

Issues regarding taking landslide areas into account in spatial planning in Poland

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SUMMARY

Poland is seen as a country, where the occurrence of natural hazards is really scarce. However, gradually, in the seasons of the increased atmospheric precipitation or during the spring thaw, the occurrence of landslide movements is noticeable in our country. Under the Polish law, the soil landslides are classified as natural calamities. Nevertheless, when their consequences threaten the life or health of many people, regard property of high value or threaten large areas of the natural environment, they are considered a natural disaster. In Poland the number of registered landslides is still growing. The current legal regulations require the keeping of records of the areas endangered by soil mass movements and of the areas on which such soils occur. They also indicate the manner and scope of monitoring landslides, both in the geological and surveying respect.

Spatial planning in Poland is carried out at national, regional and municipal levels. However, it is the municipality which decides to allocate specific land for investment purposes. Spatial planning includes study of conditions and directions of spatial management, which is developed in the area of a given municipality. It is a document setting out the direction of the municipality spatial development. In its content, the study should account for the areas of mass soil subsidence, such as the local development plan, which is developed on its basis. This plan is already an act of local law, and therefore it is binding for the inhabitants of the municipality. Unfortunately, with the current legal status in Poland, there is no obligation to develop local plans. If the municipality has not adopted a local plan, allocating land for investment purposes is carried out through an administrative decision, called the decision on zoning and land use. In this case, before issuing a decision, the legislature accounts for the need to consult a competent geological administration authority - in respect of the land which is at risk due to landslides of soil masses.

Therefore, the primary issue is the cooperation among public administration authorities as well as the correct flow of information about the occurrence of active landslides or areas at risk of the occurrence of mass movements.

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1. INTRODUCTION

As a result of the hitherto research on the Polish territory, 20 000 landslides were identified, 90% of which are located in the Carpathian Mountains. In addition to geological aspects, the development of landslides is affected by atmospheric precipitation of high intensity, infiltration of water from the precipitation and occurring as the result of melting of the accumulated snow, the erosion of the slopes of valleys and gorges, as well as human activity associated primarily with the conducted surface and underground mining.

Mass movements, regardless of the cause of their occurrence, often endanger the safety of people and buildings as well as they cause great damage to property. In the years 1997, 2000 and 2001 intensification of mass movements and related damage were observed, which became the basis for a range of actions to minimize future losses. Changes in the legislation have been made, and the manner of mass movement records was unified for the entire country [4], [5].

Commissioned by the Minister of Environment, the national project called The Anti-Landslide Protection System (SOPO) was launched. This project is to assist local authorities in fulfilling their obligations relating to the issue of mass movements resulting from the relevant laws and regulations. Its primary purpose is to identify, document and indicate on the map with a scale of 1:10 000 all of the landslides and the areas potentially at risk of mass movements in Poland. In addition, on the 100 selected landslides, there is or will be, in subsequent years of the project, a deep or surface monitoring installed. The results of the project are to help in landslide risk management, and therefore to significantly reduce the damage and devastation caused by landslides through desisting from road construction and housing within the area of active and periodically active landslides.

2. MANNER AND SCOPE OF LANDSLIDE MONITORING IN GEOLOGY AND ENGINEERING

During the implementation of the SOPO project, the National Geological Institute has developed guidelines, whose primary aim is to provide uniform rules to develop maps of landslides and areas at risk of mass movements, as well as landslide monitoring.

Information on mass movements in Poland, collected in accordance with the guidelines, are to be in one, public SOPO database. This information is intended to assist local government units and the government in their tasks of environmental protection, protection of human life and property and the recording and counteracting negative phenomena of nature. The necessity to prevent threats resulting from mass movements derives from the following acts:

- a) The Act of 27th April 2001 Environmental Protection Law (Official Journal of 2001, No.62, item 627, as amended) [7],
- b) The Act of 27th March 2003 on Spatial Planning and Development (Official Journal of

2003, No.80, item 717) [9],

c) The Act of 3rd February 1995 on the protection of agricultural and forest land (consolidated text of Official Journal of 2004, No.121, item 1266) [6],

d) The regulation of the Minister of Environment of 20th June 2007 on information on mass movements of the earth (Official Journal of 2007, No.121, item 840) [3].

