

## IS THE OBLIGATION TO MONITOR LAND USE CHANGE IN POLAND COMPLIED WITH?

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### ABSTRACT

The paper focuses on issues related to the monitoring of changes in land use, which is a statutory obligation of voivodeship marshals in Poland. The analysis involved responses to author's inquiries received from 16 marshal offices. The paper analysed whether and how marshals fulfil this obligation. At the second stage, the official replies were juxtaposed with relevant information from marshal offices' websites. The results suggest that not all marshals fulfil the obligation to monitor land use change. In most cases, the actions taken currently involve comparison of the current land use structure to the one of the previous year. This approach does not lead to proper conclusions from analyses and hinders taking appropriate decisions.

**Keywords:** land use, monitoring, voivodeship surveyor, land change

### INTRODUCTION

Environment is being constantly transformed by human activity on an unprecedented scale (Kumar et al. 2014). Land use changes over time, and current processes of transformation are accelerating due to anthropogenic pressures, like industrialisation and urbanisation (Samal and Gedam 2015, van der Molen 2017). Among the issues concerning global environment it can be noted that the changes in land use are analysed in terms of natural and anthropogenic processes (Kumar et al. 2014, Kocur-Bera 2016). Land use was considered a local environmental problem, but now it becomes a force of global importance (Samal and Gedam 2015).

In recent years, research on land use is one of the most thriving fields in the environmental science international community (Kumar et al. 2014, Akinyemi et al. 2017, Karimi et al. 2017). Such studies were carried out in Poland (Poławski 2009, Senetra et al.

2014), Europe (van Vliet et al. 2015, Kuemmerle et al. 2016), as well as on all other continents (see e.g. Deng and Li 2016, Chen and Dirmeyer 2017, Kleemann et al. 2017).

Land use is one of the ways human species utilise terrain (Karimi et al. 2017) and interact with climate change on the Earth's surface (Kim 2016), and reshape the landscape (Yang et al. 2017). On the other hand, Rajcaniova's et al. research (2014) suggests that rising energy prices and the policies supporting bioenergy contribute to changes in land use by transforming agricultural lands aimed at food production into bioenergy plants cultivation.

It should be pointed out that in Poland after the political transformation rational land management and sustainable development stand as important issue (Gawronski et al. 2013). Constant changes that affect areas of land use call for their monitoring. Spatio-temporal analysis of transformations in methods of land use is essential for understanding and assessing

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their consequences (Samal and Gedam 2015). Moreover, such analysis can provide basic information for making the right decisions (Deng et al. 2009). Regular monitoring and assessment of land use change is in turn crucial to understanding the impact of anthropogenic and natural changes on a local, regional or global scale (Kim 2016). According to Krasowicz, et al. (2011) it is therefore necessary to systematically monitor the current state and directions of use changes and to indicate various threats to rational management of soil environment. Similar opinion is expressed by Woch and Woch (2014). Łowicki (2008) adds that the pace and directions of changes in land use are forcing the authorities responsible for spatial planning at the regional and local level to identify the causes and develop methods preventing adverse phenomena. Monitoring land use change has also relevance for various European programs (Łowicki 2008), such as CORINE Land Cover project which serves as an information system on the condition of the European environment.

In Poland, the Act of 17 May 1989 on geodetic and cartographic law indicates the voivodeship marshal as an authority responsible for monitoring land use change (Ustawa... 1989). It also should be noted that this obligatory task of the marshal was introduced into the Polish legal order only in January 2000 (Ustawa... 2000). The marshal performs his statutory tasks with the assistance of voivodeship's surveyor, which means that in fact it is the surveyor who fulfils this duty. It is illustrated in Figure 1.

The issue of how actually voivodeship marshals do monitor changes in land use has not been a sub-

ject of frequent scientific research in Poland, so far. Therefore, the aim of this article is to investigate: (1) whether the marshals perform their duty of monitoring the land use change and (2) ways of its possible implementation. The author's side objective was also to encourage some debate on the subject by the scientific community.

