) No 2015/2282 of 21 April 2004 implementing Council Regulation (EU) No 2015/1589 laying down detailed rules for the application of Article 108 TFEU.

In the case of property tax, the material scope has been significantly reduced as the legislator has provided for a wide range of properties that can benefit from the exemption. However, it should be pointed out as a shortcoming of this regulation that the exemption system has not been regulated in a uniform manner. It is possible to indicate a group of exemptions, which refers to other laws, including regulations granting exemptions for doing business in special economic zones. In principle, however, the tax exemption may result from the law itself (ex lege), or may be the result of the exercise of discretionary power by authorised bodies examining applications from individual entrepreneurs (administrative recognition). The types of these exemptions and tax reliefs constitute a form of public aid for an entrepreneur called collectively tax subsidies (Krajewska et al. 2016).

We can therefore speak of two groups of tax subsidies. The first type is the various general tax exemptions and reliefs which arise directly from the provisions of substantive tax law (ex lege). The second type of tax subsidies, in turn, are the profits contained in the provisions of formal tax law, which grant taxpayers (and thus also entrepreneurs) the right to apply for abandonment of collection, postponement of the payment deadline, or spreading the payment of the tax due in instalments, or for redemption of arrears or interest – which is in line with the powers of tax authorities under the Act of 29 August 1997 – Tax Ordinance (Journal of Laws of 2019 item 900).

The scale of aid granted to entrepreneurs in the form of reductions and exemptions is shown in the Table 2 , which contains data on the structure of real estate tax exemptions under the municipal council resolutions in 2018.

**Table 2.** The structure of real estate tax exemptions under the resolution of the municipal council in 2018, presented as a percentage

| Type of subject matter of taxation | Total municipalities [%] |
|---|---|
| Land related to business activities, regardless of how it is classified in the land and building register | 5.23 |
| Other land* | 9.29 |
| Business buildings and residential buildings or parts thereof occupied for business activities | 20.51 |
| Other buildings** | 16.03 |
| structures | 48.94 |

Explanations:
* includes land under lakes, occupied for storage reservoirs or hydroelectric power stations, others, including those occupied for the conduct of paid statutory public benefit activities by public benefit organizations, not developed within the revitalization area;
** includes buildings: residential buildings, associated with the provision of health services within the meaning of the legislation on medical activities, occupied by providers of such services, others, including those occupied for the conduct of paid statutory public benefit activities by public benefit organizations
*Source*: own study based on Bieniaszewska et al. (2019) parts *A* and *B* of the report

Taking into account the table above, it can be seen that in the structure of the redundancies under the resolutions of the municipal councils, the largest number of redundancies for buildings is made. As a result, municipalities are losing income, which represents almost half of the total amount of redundancies – 48.94%. Of the total amount of exemptions, as many as 74.85% are exemptions for tax subjects related to or occupied for business activities.

At this point it should be stressed that all cases of formulating tax reliefs and exemptions constitute an exception to the principle of tax universality contained in Article 84 of the Polish Constitution. Also in the


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legislation of the European Union countries there is a departure from formulating general reliefs and exemptions for entrepreneurs in the material tax law (Jurkowska 2001). According to Article 107 TFEU, any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods shall, in so far as it affects trade between Member States, be incompatible with the internal market. The Community legislator, in Article 107(2) TFEU, indicates which aid is compatible with the internal market and in Article 107(3) TFEU, which aid may be declared compatible with the internal market. Among other things, due to the fulfilment of the conditions set out in Article 107(2) and 107(3) TFEU, there is a specific type of aid that can be authorised subject to low value (so-called de minimis aid). This type of aid may be a form of granting relief from the payment of tax liabilities to the entrepreneur, on the basis of Article 67a and Article 67b of the Tax Ordinance.

A different kind of aid has now developed due to the COVID-19 pandemic, as some entrepreneurs have suffered huge financial losses due to the measures taken to reduce the spread. As a result, the Polish Government has taken steps to cushion the negative effects of the pandemic on business finances. This was the signing, on 31 March 2020, of the Act amending the Act on special arrangements for the prevention, prevention and combating of COVID-19, other infectious diseases and crisis situations caused by them and certain other acts, the so-called second anti-crisis shield. One of the options provided for in the aforementioned law is to provide the Municipal Council with the competence to exempt from tax land, buildings and structures used for business activities. In addition, the municipal council may also adopt a resolution to extend the deadlines for payment of property tax instalments, payable in April, May and June 2020, but no longer than 30 September 2020. Both support may concern groups of entrepreneurs indicated by the municipality, whose financial situation deteriorated as a result of the coronavirus epidemic, i.e. their liquidity deteriorated due to negative economic consequences due to COVID-19. However, for such an exemption to take place, a resolution of the municipal council is necessary, which means that it will be up to the local authorities to decide whether they will introduce such exemptions and how they will determine the criteria for the deterioration of financial liquidity (Kubicka-Żach 2020). The exemption resulting from such a resolution constitutes public aid to remedy a serious disturbance in the economy of a Member State, which is granted in accordance with point 3.1 of the European Commission Communication: Temporary Framework for State aid measures to support the economy in the context of the ongoing COVID-19 epidemic (2020/C 91 I/01) (Official Journal of the European Union C 91I of 20.03.2020).

The Ministry of Finance, in a letter sent on 10 April 2020 to the provincial governors and presidents of the Regional Chamber of Accounts, stresses that the new competence regulations for municipalities are characterised by a significant degree of generalisation. This is intended to allow municipalities to make independent decisions on the application and scope of support for entrepreneurs, in accordance with their own fiscal policy adapted to the local situation (Horbaczewski 2020).

The Ministry also recommends that it should be guided by a purposeful interpretation and, at the same time, by the need to provide local government units with own income at an appropriate level. The only criterion is that these are entrepreneurs whose liquidity has deteriorated due to the negative economic consequences of COVID-19. In order to benefit from the exemption, the municipality may not require the taxpayer to submit an application for exemption. As the Ministry of Finance explains, it is necessary to take into account the provisions of the Act of 12 January 1991 on local taxes and charges, which impose an obligation on the taxpayer to submit information (natural persons) or to correct declarations (legal persons) in the event of an event occurring during the year which affects the amount of taxation in that year, as well as those which impose

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an obligation on the tax authority in such a situation to change the decision which established the tax (Kamiński 2020).

A circumstance corresponding to this description is precisely the fact that the property tax exemption is being used. Therefore, if the taxpayer meets the conditions specified in the resolution of the municipal council, he does not submit an application for the application of the exemption, but only submits information on real estate tax or corrects the declaration for this tax. The regulations which are the basis for introducing these forms of aid by the municipality entered into force on 31 March 2020. With this date, the municipalities were granted the right to introduce the above tax preferences. The realistically commented foot-relief applied from 1 April 2020. If the municipality, within its discretion, decides to introduce tax exemptions after that date, it may give the resolution retroactive effect (Kamiński 2020).

In addition to the provisions explicitly indicating the application of state aid, in the form of reliefs and exemptions, important assistance to entrepreneurs also brings with it favourable case-law of the courts, which, with such complex rules as exist in tax law, is cardinally important. An important example of such a line of judgement favourable to entrepreneurs is the issue which resulted from Article 1a(1)(3) of the l.t.f.a., which indicates that buildings related to the conduct of business activity are deemed to be those owned by the entrepreneur or another entity conducting business activity, with the exception of residential buildings and land related to those buildings, as well as land referred to in Article 5(1)(1)(b) of the l.t.f.a., unless the subject matter of taxation is not and cannot be used to conduct that activity for technical reasons.