The National Geological Institute, within the scope of the state geological service in the field of geological mapping, is responsible for executing a serial map of landslides and risk areas. This is the mapping-geological documentation of landslides and areas at risk of mass movements, which constitute or may constitute a threat to human activity and existence up to 50 years. This documentation is being developed within the administrative boundaries of the country. For the area of the Carpathian Mountains and the region located directly north of the Carpathians, the documentation is prepared within the communes, and for the rest of Poland - within the administrative boundaries of counties.

The map of landslides and risk areas constitutes a part of the SOPO database resources, which is placed in the structure of the Central Geological Database, which functions in the Central Geological Archive of the Polish Geological Institute. The documentation is only available digitally, and SOPO database users will be able to generate output for the selected area and thematic scope.

The map of landslides and risk areas as well as SOPO database resources allow to evaluate the threat and are designed to help make decisions regarding management and governance in the area where there is a risk of mass movements. It refers to, in particular:

- a) predicting the threats associated with mass movements through their monitoring,
- b) rational spatial planning taking into account the risks arising from the possibility of the emergence and development of mass movements,
- c) raising public awareness of the negative effects associated with mass movements.

An integral part of the SOPO project is the monitoring of selected landslides based on the surface and subsurface methods. The scope and frequency of the conducted observations shall be determined individually for each landslide at all stages. The monitoring system is also carried out on landslides, which were covered by the securing and stabilization works in order to control their effectiveness. Monitoring requires carrying out more detailed field works than it is apparent from the development of the map of landslides and risk areas. This monitoring shall include:

- execution of a situation and elevation map,
- detailed geological image,
- research drilling,
- sampling,
- installation of instruments to observe the movement of landslides,
- installation of hydro-geological monitoring system,
- execution of additional tests (e.g. geophysical).

3. RECORDS OF AREAS AT RISK OF MASS MOVEMENTS

Local government administrative units are obliged to keep a record of areas at risk of mass movements. For this purpose, at a given administrative unit, as a part of the field works, a map of landslides and areas at risk of mass movements is prepared [2].

The map of landslides (Fig. 1) and areas at risk must be prepared for the relevant administrative units on topographic base-map with a scale of 1:10 000, sheet cutting.