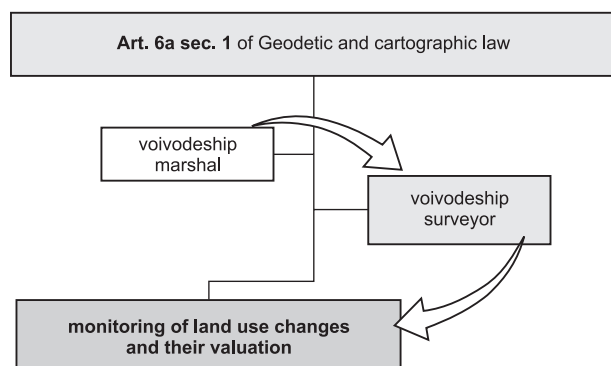
## MATERIALS AND METHODS

At the beginning, research objects were selected assuming that the analysis will be carried out in all 16 voivodeships in Poland. It examined the execution of the marshals' obligation to monitor changes in the ways land is used. To this end, in September 2017, all marshal's offices in the country were contacted with an official letter requesting public information and answers to questions earlier prepared by the author. In particular, these concerned:

- 1) Whether and how the marshal of the voivodeship performs his duty under Art. 7c sec. 1 pt 5 of the Act of May 17, 1989 on Geodetic and cartographic law (Ustawa... 1989) pertaining to monitoring changes in land use?
- 2) Are there any studies or analyses in this field? If so, how and how often are they carried out?
- 3) Are the results regarding monitoring changes in land use publicly available (e.g. on the office's website), and whether are they accessible for citizens? If so, please do provide the link to the website.

After receiving feedback letters from all 16 offices the analysis of obtained responses could proceed. The second stage of the research was aimed at verifying information obtained from the websites of the marshals' offices, which relied on author's earlier research (Noszczyk 2018). Received responses made it possible to verify what the officials have admitted with what has been available on the websites.

Also, the paper pertains to the acts on grounds of which the legal basis and authority responsible for monitoring the changes in land use were indicated. All data was obtained from 16 marshal offices received letters containing responses to questions. For legal acts the Online System of Legal Acts (ISAP 2017).



**Fig. 1.** Diagram of land use monitoring by local government administration in Poland

## RESULTS AND DISCUSSION

One of the sources of information on land use in Poland is cadastral data (from land and buildings registry). The main advantage of this data is continuity and nationwide character (Łowicki 2008). Besides the advantages, the literature on the subject also points to their flaws (Mika 2016), like e.g. the lack of regu-

lar updates (Wolny 2005, Zwirowicz 2010). Łowicki reckons (2008) that by increasing the availability of data and improving the GIS techniques for their processing, the cadastre allows to examine in detail the changes in land use in different parts of Poland. Other sources of data on land usage and coverage are presented in Table 1.

**Table 1.** Sources and scope of data on land use and land cover in Poland

Data source	Description of data	Level of detail
Numeric non-spatial data		
Data summaries of the EGiB	The content resulting from the lists of lands, includes general area of lands according to register groups and subgroups, with a division into land use. Data is prepared annually	municipality
Central Statistical Office (GUS)	The Central Statistical Office publishes many studies on land use. They are available i.a. in Local Data Bank (BDL), statistical yearbooks and thematic studies. Data on land is shown according to forms of its use	voivodeship or county (depends on a study)
Spatial data		
Corine Land Cover (CLC)	CLC is supposed to provide with information on current land coverage. Data is presented according to specific classes of coverage depending on detail level. Material is obtained from satellite photos (lately every 6 years – CLC 2000, CLC 2006, CLC 2012)	European project, unit responsible in Poland is the Chief Inspectorate for Environmental Protection (GIOŚ)
Urban Atlas	Studies in a scale of 1:10 000, including objects with an area of 0.25 ha (for urban classes) or 1 ha (for other classes). Data are unified, what allows their comparison within particular cities and comparing of different European cities. Not updated annually	Only for cities with more than 100 thou. citizens and their suburbs
Database of Topographic Objects (BDOT10k)	Spatial database, details correspond to topographic maps with scale 1:10 000. Includes content registered in thematic layers, i.a. land cover and land use complexes. Updated immediately after obtaining new data	Run by WODGiK for voivodeships

Source: own study.