It follows from the above definition that the criterion determining the application of the highest rate is the mere fact that the entrepreneur owns the building. It is not necessary to actually use the building for business purposes. A building which is not used at all and which is owned by the entrepreneur is also subject to property tax at the highest rate. It should be pointed out that until recently, the Administrative Courts were of the opinion that even if only one of the co-owners is engaged in business activity, all are liable to pay the tax at the highest rates (judgment of the Provincial Administrative Court in Olsztyn of 28 October 2004, I SA/Ol, 317/04). However, this stance was criticised by the Constitutional Court in its judgment of 12 December 2017, Ref. SK 13/15, which indicated that Article 1a Section 1 point 3 in connection with Article 5 Section 1 point 1(a) of the Act of 12 January 1991 on Local Taxes and Fees, understood in such a way that a sufficient premise for classifying the land subject to real estate tax as land related to business activity is the pursuit of business activity by a natural person who is its co-owner, is inconsistent with Article 2 in connection with Article 64 Section 1 and 2 and Article 84 in connection with Article 32 Section 1 of the Constitution of the Republic of Poland. In the justification of the judgment, the Constitutional Tribunal stated that the contested regulation has too broad a scope of application, even taking into account the exclusions referred to in the last sentence of Article 1a, paragraph 1, point 3 l.t.f.a. In the opinion of the Constitutional Tribunal, the mere pursuit of economic activity by a natural person is not important for taxation of land with the tax rate on land related to the pursuit of economic activity (referred to in Article 5, paragraph 1, point 1, letter a of the l.t.f.a.). In view of the ratio of the application of the increased rate, which is the potential for obtaining revenue from the use of the land in question, it is necessary to establish the actual use of the taxed land of which a natural person carrying out an economic activity remains a co-owner. Omitting this criterion leads to a differentiation between holders of land which has no connection with the exercise of an economic activity. Taxpayers (natural persons) in a similar situation (owners of land not related to business activities) pay property tax at different rates. In the opinion of the Court, this differentiation has no constitutional justification in relation to persons holding land not related to business activity. A similar position has also been presented by some Administrative Courts. Voivodship Administrative Court in Rzeszów in the


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judgment of 14 August 2017, file no. I SA/Rz 296/17. A more precise interpretation of the provisions was made by the Voivodship Administrative Court (WSA) in Szczecin in its judgment of 7 September 2017, file no. I SA/Sz 521/17, in which it stated that in the case of natural persons conducting economic activity, the choice of the appropriate rate of real estate tax should be preceded by determining which real estate is related to the activity of the taxpayer – entrepreneur, and which belongs to his personal property, i.e. not related to economic activity.

The position described above is important from the point of view of business taxation. What is crucial in the ruling is not only that the Constitutional Tribunal recognised the unconstitutionality of the provisions in the case where one of the spouses is engaged in business activity and the other is not, but it is equally important that the authority, before issuing a dimensional decision, should examine the facts of the case in order to conclude that the land or other property in question is actually used in the taxpayer's business activity. The mere fact of owning real estate cannot in this case be a condition exaggerating its economic use in the entrepreneurial activity.

## CONCLUSIONS

The income from real estate tax, as an income that feeds the entire municipal budget, enables local government bodies to carry out the tasks set by the legislator, which is a very important source of income for municipalities. The tables presented in this article show that the largest share in this income are the taxes levied on land and buildings owned by the entrepreneur, i.e. those properties connected with carrying out economic activity. It can therefore be concluded that the application of any tax subsidy and the possibility of deferring the payment of the tax only takes place in particularly justified cases, i.e. those which determine the continued existence of the entrepreneur concerned. Moreover, the expenses incurred by entrepreneurs as a result of their tax obligations are as financially significant for them as in the case of municipalities. Frequently, tax deferrals or write-offs can cause entrepreneurs to get out of financial trouble. For this reason, one cannot deny the legitimacy of using this form of assistance to an entrepreneur. At the same time, it is important to remember the principles of fair competition. Therefore, any subsidies or other assistance to entrepreneurs should comply with the provisions of the Act on State Aid and EU regulations, which prohibit the provision of such financial assistance to an entrepreneur that distorts or threatens to distort competition by favouring certain enterprises.

Nevertheless, the use of such assistance, as well as the right of municipalities to differentiate tax rates or introduce exemptions, gives them the opportunity to influence local development, such as attracting external investors, stimulating entrepreneurship and thus solving difficult problems in the local labour market. It is therefore very important for local authorities to have a proper property tax policy. Property tax is also an instrument used to stimulate entrepreneurship, as can be seen from the municipalities setting tax rates below the maximum rates. This does not mean that they can be described as low and entrepreneurs do not try to find ways to reduce this levy. The problem of a significant link between tax law and construction law, namely the smoothness of the boundary between the definitions of a building and a structure, still remains. A good example is, for example, the need to tax buildings on their historical value (initial value), which does not take account of depreciation write-offs made by the taxpayer. Such a solution does not encourage entrepreneurs to modernise their property, because the regulations in their current form favour this property of the entrepreneur, which is old and has a low initial value. According to the author, running a cadastral tax could contribute to solving this problem.

When concluding, tax rules do not have to be very strict and absolute. It can be considered that precisely if the tax system were more transparent and at the same time allowed the entrepreneur to benefit from a lower rate of property tax, this would be more beneficial to the economy and the state budget. At present, the ambiguity of the regulations under discussion

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and the problems of interpretation associated with this lead to numerous legal proceedings. These, in turn, involve a significant commitment of time and money that could be used by the entrepreneur for investment purposes. In the long term, this could be linked to the development of such an entrepreneur and, consequently, to the regional and national economy, and could therefore also affect the income of the municipal and state budget.

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# MATHEMATICAL MODEL FOR ERRORS ESTIMATION OF DIFFERENCE OF OBJECTS'S ELEVATION DETERMINATION USING FLYING PLATFORM

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## ABSTRACT

In this paper the method for determination of the object's elevation on the ground as well as the mathematical model for error estimation of object's determination are suggested. It is assumed that the object is situated beyond line-of-sight or, whatsoever, beyond the horizon.
It has been obtained the analytic expression for error estimation of the object's elevation determination using flying platform in case of the known inaccuracy of goniometry and distance measures.
The effect of inaccuracy of goniometry and distance measurements on the error estimation of the object's elevation determination is traced. Analytic expressions of evaluating requirements for accuracy of goniometer and distance measurer are deduced. These requirements will ensure the specified accuracy of the object's elevation determination.
A relationship between object's elevation determination and its location with respect to the observing station and flying platform is investigated.

**Key words:** elevation, object orientation, flying platform, error estimation

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## INTRODUCTION

In order to perform certain tasks, landmarks have to be identified in regions where existing optical systems cannot be used. Accurate determination of landmark parameters is largely dependent on the operational performance of measuring devices. Often the determination of the object's elevation on the ground is realized by the method of trigonometric leveling from local landmarks and reference point of the geodetic network (Ghilani et al. 2012, Whyte et al. 1997). The density of the reference point is lower in the mountains and wooded area. The equipment of the OS of the NS ensures its orientation and positioning. This makes the dependence of the possibility of observations on the availability of ground control points to disappear.

Often the objects, elevation of which on the ground to be determined, can be located beyond the line-of-sight range from the observing point. In some problems, they can be located beyond the horizon. For these reasons, the search for methods of elevation determination for such objects is still up-to-date/to the point. In this case as well as in the papers (Korolov et al. 2009a, Korolov et al. 2009b), it is proposed to use flying platform as additional observing station.

Apart from the navigation system, observing station is equipped with the devices that allow measuring of viewing angles of the objects and distances to them. The flying platform is equipped with both vertical signaling gyroscopic unit and devices, which allow measuring of viewing angles of the objects and distances to them. In the paper (Korolov et al. 2019) the problem of determining the object's plane coordinates with the use of flying platform is solved, but the issue of elevation determination remains open.