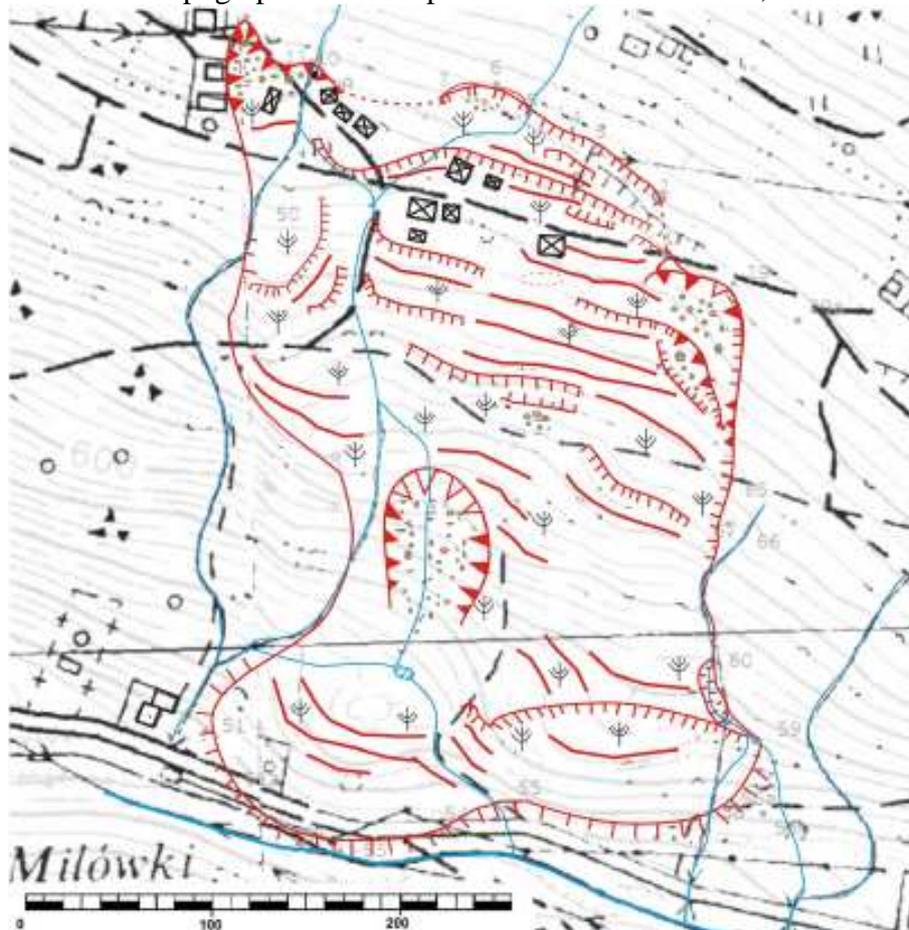


Figure 1. Map of landslide in Milówka
Source: own work on the basis [2]

The numbering of individual facilities is conducted separately for landslides and areas at risk of mass movements within a given administrative unit. Numbering should be carried out continuously in strips with a width of one mesh of a kilometer net, from west to east, starting from the northwest corner of the map.

On the map of landslides and risk areas, only those landslides are marked in the scale, whose surface is greater than 500 m², and the length and width are greater than 10 meters. Smaller landslides, if they have a negative impact on the infrastructure, are recorded on the map as points.

Explanatory text, which complements the map of landslides and areas at risk of mass movements, consists of seven chapters with a well-defined content of which, from the standpoint of spatial planning, the conclusions are particularly important, within which the proposals of the method of developing landslides and risk areas are presented.

The main task is to set the boundaries of landslides and to determine their level of activity. It is documented in the form of papers, which include:

- landslides record card,
- record card of the area at the risk of mass movements.

Landslide record card is the description of a landslide in a tabular form. It includes: location, morphometric, geomorphological, geological and hydrographic characteristics, history of a particular landslide development, land development elements and a list of hazards and landslide damage.

When filling out the record card for a given landslide, a record number is adopted. It consists of codes of administrative units in the National Official Register of Territorial Division and the number of the landslide. The first two digits indicate the code of the province, the next two digits indicate the county code, three consecutive digits indicate the code of the commune. The last six digits is a unique identification number of the landslide, which is attributed during the introduction of a record card to the SOPO database.

Record card of an area at risk of mass movements is a description of the area at risk of mass movements in a tabular form, prepared for the possibility of the occurrence of mass movements.

In the case of mass movements, risk area should be subject to a periodic observation. Periodic observations should be executed at least two times a year: in spring after the disappearance of the snow cover and in autumn after the period of precipitation, and in other periods - after a very intense rainfall.

The completed cards are an essential document collected by the staroste in the register of areas at risk of mass movements and of the areas on which these movements occur.

The number of the landslide marked on the map and placed in a record card of the landslide must be identical, similarly to the number of an area at risk of mass movements on the map and in the card must be identical.

The set of resulting materials, namely: an original map of landslides and areas at risk of mass movements with a scale of 1:10 000 for a given administrative unit, completed record cards, explanatory text and field notes and maps shall be forwarded to the regional coordinator to substantial verification.

The coordinator shall acknowledge the receipt of the documentation by writing an opinion and completing the evaluation sheet of the landslide map (on a fixed form). Only after these steps, data can be enter into the SOPO system. The author also submits a set of materials to the Central Geological Archives.

The acceptance of the monitoring documentation is carried out through passing it for acceptance to the team for landslide monitoring, set up by the Polish Geological Institute. After obtaining the approval in the form of a filled out monitoring documentation evaluation card (on a fixed form), the author presents the documentation to the competent county staroste.

The data collected during the development of the map of landslides and risk areas as well as monitoring, constitute resources of the SOPO database. The application operating in the SOPO database enables to introduce and edit data, realize inquiries and to generate reports and maps. It aims at supporting governors in record keeping, according to the regulation of the Minister of Environment of 20th June 2007 on information on mass movements of the earth [3].

In case of any new landslide or activation of the existing one, the information about this fact may be provided by any person to the local administration unit (municipal office or the county

office). Having accepted the notification, the staroste, as the person responsible for keeping a record of areas at risk of mass movements, should inform the appropriate Geological Survey of the occurrence of such a fact.