Table 1 demonstrates that there are a few sources of data on land use and cover in Poland. Some of them having spatial character could be an alternative to the EGiB data with records that have no spatial reference. This regards to mainly the BDOT10k, which is a state database run by WODGiK and could be used by voivodeship marshals for analyses of monitoring of land use change.

The analysis of the responses to official letters allow to claim that all marshal offices in Poland fulfilled their duty pending on the act on access to public information and provided answers to the posed questions. Thereby it was possible to have a full overview of this issue in the entire country. The results of the analysis of received responses are presented in Table 2.

**Table 2.** Results of responses from marshal offices in Poland (October 2017)

Name of the voivodeship	Does the marshal fulfill his obligation	Type of analysis	Are the results available to the public
Dolnośląskie	YES	Analysis compendium of changes in the agrarian structure and monitoring changes in land use in rural areas in 1999–2007–2013	NO, available at the office (2014–2016)
Kujawsko-pomorskie	YES	Analysis of property and land use in year 20....	YES, at the website (2015 and 2016)
Lubelskie	YES	Structure of property and land use (report)	NO, available at a request
Lubuskie	YES	Analysis of monitoring land use change for municipalities (depending on needs)	NO, available at a request
Łódzkie	YES	Agricultural plans, depending on monitoring land use change for municipalities (depending on needs)	YES, at the website (2002 and 2015)
Małopolskie	YES	Analysis of property and land use	NO, available at a request
Mazowieckie	YES	Structure of property and land use (report)	YES, at the website of the Department of Geodesy (2005–2016)
Opolskie	YES	Creating and updating a thematic database for planning, monitoring and analysis of changes in agricultural structure and land use	YES, cartographic studies available at the website (in 2007, 2009, and 2011–2016)
Podkarpackie	YES	Analysis of changes in agricultural structure and land use in 2006–2014	NO, available at the office (2011, 2012, 2015)
Podlaskie	YES	Analysis of changes in agricultural structure and land use for municipalities (depending on needs)	NO, attached to geodetic resources and available as to Pgik
Pomorskie	YES	Analysis of changes in agricultural structure and programming and coordinating agricultural works, monitoring of land use change and their value	NO, attached to geodetic resources and available as to Pgik
Śląskie	YES	Analysis of property and land use in 20....	YES, at the website (2002–2016)
Świętokrzyskie	NO*	No demand. Only preparation of summaries of EGIB data	–
Warmińsko-mazurskie	YES	Analysis of agricultural structure and land use on 01.01.20...	Yes, on the website of Atlas of Warmia and Masuria (since 2013)
Wielkopolskie	YES	Analysis of property and land use	Yes, at the website of voivodeship's surveyor (from 2016)
Zachodniopomorskie	NO	Only preparation of summaries of EGIB data	–