The purpose of this paper is to develop the method of object elevation determination without direct vision or in case its location beyond the horizon and its accuracy evaluation.

## METHODOLOGY OF RESEARCH AND MATERIALS

To achieve this goal, we consider a geometric spatial model of the location of the flying platform relative to the observation station and the object. Math modeling was carried out using MatLab software.

To solve this problem the observing station (OS) is to be established, which is equipped with navigation system (NS). It provides object's orientation and positioning. Additionally, observing station is equipped with two devices: distance measuring instrument and position indicator. With respect to OS an airborne observing station is established. It is proposed to use flying platform for that purpose. This platform is equipped with vertical signaling gyroscopic unit and position indicator. The elevation of flying platform referred to OS is to be defined from the OS. By means of the abovementioned devices on flying platform, its elevation with respect to the object is determined. Their difference represents the elevation of the object.

Schematic illustration of mutual disposition of the flying platform referred to observing station and the object is shown in Figure 1.

The following symbols are used in the Figure 1:

$K$ – the observing station;
$H$ – the flying platform;
$C$ – the object;
$z_k$ – the observing station 's coordinate of elevation (above sea level);
$z_H$ – the flying platform 's coordinate of elevation;
$z_c$ – the object's coordinate of elevation;
$D_{\mathrm{KH}}$ – the distance between observing station and flying platform;
$D_{\mathrm{HC}}$ – the distance between the flying platform and the object;
$\delta$ – the angle between the horizon and the direction from the observing station to the flying platform;
$\varphi$ – the angle between the vertical passing through the flying platform and the direction from the flying platform to the object.


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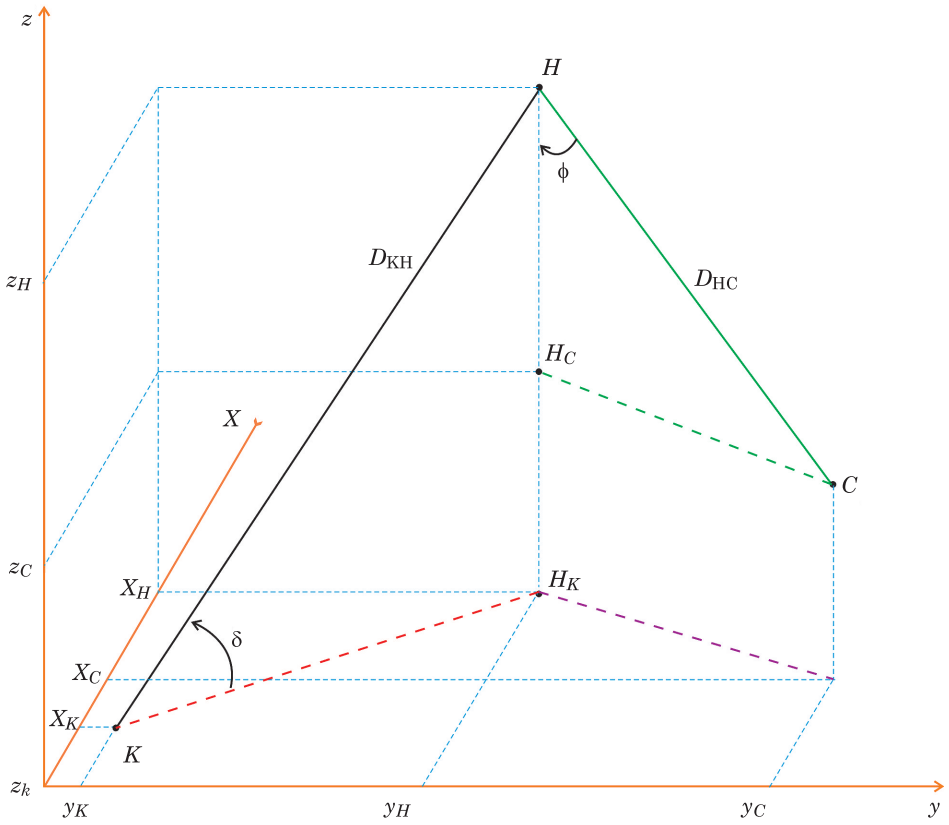


**Fig. 1.** The scheme of the mutual location of the observing station and object

Variable $z_H$ – elevation of the flying platform $H$ referred to observing station $K$ is determined by trigonometric levelling (Ghilani et al. 2012)

$$z_H = D_{KH} \cdot \sin \delta \tag{1}$$

Using similar approach, the elevation of the flying platform $HH_C$ referred to the object $C$ is found from the expression

$$HH_C = D_{HC} \cdot \cos \varphi \tag{2}$$

Geometrically, variable $z_c$ – elevation of the object $C$, is found by using formula

$$z_c = z_k + D_{KH} \cdot \sin \delta - D_{HC} \cdot \cos \varphi \tag{3}$$

Function $z_c$ is a multivariable function

$$z_c = z_c(z_k, D_{KH}, \delta, D_{HC}, \varphi) \tag{4}$$

The value of $z_k$ is taken from the map, in the future its error is considered systematic. Its arguments $D_{KH}$, δ, $D_{HC}$, φ are the values of measurements of the respective distances and angles. With defined accuracy the measurements are taken by the assemblies, disposed at the observing station ($D_{KH}$, δ) and at the flying platform ($D_{HC}$, φ). Thus, the values of measured parameters $D_{KH}$, δ, $D_{HC}$, φ are random in character. So the function (4) can be considered as a function of multiple random variables.

In view of the foregoing, in order to estimate the error of object's elevation definition it is perfectly natural to use $\sigma^2_{z_c}$ function dispersion (4).

The fact that the parameters measurements $D_{KH}$, δ, $D_{HC}$, φ are taken by different operators, various devices, which are disposed in different locations, allows considering the errors of their measurements as statistically independent.

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In this case for computing $\sigma_{z_c}^2$ we'll employ formula known from the probability theory (Ventcel 1969, Jeffreys 1998, Taylor 2015).

$$\sigma_{z_c}^2 = \left(\frac{\partial z_c}{\partial D_{\text{KH}}}\right)^2 \sigma_{D_{\text{KH}}}^2 + \left(\frac{\partial z_c}{\partial \delta}\right)^2 \sigma_\delta^2 + \left(\frac{\partial z_c}{\partial D_{\text{HC}}}\right)^2 \sigma_{D_{\text{HC}}}^2 + \left(\frac{\partial z_c}{\partial \varphi}\right)^2 \sigma_\varphi^2 \quad (5)$$

Assuming that measurements of the linear and angular values both at the OS and flying platform are of equal accuracy: $D_{D_{\text{KH}}}^2 = D_{D_{\text{HC}}}^2 \equiv \sigma_D^2$, $D_\delta^2 = D_\varphi^2 \equiv \sigma_\theta^2$, and having performed appropriate manipulations, we obtain

$$\sigma_{z_c}^2 = (\cos^2\varphi + \sin^2\delta)\sigma_D^2 + \left(D_{\text{HC}}^2 \sin^2\varphi + D_{\text{KH}}^2 \cos^2\delta\right)\sigma_\theta^2 \quad (6)$$

For a qualitative assessment of the relative effect of the additive components of the right-hand side of the equation (6) on the value of the variable $\sigma_{z_c}^2$ let us consider the diagrams of the behaviour in the same axes. Considerations will be carried out for the most typical configurations of the location of the OS, flying platform and the object.

For the quantitative error estimation of the object's elevation determination we will use the value of the variable $\sigma_{z_c}$.