Geological Survey accepts the notification for verification in the field and updates the content of the map and landslides and risk areas, and develops record cards. After the approval of the updated materials by the Cartographic Commission, the procedure follows of introducing new data into the SOPO database.

4. AREAS AT RISK OF MASS MOVEMENTS IN SPATIAL PLANNING

4.1 Spatial planning system in Poland

Spatial planning in Poland is carried out at national, regional and local levels (Fig. 2). At the national level, government administrative bodies are responsible for spatial planning, at the other levels - local government bodies.

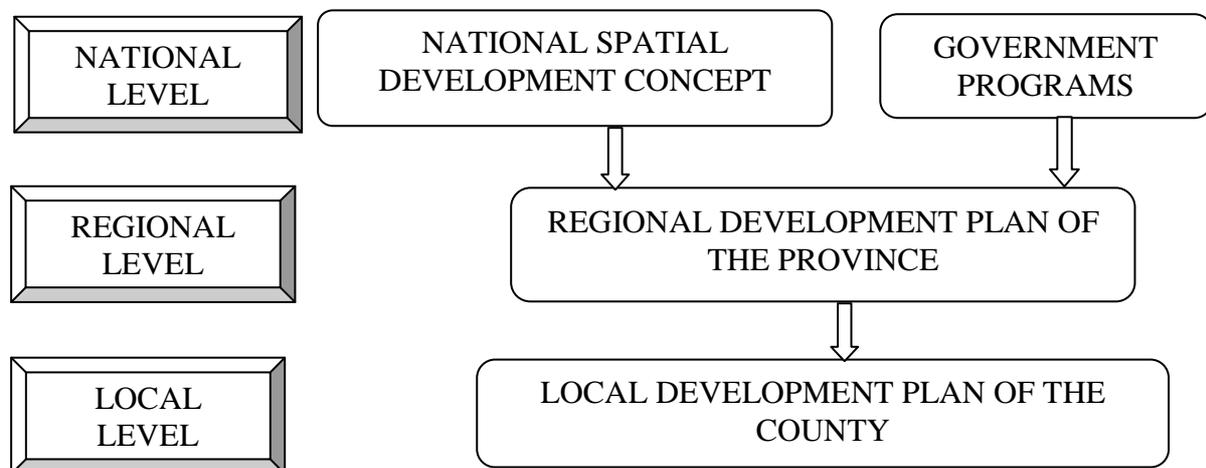


Figure 2. The system of spatial planning in Poland.

Source: own work.

At the national level, spatial planning is carried out through:

- drawing up national spatial development concept, which takes into account the principles of sustainable development of the country based on the environmental, cultural, social and economic conditions,

- development of government programs relating to the areas and issues within the scope of strategic planning and forecasting of economic and social development.

The adopted by the Polish government in December 2012, "National Spatial Development Concept 2030" is currently the most important strategic document for the national spatial development of the country. This concept was developed in accordance with the provisions of the Act on spatial planning and development of 2003 [9]. This document presents a vision of Polish spatial planning for the next twenty years, sets goals and development policies of the country for the attainment and identifies the principles and mechanisms for coordination and implementation of public development policies having a significant territorial impact. The new approach to spatial development of the country proposed in the concept is to change the

approach to the role of spatial policy of the country in achieving the outlined development visions. It proposes a breach of the existing double-track spatial and socio-economic planning at national, provincial and local levels and in relation to functional areas. In return, it introduces the correlation of spatial policy objectives with the objectives of regional policy, it links strategic planning with the programming of the activities in the scope of the development and operational programs co-financed by EU funds. In accordance with statutory requirements, as specified in the concept, the findings and recommendations for the preparation of development plans of the provinces were identified.

Government programs are prepared by the relevant ministers and central government administrative bodies to implement a public investment of national significance. The minister responsible for spatial economy keeps a record of these programs and ensures their introduction to spatial development plans of the provinces.