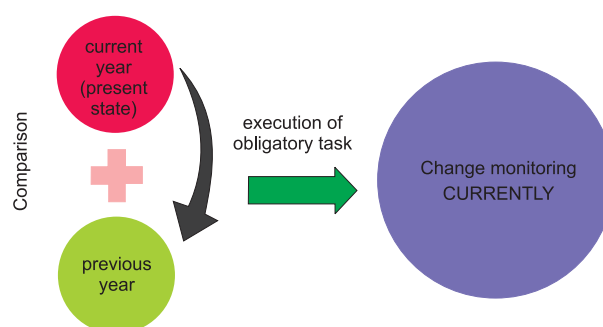
\* No unambiguous answer

Source: own study

It is worth noting that the answers given to the first question indicate that the vast majority of marshals declare the execution of their statutory obligation under Art. 7c sec. 1 pt 5 on monitoring of changes in land use. Only 2 marshals (Świętokrzyskie and Zachodniopomorskie Voivodeship) gave negative or no response on this issue (Table 2), at the same time stressing that they make annual statements with data covered by EGiB, claiming that it is a part of the monitoring of changes in land use. However, according to the author, this is a separate task – which is confirmed by Pgik. The preparation of voivodeship summaries of data included in land and buildings registry is another task of the marshal, stated in the Art. 25 sec. 2 Pgik (Ustawa... 1989). These summaries, depending on the administrative level, are prepared for municipalities and counties by starost, for voivodeships by the voivodeship marshal, and the national summary by the National General Surveyor. It should be pointed out that the starosts hand over summaries compiled on the county level to the marshals by 15 February of each year, and marshals after collecting data for a voivodeship forward them to the National General Surveyor by March 15 of each year (Rozporządzenie... 2001).

The EGiB data covered by county and voivodeship summaries serve as basis for marshals to fulfil their obligation to prepare i.a. analyses for monitoring changes in usage structure (Dawidowicz 2010, Analiza... 2016a). Actually, they do not use other data sources listed in Table 1. As far as the extent of analyses is concerned, the situation depends on the voivodeship. For example, in the Wielkopolskie and Kujawsko-pomorskie Voivodeships analyses are conducted at the regional level (the entire voivodeship) (Analiza... 2017, Analiza... 2016a). However, most data is analysed by marshals at the county level (Analiza... 2014, Analiza... 2015, Analiza... 2016b), but there are also analyses at the municipality level (Struktura... 2016). This is confirmed by the received letters as well as by data available on the websites of several offices (Noszczyk 2018).

Moreover, the majority of marshals, while executing their statutory duty, prepare a comparative analysis of the present land use in a given calendar year with the data from the previous year. Diagram of this is illustrated in Figure 2.



**Fig. 2.** Diagram of measures taken by voivodeship marshals as to land use monitoring

This is confirmed by both the received responses to the second question and the analyses available on the websites of some voivodeships (e.g. Śląskie, Warmińsko-mazurskie). Most of voivodeship marshals confirm that along with carrying out studies on monitoring land use change, they compare them to the previous year or a few of selected previous years. Sometimes the present land use is contrasted with land use, for example, of 3 or 5 years back (Analiza... 2016a, Analiza... 2017). Virtually no marshal office prepares regular analyses examining changes in the long-term (Noszczyk 2018). Only the Mazowieckie Voivodeship distinguishes itself in this matter, keeping records of changes in land use since 2002 (Struktura... 2016). The Wielkopolskie Voivodeship in its analyses compares the studied year 2017, for example, with 2010, 2013 and 2016 (Analiza... 2017). While, the Śląskie Voivodeship compares the studied year with other years irregularly selected (sometimes one year back (Analiza... 2013), sometimes seven (Analiza... 2016b), and even referring to year 2002 (Analiza... 2015). This is confirmed in the materials available on the websites. Some voivodeships (including Lubuskie, Łódzkie and Podlaskie) do not carry out annual analysis of changes in land use for the entire voivodeship, and only for selected municipalities or counties depending on needs. This is related to, for example, an implementation of certain investments (construction of roads and motorways), an assessment of municipalities in terms of merging needs or to areas, where there are industrial plants that cause changes in land use.

Furthermore, half of the inquired offices responded positively to the third question regarding publish-

ing the results from land use analyses. Some have indicated a link to the website where such studies can be found. The other half of the offices declared they do not publish materials (Table 2), but informing that they are available for view at the office (Dolnośląskie, Podkarpackie) and may be accessed at the request (Lubelskie, Lubuskie, Małopolskie Voivodeships), or are part of geodetic materials that can be made available in compliance with Pgik (Podlaskie and Pomorskie).

Information provided in writing by the marshals also allowed to verify the data obtained from the websites in research carried out by Noszczyk (2018). The vast majority of responses confirmed the online information. Interestingly, not in every case they matched. For example, the Dolnośląskie and Świętokrzyskie Voivodeships publish selected analyses or maps online, but in the official response did not supply such information. Also, the marshal of the Wielkopolskie Voivodeship claimed to publish analyses from 2016, though these were not found before (Noszczyk 2018). However, it should be said they are actually located on the website of the Geodesy Office of the Wielkopolskie Voivodeship. It was also verified that the Mazowieckie Voivodeship issues annual summaries since 2005. And the voivodeships, which declared they publish studies online in fact do so, and these can be found on their websites.