## DISCUSSIONS AND RESULTS

For studding the behaviour of the value $\sigma_{z_c}^2$ and its components, mathematical modeling with MatLab application was developed (Grant et al. 2008, Moore 2017). The example of the use of the angles and distances measuring devices was considered. These devices are used at the observing station and flying platform, they have such characteristics as maximum error in distance measurement is $\sigma_D = \pm 10$ m. Value $\sigma_\theta$ – is a maximum error in angles measurement by means of measuring device set up $\sigma_\theta = 2$ mrad (Korolov et al. 2000, Korolov et al. 2003, Bekir 2007). The abovementioned devices and their errors in measurement are taken as an example for clarity and quantitative assessment of the measurement of the necessary parameter in case of normal use. The results of the modeling are performed in Figure 2.

On the graphic plots (Fig. 2 ) for convenience of the results analysis, the values of $\sigma_{z_c}^2$, as well as the first and the second additive components of the formula (6) were marked along the vertical axis.

The calculation data are grouped into the first (*a*, *d*, *g*), the second (*b*, *e*, *h*) and the third (*c*, *f*, *i*) columns for the options, when $\text{KH}_K$ (the distance along the flying platform horizon from the observing station) is 2000, 5000 and 7000 m, respectively.

The first (*a, b, c*), the second (*d*, *e*, *f*), and the third (*g*, *h*, *i*) rows contain the calculation data grouped for the options for flying platform disposal at an elevation of 5000, 2500, and 1000 m, respectively.

On the left horizontal axes we should mark the values of the flying platform elevation above the object from 0 to 5000, 2500, and 1000 m for the 1st, 2nd, and the 3rd column respectively.

On the right-hand horizontal axes we should plot the value of the horizontal distance from the object to the vertical, which passes through the flying platform from 0 to 5000 m for all options.

On the results of the analysis of the outlined graphic plots behavior it can be concluded that $\sigma_{z_c}$ error in determining the elevation of the object varies for different options for placing the objects, which participate in remote sensing as follows:

- takes a value of up to 14 m at a elevation of the flying platform of about 5000 m;
- takes a value of up to 12–13 m at a elevation of a flying platform of about 2500 m;
- when the elevation of the flying platform is up to 1000 m, a zone of local minimum is observed – the value $\sigma_{z_c}$ remains in the range of 5 to 8 m (at $\text{KH}_K = 2000$ m and 7000 m, respectively).

From the graphic plots (*g*, *h*, *i*) it is apparent that $\sigma_{z_c}$ takes the smallest value when 1500 m < $H_C C$ < 3500 m. When going beyond the range of the interval the variable $\sigma_{z_c}$ increases, especially at small values $H_C C$. Therefore the optimal positioning of the flying platform from the OS is at the elevations not less than


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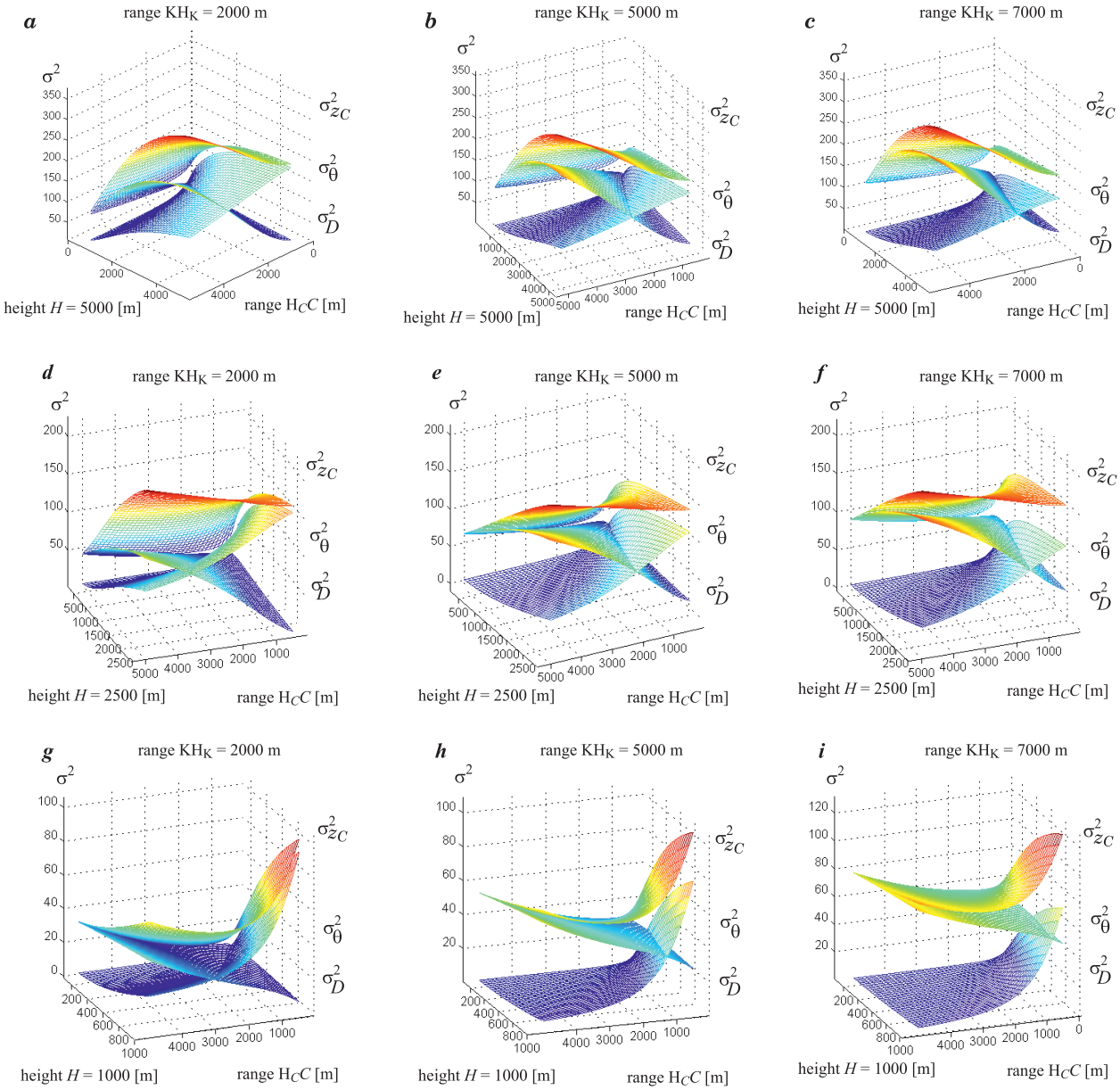


**Fig. 2.** Characteristics of the behavior of the value $\sigma^2_{z_c}$ and its components, depending on the location of the observing station, the flying platform and the object

1000 m and at the distance $H_CC$ from the ground control point when 1500 m < $H_CC$ < 3500 m.

For the values $KH_K$ > 5000 m and $H_CC$ > 1500 m (the most typical regular situations) $\sigma^2_D(\cos^2\varphi + \sin^2\delta)$ the first element of the right-hand side of the formula (6) is by the order of magnitude lass than the second additive component. It allows ignoring it. Thus, we can conclude that the main component of the error in object's elevation determination $\sigma_{z_c}$ is the error in angles measurement.

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Then, to estimate the value $\sigma_{z_c}$ we can apply the analytic dependence in the form:

$$\sigma_{z_c} = \sigma_\theta \cdot \sqrt{D_{\text{HC}}^2 \sin^2 \varphi + D_{\text{KH}}^2 \cos^2 \delta} \qquad (7)$$

Thus, with the known accuracy of the goniometers, formula (7) allows us to assess the potential accuracy of the object's elevation determination.

For the inverse problem. As may be required to provide with the specified accuracy of elevation determination, the formula

$$\sigma_\theta = \frac{\sigma_{z_c}}{\sqrt{D_{\text{HC}}^2 \sin^2 \varphi + D_{\text{KH}}^2 \cos^2 \delta}} \qquad (8)$$

allows to estimate the requirements for angular measurement accuracy.

Note, that in case of using of assemblies, providing geodetic accuracy of distances and angles measurement, the error in elevation determining will be correspondingly less, but the nature of its behavior will remain the same.

Further it is planned to develop the mathematical model for estimating the errors in determining the coordinates of the moving object, when they are determined with the use of the flying platform.

## CONCLUSIONS AND PROPOSALS

1. It is shown that the error in angles measurement induces dominant component of the error in object's elevation measurement.

2. It is established that error in object's elevation measurement does not exceed 14 m, if the flying platform is set at the elevation no more than 5000 m (provided that the accuracy of measuring distances is not worse than ± 10 m and angles – not worse than 2 mrad). It is shown that the error in object's elevation determination varies from 5 to 8 m, if the flying platform elevation is not higher than 1000 m, the distance to the object is no more than 1500 m, distance to the observing station is no more than 3500 m.

3. Here is deduced the analytic expression for error estimation of the object's elevation determination, if the accuracy of the goniometers is known.

4. Here is obtained the analytic expression for assessing the requirements for angular measurement accuracy when determining the elevation of the object to the specified accuracy.

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# REMUNERATION FOR ESTABLISHING THE NECESSARY PASSAGE EASEMENT IN THE LIGHT OF JUDICIAL DECISIONS

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## ABSTRACT

Judicial practice abounds in numerous disputes arising from the provisions concerning land easements. It can be stated that there are many interesting legal issues in both doctrine and judicature that would certainly require separate and detailed studies. First of all, the issue of remuneration due to the owner of serviant l and is widely discussed. The regulations do not indicate criteria leading to determining the amount of remuneration, which raises many doubts in practice. The presented article is devoted to discussing the method of determining the amount of remuneration for establishing a necessary passage easement. Its purpose is to present various proposals for ancillary criteria which should be taken into account when calculating the remuneration due to the owner of the property.

**Key words:** property law, civil law, real estate, remuneration, necessary passage, expert witness, land easement

## INTRODUCTION

Passage easement (the right of passage) is defined by the Act as the easement of a necessary passage. In accordance with Article 145 § 1 (Civil Code 1964 abbreviated: CC), if the property does not have adequate access to the public road or to the farm buildings belonging to the property, the owner may require owners of the neighboring lands to establish necessary passage easement. This provision does not indicate the criteria according to which the amount of remuneration provided for in it should be determined in addition, in Article 145 § 1 of CC (1964) the legislator did not order, as they did in the case of the transmission easement – Article $305^2$ § 1 of CC (1964) – that the reward for establishing a necessary easement should be relevant. They used the word remuneration without the adjective "relevant". Use of the adjective "relevant" in Article $305^2$ § 1 of CC (1964) means that the remuneration provided for in this provision should be determined on a case-by-case basis and adapted to the circumstances relevant to the case (Decision of the Supreme Court 2013).

In practice, the issue of determining the amount of remuneration is often left to the will of the parties who contractually establish passage easement, usually guided by the market value of a given law, with a view to increasing the usability of the dominant estate, and the impairment of the servient estate. Within the freedom to conclude contracts, the parties may also establish free-of-charge passage easement.

In contrast, the establishment of a necessary passage easement by court always takes place

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against payment. The court-law emphasizes that in proceedings to establish the necessary passage easement, remuneration for the owner of the servient property is ordered ex officio (Order of the Supreme Court 2000, Order of the Supreme Court 2012). This means that the court is obliged to decide on the amount and method of payment of remuneration in the order issued, even if the request for payment of such remuneration was not made by the parties, unless the entitled party has waived their right to remuneration. Therefore, in a situation when the entitled person has not waived this remuneration and does not agree to determine its amount as proposed by the obligated person, the court is obliged to carry out – also when exercising the right provided for in Article 232 second sentence of the Code of Civil Procedure (1964) [abbreviated: CCP] (consolidated text of the Journal of Laws of the Republic of Poland of 2019, item 1460). All evidence useful for correct determination of the extent of the benefit (Order of the Supreme Court 2008, Order of the Supreme Court 2012, Balwicka-Szczyrba, p. 36). Legal assessment of the omission of this obligation can be made in two areas.

First of all, the owner of the servient estate has the right to appeal against such a decision alleging a violation of substantive law – Article 145 § 1 of CC. (1964) The failure in making arrangements regarding the amount of remuneration by the court of first instance in the case for establishing a necessary passage easement means failure to recognize the substance of the case justifying reversing the order by the court of second instance and passing the case for re-examination (Order of the Supreme Court 2012).

However, in a situation where the right holder does not decide to appeal or overlooks such a possibility, they are not yet deprived of a claim for payment of remuneration for setting a necessary passage easement. They then have still the option of bringing an action for payment of remuneration in a procedural manner (Rudnicki 2011, p. 84).

## MATERIALS AND METHODS

The nature of the topic required the dogmatic and legal method. The most adequate research techniques and tools took the form of examining source documents – provisions of national law and analysis of court rulings. All the content presented in this study is a compatible theoretical and empirical conglomerate. This arrangement allows for an objective presentation of the essence of considerations not only in the perspective of the analysis of sources of law, subject literature, but also court cases for establishing the necessary passage easement.

## NATURE OF REMUNERATION

It should be emphasized that there is a divergent stance in the doctrine as to whether the obligation to pay remuneration is a real obligation or an obligation relationship that is not related to a legal situation. Rudnicki (2012, p. 120) stated that remuneration for the establishment of a necessary easement is not compensation, but as the equivalent of encumbrance of real estate, it is a price and real bond, the source of which is the establishment of a limited property right. Ciepła (2018), justifying this view, further emphasizes that the remuneration is not conditioned by either the increase in the usability of the dominant property or the damage suffered by the owner.

However, the trend in literature according to which it is assumed that from the moment the easement is established, a bond relationship regarding the payment of remuneration is established seems to be more convincing (Warciński 2010, p. 59, Karaszewski 2014, pp. 85–99, Skowrońska-Bocian and Warciński, p. 513, Matusik 2020, p. 56). It is difficult not to share these reservations, because, as Kraszewski (2014, p. 95) stated, the obligation to pay remuneration does not pass on the buyer of the dominant property (the law being its correlate has no *erga omnes* efficiency characteristics), the parties to the contract may shape the content of this obligation on general principles provided for in Article $353^1$ of CC (1964) The contract for the establishment of the necessary


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passage easement consists of two layers: substantive which consists in the establishment of easement, and obligatory that determines the remuneration for this easement. Janiszewska (2015, p. 143) also emphasized that there is no specific subject to legal and material relationship for every authorized and obliged person. Therefore, if the debt transfer is not transferred or the debt is not taken over, the obligation to pay once aroused, would bind the parties irrespective of whether the dominant or servient estate was sold. Meeting periodic benefits could, therefore, be provided in isolation from the use (or removal of the inconvenience of using) of the property encumbered with the necessary passage easement.