The obligation to monitor changes in the methods of land use is very important. Krasowicz et al. (2011) and Woch and Woch (2014) reckon that constant monitoring of these changes is necessary for rational management of space and soil environment in a given voivodeship. A correctly executed monitoring and analysis in this regard can serve the marshal, e.g. to diagnose directions and modifications in the agrarian structure, which took place over the studied years (Analiza... 2017). Results of such analyses can also support decision-making at the voivodeship level (Noszczyk et al. 2017), for example, regarding agricultural works or excluding land from agricultural production (Gawroński et al. 2013). Therefore, monitoring changes in land use in Poland is necessary and should not be treated as an arduous duty imposed by the legislator. In their research, Cegielska et al. (2017) add that a continuous monitoring of these changes is indispensable for planning measures to reduce the negative

effects of land use change (in particular human pressure) (Akinyemi et al. 2017). Krasowicz et al. (2011) consider this to be also a significant challenge, both for science and practice, and at the same time an important strategic direction.

## CONCLUSIONS AND RECOMMENDATIONS

The research allowed to formulate the following conclusions:

- 1) Not all marshals in Poland execute their duty to monitor changes in land use.
- 2) Currently taken actions in this respect consist mainly of an observation of a structure of land use and comparing it to previous year (or a few years back).
- 3) Such approach does not lead to an adequate conclusions or observations resulting from analyses, and thus obstructing rational decision-making or adopting appropriate countermeasures.
- 4) Only seven marshal offices make analyses of monitoring of land use accessible online.
- 5) Questions addressed to marshal offices allowed to obtain official responses and to verify previous studies of the paper's author.

The research also led to a few recommendations. It is advised to perform monitoring of land use change precisely and in more detail. This means first and foremost to prepare comprehensive analyses, i.e. recording each year and for a long period. The marshal should – while fulfilling his statutory duty – in the author's opinion, analyse use change year after year, reaching as far back as possible (depending on the available data and resources). Monitoring changes in land use in Poland is really essential and its proper application may serve as a practical diagnosis of directions and changes in the agrarian structure. The process of monitoring land use transformations may also support statistical modeling, presented in Noszczyk et al. (2017). However, it requires an expert knowledge and skills in the field of statistics – nevertheless, it could be outsourced to external entities or scientific units. An undoubted advantage of modeling is the possibility to recognise current trends and to indicate the pace of changes taking place. On this basis, it would be possible to take appropriate decisions and countermeasures in terms of spatial policy and land use.

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## REALIZACJA OBOWIĄZKU MONITOROWANIA ZMIAN UŻYTKOWANIA GRUNTÓW W POLSCE

### ABSTRAKT

W artykule podjęto zagadnienia dotyczące monitorowania zmian sposobu użytkowania gruntów, co jest ustawowym zadaniem marszałków województw w Polsce. Do analizy wykorzystano uzyskane z 16 urzędów marszałkowskich odpowiedzi na pytania przygotowane przez autora. W pracy przeanalizowano czy i w jaki sposób marszałkowie realizują swój obowiązek. W drugim etapie badań zweryfikowano oficjalne odpowiedzi z informacjami pozyskanymi w tym zakresie ze stron internetowych urzędów marszałkowskich. Wyniki pozwalają stwierdzić, iż nie wszyscy marszałkowie wykonują obowiązek monitorowania użytkowania gruntów. W większości przypadków obecnie podejmowane działania polegają na porównaniu aktualnej struktury użytkowania gruntów do roku poprzedniego. Podejście to nie prowadzi do prawidłowego wyciągania wniosków z przeprowadzanych analiz i utrudnia podejmowanie odpowiednich decyzji.

**Słowa kluczowe:** użytkowanie ziemi, monitoring, geodeta województwa, zmiana gruntów