## SCOPE OF REMUNERATION

The content of the provision of Article 145 of CC (1964) is not a foregone conclusion on the nature of the obligation, which results in the obligation to pay remuneration to the owner of the servient property. It should be noted that it is indicated that the establishment of an easement occurs "for remuneration" and not "for compensation". Hence, it can be assumed that the will of the legislator was not only to compensate the damage that occurs in the property of the owner of the property encumbered as a result of the establishment of the passage easement. The concept of remuneration is broader and more flexible. It is equivalent to enduring someone else's pedestrian or vehicle passage through the property. On the one hand, it should take into account the benefit that the dominant real estate enjoys and the inconvenience that the establishment of easement results for the servient property. The remuneration may not, however, serve unjust enrichment at the expense of the owner of the real estate. It should be proportional to the degree of interference with the content of the ownership right (Order of the Supreme Court 2016, Order of the Supreme Court 2012, Order of the Supreme Court 2010, Order of the Supreme Court 2012, Order of the Supreme Court 2018).

Remuneration is also due if the owner of the servient property has not suffered any damage in connection with the establishment of an easement (Order of the Supreme Court 2000). In the event of damage, this fact must be taken into account when determining the amount or type of remuneration due. However, it should be noted that according to the rule of Article 6 of CC (1964) the owner who claims damage caused as a result of burdening their property by the passage easement has to deliver evidence (Gołba 2016, p. 120). The remuneration for establishing the necessary passage easement in the form of a monetary benefit may be valorized in accordance with Article $358^1$ § 2 of CC (1964) (Skowrońska-Bocian and Warciński 2018, p. 444).

## COMPONENTS OF REMUNERATION AND THE METHOD FOR DETERMINING THE AMOUNT OF REMUNERATION

There is also no doubt that the amount of remuneration due to the owner of the property and the criterion on the basis of which it should be determined is verified by means of evidence from an expert opinion. As previously stated, the court which has failed to consider this evidence runs the risk of being charged with violating Article 232 second sentence of the CCP (1964) in connection with Article 278 § 1 of CCP (1964).

According to the decisions by the Supreme Court, the opinion of an expert is intended to facilitate the court's discernment and understanding of the field (matter being resolved) that requires special information. In this sense, the expert is the court's assistant, however, they present their own position on the issue on which the court decides. The expert maintains independence as to the substantive content of the opinion, which ensures the correct role of this opinion in court proceedings (Decision of the Supreme Court 1997, Ereciński 2016, p. 423). The Supreme Court clearly stated that the Dispute is settled by a court, not an expert; the expert is only a court's assistant, providing the court with specific scientific, technical and other information, which the court may not have (Decision of the Supreme Court 1935, Gudowski 1998, p. 520). Whether and in what field

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they are necessary to settle the case, the court assesses each time against the background of the circumstances of the case (Decision of the Supreme Court 2017).

First of all, it is necessary to answer the question in what field the court should consult an expert. It is rightly argued in the case-law that undoubtedly determining the amount of remuneration pursuant to Article 145 § 1 of CC (1964) for the established necessary passage easement requires proof in the form of a report prepared by an expert (Order of the Supreme Court 2012). However, the Supreme Court (Order 2019) assumed that in some cases it may be useful and sufficient enough to obtain other evidence, including evidence from expert opinions of other specialties, to correctly determine the amount of this remuneration. It should be noted, however, that the presented position was issued in the case in which the servient real estate was located in an agricultural area. In this case, it is difficult not to share the view that this circumstance may support the recognition of the opinion of an agricultural expert as adequate evidence for the purposes of determining the amount of remuneration due to the owners of the servient property.

The provision of Article 145 of CC (1964) does not specify criteria for determining the indicated remuneration. Various criteria have been proposed in the literature and case-law to determine the components and amount of remuneration for establishing the necessary easement. The considerations already made show that the remuneration should be determined individually and should be adapted to the circumstances relevant to the given case. When determining the form of remuneration, it should be considered whether the legal status shaped by the establishment of the easement is permanent or temporary. It should also be borne in mind that when forecasting the long-term perspective of the functioning of the passage easement, the sum of remuneration for establishing the passage should not exceed the value of the servient property (Order of the Supreme Court 2013).

The case-law draws attention to the fact that the result of the assessment of the real purpose of the real estate to be encumbered with the necessary passage easement should take into account the impact of this qualification on the amount of remuneration for the establishment of the passage easement due under Article 145 § 1 of CC (1964) (Order of the Supreme Court 2018)

In its decision (2016), the Supreme Court stated that in addition to any compensation for lost profits, damage to property (understood as *damnum emergens* and *lucrum cessans*), and the inconvenience caused to the owner of the servient property, the payment for the establishment of the easement itself understood as the price is due to the property owner. It is sometimes argued that it is the greater, the more benefits the owner of the dominant property has obtained as a result, and it is also emphasized that it should take into account the easement applicant's fault contributing to the need to establish the passage easement.

This ruling met both approval and criticism of the doctrine. The view that the reduction of income from the servient real estate, understood as lost benefits, should be reflected in the amount of remuneration is shared by Kocon (1977, p. 72) and Matusik (2020, p. 53).

Karaszewski takes a different view (2014, pp. 85–99), though the argument that such a procedure would result in unjust enrichment of the owner of the servient land is not convincing. According to the author, the sale of the real estate (including the sale of a plot of land to a neighbor), if it is made at market price, also includes to some extent the value of the expected benefits (the greater the benefits expected from a given property, the greater its attractiveness on the market).

It is noteworthy that the view expressed by Rudnicki (2001, p. 842) saying, that when determining remuneration, one should take into account: a particular increase in the value of real estate due to access to a public road or farm buildings, a decrease in the value of the serviant property, expenses for necessary adaptations, as well as market prices of public road access obtained from obligatory sources. Rudnicki (2011, p. 74) also argued for the fact that when determining the amount of remuneration by analogy, one can use Article 13 of the Act on Inheritance and


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Donation Tax of 28 July 1983 (consolidated text published in the Journal of Laws of the Republic of Poland of 2019, item 1813) by calculating the value of recurring benefits to determine the tax base for inheritance and donation tax. This view was shared by Ciepła (2018), which, referring to the aforementioned provision, stated that it is necessary to take the annual depletion value multiplied by the number of years if this easement is established for a definite period of up to 10 years, or multiplied by 10 if the easement is established for different time duration or for an indefinite period.

In addition, the issue of admissibility of adjusting (reducing) the amount of remuneration from the point of view of Article 5 of CC (1964) still requires further consideration. Article 5 of CC (1964) applies, in principle, when there is a need to protect the other party to a legal relationship, its legitimate interest, which deserves such protection, and if the interest threatened with the exercise of subjective right cannot be secured otherwise, and if there is no other legal mechanisms to ensure this protection. The obligation to pay remuneration resulting from the Act should be assessed as obligatory during court proceedings, which means that its exclusion can only take place if the owner renounces this remuneration. The remuneration here is the equivalent, as a rule, of money, of those lost or limited rights of the property owner that they could have exercised in respect of the property if easement had not been established. The right to such an equivalent is therefore the subjective right of the owner of the servient property and cannot be eliminated by the application of Article 5 of CC (1964). As indicated in the decisions of the Supreme Court, the richness of everyday life does not allow to exclude a situation in which it would be necessary to reduce the amount of remuneration pursuant to Article 5 of CC (1964). This could only occur in exceptional circumstances (Order of the Supreme Court 2018).

## FORMS OF REMUNERATION

The provisions of Article 145 of CC (1964) do not specify the form of remuneration they provide, in particular they do not specify whether the remuneration is in the form of a one-time or periodic benefit. The periodic payment would lead to the situation that the easement would not be equivalent to burdening part of the property with easements, but in fact the source of income of the participant, as it would soon exceed the market value of this part of the plot. The remuneration for establishing the necessary passage is not compensation, but an equivalent benefit fulfilling the function of price and is due for the establishment of the easement alone (Order of the Supreme Court Order 2015). The remuneration for the easement may be in the form of periodic benefits, but it cannot include the period prior to the establishment of the easement. Therefore, if the legislator intended to introduce only one-time remuneration, it would undoubtedly have to find expression in the content of Article 145 of CC (1964) This means that the correct reasoning must be that which, in the absence of a definition of the form of remuneration, draws a conclusion on the admissibility of remuneration also in the form of periodic benefit (Order of the Supreme Court 2014, Order of the Supreme Court 1969).

## CONCLUSION

The issue of establishing a necessary passage easement often raises neighbors' disputes on two levels – the course of the land easement and the amount of remuneration due to the owner of the servient property. Lack of agreement between the parties is the reason for initiating court proceedings, under which the question of the amount and method of determining the amount of remuneration for establishing the passage easement becomes the subject of legal considerations of common courts and the Supreme Court. It should be recognized that the legislator deliberately does not specify criteria for determining remuneration in order to make its

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amount adapt to the circumstances relevant to a given case. Therefore, when deciding on the problem with which criteria to determine this amount, it is indicated that the interpretation of the term "remuneration" from Article 145 § 1 of CC. (1964) has a broader meaning range than compensation. Therefore, according to the author, when determining the amount of remuneration, one should take into account: the actual purpose of the servient property, the specific increase in the value of the dominant property, the reduction in the value of the servient property and also the losses incurred by the owner of the servient property, e.g. in the form of loss of benefits, lost crops, multiple of the rent for the occupied strip of land, provided that evidence of this damage is demonstrated in court proceedings in accordance with the rule provided for in Article 6 of CC(1964).

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# POSSIBILITY TO TERMINATE THE CONTRACT OF THE RENT-FREE USE OF ARABLE LAND WITHOUT THE NOTICE PERIOD DUE TO FAILURE TO SETTLE THE TAX OBLIGATION

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## ABSTRACT

The study discusses the issue of a contract of the rent-free use of agricultural land (Article 708 of the Civil Code 1964). Particular attention has been paid to the possibility of terminating the contract without notice period due to failure to settle the tax obligation. The admission of the provisions on the failure in paying rent to the contract for the rent-free use of arable land means that the lack of payment of taxes or other burdens related to the ownership of real estate, which is the equivalent of not paying the rent in the lease contract, authorizes the termination of this contract. The author shares the view formulated in the decisions of the Supreme Court that Article 703 of the Civil Code (1964) is a provision of a relatively binding nature. As a consequence, adopting the above position leads to the conclusion that the contract may be terminated even without the notice period if the parties to the contract have differently regulated the effects of delay in payment of these benefits than is stipulated in Article 703 (1964).

**Key words:** lease contract, arable property, rent-free use of arable land, termination of the contract, arable tax

## INTRODUCTION

The issue of rent-free contracts for arable land in exchange for settling tax, based on public law related to ownership, has been the subject of discussions in Polish literature and the Supreme Court judicature for a long time. Judicial practice abounds in numerous disputes arising from the performance of such a contract, and in particular the possibility of termination due to failure to transfer the equivalent of tax set by public law resting on the estate owner to the property owner or – under his authorization and on his behalf – to the tax authority. Therefore, I attempt to take a closer look at the institution of the rent-free use of arable land and deriving benefits from the property, using judicial doctrine and practice.

It is worth noting that this type of contract does not specify the lease rent, which means that the legal relationship that arose between the parties based on such a contract is called "rent-free use of arable land" (Lichorowicz 2004, Suchoń 2019). Furthermore, this contract is also commonly referred to as a rent-free lease. However, it must be noticed that the last term, although legible, is not correct. As rightly empha-

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sized in the literature, the agreement on rent-free use regulated in Article 708 of the Civil Code (1964) is not a lease, because it does not meet the basic *essentiale negotii* of a lease which is the determination of rent, but only applies the provisions on lease to it accordingly (Szachułowicz 2003). The doctrine also proposed to define this contract as "rent-free taking advantage of property" (Szachułowicz 2003). I think, however, that the trend in literature in which the term "rent-free use" is used in reference to the contract discussed in Article 708 of the Civil Code (1964) seems more convincing. It is widely accepted that a contract of rent-free use can be concluded in any form (Szachułowicz 2009). Although the contract referred to in Article 708 of the Civil Code (1964) is similar to a lease contract, the most important difference between these contracts is that those who use arable land are not obliged to pay rent, but they are obliged to bear taxes and other burdens related to the ownership of real estate. This is a situation in which a non-contractual user, like a leaseholder, has the right to use the property and derive benefits from it, but is not obliged to pay the rent. Consequently, the question arises that dodging tax settling by the user of the arable property may constitute the basis on the part of the person who gave the arable property into use to terminate the contract. The explanation of this interesting legal thread fundamentally determines the resolution of the discussed issue arising in the context of this institution.

## MATERIALS AND METHODS

When developing the issue, I used the dogmatic method to assess the case law of the Supreme Court and civil law doctrine in the analyzed area. First of all, in the presented study I would like to draw attention to a more detailed problem related to the proper application of the provisions on lease to the contract of rent-free use of arable land. As already indicated, it is a bilaterally binding agreement and shows similarity to the lease contract. The special nature of the legal construction of the contract of the rent-free use of arable land adopted by the Civil Code means that Article 708 of the Civil Code (1964) does not regulate in detail the rights and obligations of the parties to the contract and refers in these matters to the lease provisions.

Moving on to the short remarks regarding the regulations of rent-free use, it should be pointed out, right at the beginning, that the duty of a person taking a property in rent-free use is to bear taxes and other burdens related to the ownership or possession of land. In reference to arable real estate, it is primarily about paying property tax and arable tax. Taxes are usually paid on behalf of the person who gave access to the land to another person to use and derive benefits from it. As already mentioned, the reference to the lease provisions is not a precise method of regulating the rent-free use agreement. As a result, it is, therefore, not surprising that the legal regulation of the rent-free use of arable land raises many doubts in doctrine and case-law.

One more point deserves clarifying here. The provision of Article 708 of the Civil Code (1964) refers to the concept of "arable property", whereas lease regulations do not contain a definition of this term. Hence, I believe that it is appropriate to refer to Article 461 of the Civil Code (1964), according to which arable real estate (arable land) is real estate that is or can be used for agricultural production activities in the field of plant and animal production, not excluding horticultural, fruit and fish production. Therefore, the purpose criterion does not imply the need to actually conduct business activity on the property for the purpose indicated above, the mere possibility of such use of the property is sufficient. For these reasons, it concerns all agricultural properties, including those intended for non-agricultural purposes in the land use planning. The content of the land register and land use planning may be helpful to determine the purpose of the property as arable and, as a consequence, its qualification in the light of Article 461 of the Civil Code (1964). However, they are not decisive for the qualification of real estate as arable real estate.

Since Article 708 of the Civil Code (1964) requires that the relevant provisions on lease are to be applied to the rent-free use contract, there raises the fundamental question whether the contract referred


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to in Article 708 of the Civil Code (1964) is covered by Article 703 of the Civil Code (1964), which sets out the consequences of not complying with the obligation to pay the rent. It is a practical issue whether the person taking arable property for rent-free use paying taxes related to arable property in arrears may constitute ground, on the basis of an analogy, as in the lease contract, to terminate the contract without preserving the notice period. In the case law of common courts and the Supreme Court, there has been a tendency to recognize that Article 703 of the Civil Code (1964) also applies to the contract referred to in Article 708 of the Civil Code (1964). Therefore, in the event of failure to transfer to the person who gave the land for use or – by his authorization and on his behalf – to the tax authority the tax equivalent may constitute a basis for termination of the contract of rent-free use of arable land. I believe that one should opt for the existence of such entitlement for a person who recedes arable land for rent-free use. Comparing this view to the lease contract, where we are dealing with arrears in the payment of lease rent, dodging in settling taxes by the leaseholder, in identical manner, affects the interest of the person who gave the land for use. In my opinion, one cannot demand from this person, that they will tolerate failure in settling this obligation by the person taking arable property in rent-free use. Admittedly, there may be a court claim for overdue tax benefits, which the user should meet voluntarily and within the agreed time limit, but there are no grounds to apply in reference to such person the restriction in the form of termination of the contract. The presented study is devoted to assessing the legitimacy of such a position according to law as it exists.

## DISCUSSION AND CONCLUSIONS

Lease contract in the Polish legal system has been regulated in Articles 693–709 of the Civil Code. In accordance with Article 693 § 1 of the Civil Code (1964) through the lease contract, the lessor undertakes to give the lessee the benefit to use the property and receive benefits from it for a definite or indefinite period of time, and the lessee undertakes to pay the agreed rent to the lessor. According to this definition, the lease is a consensual, bilateral and payable contract. The payment of the lease is an important structural property of this obligatory relationship, distinguishing it from lending but also from use, which may be of a charge-free nature. Determining the rent is *essentiale negotii* of the lease contract and at the same time has legal effect in the form of payment of the contract. Therefore, the parties must specify the rent that the lessee is to provide to the lessor.

Article 693 § 2 of the Civil Code (1964) suggests that rent may be settled in money or other benefits, including a fraction of benefits. Studies indicate that the rent can also take the form of services for the lessor. The amount of rent may be determined by the parties freely in a manner that best pursues their interests. It is important that they see it as a benefit that brings them specific financial benefits.

As it results directly from the content of Article 1 of the Arable Tax Act of July 15, 1984 (1984), land classified in the land and building register as arable land is subject to arable tax, with the exception of land used for non-agricultural economic activity. For this reason, the taxpayers of the arable tax are entities specified in Article 3 of the Arable Tax Act (1984). It follows from this provision that the tax liability provided for by this Act is, as a rule, binding on the owner or sole holder of arable land, its perpetual usufructuary or dependent holder of land owned by the State Treasury or local government unit. Therefore, the lessee is a taxpayer of the arable tax in the situation regulated Article 3 Clause 3 of the Arable Tax Act (1984), that is when the farm land is rented in whole or in part on the basis of an agreement concluded in accordance with the provisions on farmers' social insurance or provisions regarding obtaining structural pensions.

It should be emphasized that the parties to the lease contract can freely regulate the legal relationship between them, but of course they cannot contractually decide that the tax obligation imposed by law on one of them will be transferred to the other. This obligation can be considered as fulfilled only if the money

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provision constituting its content is fulfilled by the person who the act makes responsible for. It is worth noting that for the competent public administration body, the entity from which it accepts tax benefits, a party in tax proceedings is a person to whom the Act imposes tax obligation, and not a person who has declared in a civil law agreement concluded with a taxpayer, that they will pay tax. The current practice of using the lease contract indicates that it is quite common for the parties to agree in the contracts that the lessee will also settle tax obligations, and then these obligations, depending on the content of the contract, may be performed either by refunding tax obligation money to the lessor, who settles public-law receivables themselves, or the lessee is obliged to pay public-law receivables directly, without the mediation of the land owner.

The latter type of contractual provision in relation to taxes imposed by law on landowners can only mean a commitment to perform the service on behalf of the owner. Such contractual arrangements of the parties settling tax obligations were noted in the case law of common courts and the Supreme Court. For instance, as the most characteristic, approving these pragmatic arrangements of the parties to the tax settlement agreement, one can cite the Supreme Court's view expressed in the judgments of 2010. Generally speaking, it can be stated that paying to the lessor the equivalent of its tax obligations by the leaseholder, either directly to the lessor or on his behalf – for the benefit of the taxpayer, is a measurable economic advantage.

Back to the mainstream considerations, it should be noted that in the case law of the Supreme Court, the view that contracts of rent-free use of arable land are often included in the category of unnamed contracts should be considered shaped. Undoubtedly, these contracts' design is closer to the lease than any other contract. Putting things for free use with the right to derive benefits from them undoubtedly does not have the features of a lease contract, but obtaining by the person giving access to use of the property the equivalent of public law obligations – regardless of whether it is paid to them directly or on their behalf on the account of a public law entity authorized to collect the obligation – is economically some form of payment for giving things into use. For this reason, the name "charge-free rent", commonly used to describe a contract regulated in Article 708 of the Civil Code (1964) is not precise. It should not be forgotten that failure to comply with this obligation gives the lessor the same negative consequences as those being a result of failure to pay the rent. To sum up, it should be considered that the failure in fulfilling the obligation to pay taxes when performing the contract of rent-free use of arable land (Article 708 of the Civil Code, 1964) has the same negative consequences as the non-fulfillment of the payment of rent in the lease contract (Article 693 § 2 of the Civil Code 1964). The position presented was confirmed in the decisions of the Supreme Court in 2010, in which it stated that Article 703 of the Civil Code (1964) applies accordingly to contracts concluded on the basis of Article 708 of the Civil Code (1964).

There is one more doubt related to the possibility of including in the contract of rent-free use of arable land regulations regarding the termination of the contract in a different manner than it results from the content of Article 703 of the Civil Code (1964), i.e. without prior statutory obligation to give notice period and give an additional three-month period to pay the overdue tax charges. It follows from the content of this provision that if the lessee is in default of payment of rent for at least two full payment periods, and when the rent is paid annually, if delay in payment of more than three months is allowed, the lessor may terminate the lease without meeting the notice period. However, the lessor should warn the lessee by giving them an additional three-month period to pay the overdue rent. Although the provision cites only delay in payment of the rent, it should be remembered that the failure to perform the obligation to pay taxes when performing the rent-free land use contract has the same negative consequences as the failure in settling rent in the lease contract. These benefits have the same purpose. First of all, one should answer the question whether the regulation of termination of the


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contract contained in Article 703 of the Civil Code (1964) has the character of an absolutely mandatory legal norm, or the provision of Article 703 of the Civil Code (1964) is relatively binding. Adoption of the first position would mean that the termination of the contract without notice period is effective only after prior notification of this intention and granting an additional three-month deadline to pay the arrears. On the other hand, accepting a second position, referring to the nature of a relatively binding legal norm, would mean that the parties to the contract may differently regulate the effects of delay in payment, and hence the provision of Article 703 of the Civil Code (1964) would apply only if the parties to the contract did not include any other provisions in this regard. When answering this question, it should be pointed out that only in the older case law of the Supreme Court it was pointed out that this provision is mandatory (sentences of the Supreme Court of 2010). At present, there prevails a different view, accepting the position that this is a supplementary provision that applies only in the absence of a different regulation in the contract, and the parties may even exclude the lessor's obligation to grant the lessee an additional period to pay the rent (judgment of 2012, resolution of 2012, resolution of 2015). Therefore, contractual modification of the conditions for delay, notice periods of termination of the lease contract and setting a longer, but shorter than 3-month period of additional payment of overdue fees is acceptable. Position on relatively applicable Article 703 of the Civil Code (1964) is based on the correct assumption that the provisions of the Civil Code in the section devoted to obligations are usually supplementary, so priority should always be given to the will of the parties that shape the contract, unless the provision clearly excludes this possibility. Article 3531 of the Civil Code (1964), constituting the freedom of contract, opens the third book of the Civil Code regarding obligations, which undoubtedly can be seen as crucial in the interpretation of further provisions. Since Article 703 of the Civil Code (1964) should apply to the contracts on the rent-free use of arable land, in such a situation there are grounds to terminate the contract also without observing the statutory notice periods.

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