Spatial planning at the level of provinces is executed through the actions of local authorities of the province. They in fact draw up the spatial development plan of the province, conduct analyses and studies as well as they prepare concepts and programs relating to the areas and spatial development issues. The spatial development plan of the province should take into consideration the determinations of the national spatial development concept and government programs. This plan is periodically evaluated, at least once every four years during the term of local government authorities, for its topicality and the possible need to amend it, and the evaluation of the implementation of a public investment of more than local importance, taken into account in this plan.

Spatial planning at the local level is carried out at county and commune levels. The tasks of the county authorities are limited to carrying out analyses and studies of spatial planning relating to the area of the county, and the issues of its development. However, in the commune, spatial planning is the most important and most detailed. It is conducted in two stages. In the first stage, in order to determine the spatial policy of the commune, including local zoning rules, a study of conditions and directions of spatial development is drawn up. This document incorporates the principles set out in the national spatial development concept and spatial development plan for the province, and constitutes the basis for the development of appropriate planning document, which is an act of the local law and binding for the residents of a given commune - local spatial development plan. Local spatial development plan is being developed according to a detailed procedure set out in the Act on spatial planning and development. Its content determines specifically the designation of land for various investments - including a public investment, and the manner of development in these areas is defined.

Developing a local plan in Poland is a tedious process due to the very extensive procedure, with the participation of numerous institutions and consultative bodies. Additionally, in the current law, there is no obligation to develop local spatial plans in individual communes. The effect of this state are huge shortages of plans in Poland (Fig. 3).

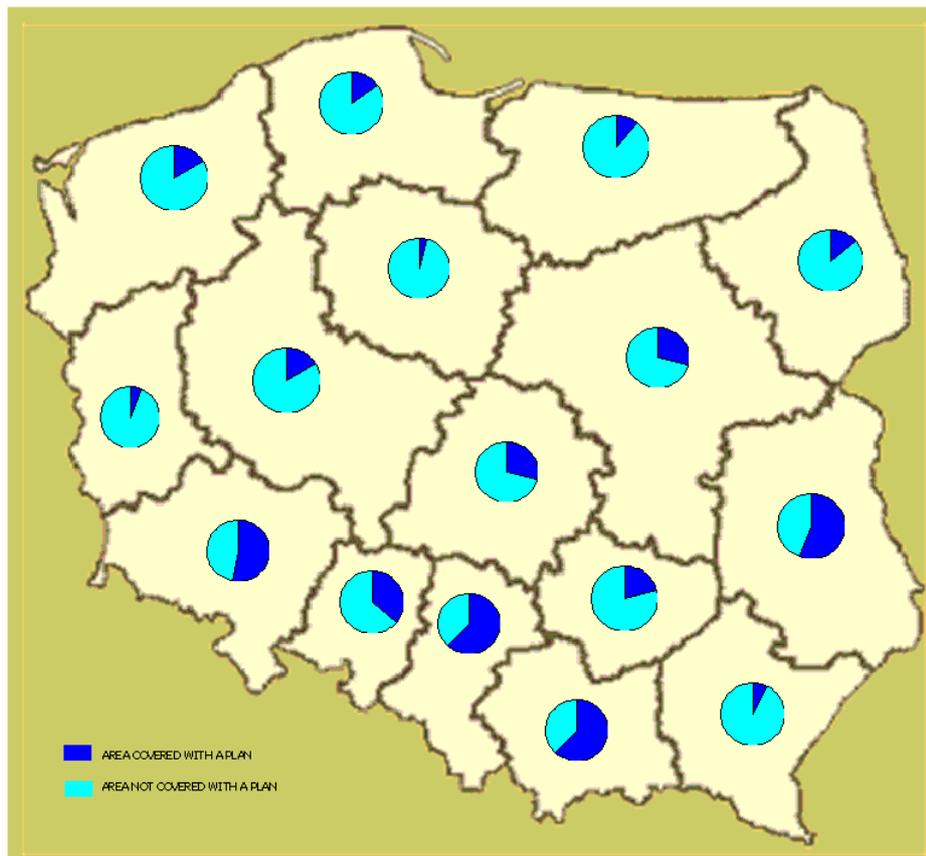


Figure 3. The percentage of the province areas covered with local spatial development plans.
Source: (own work)

If the commune has not adopted a local plan, designating land for investment purposes shall be conducted by issuing an administrative decision, called planning permission. This decision is issued based on the analysis of the function and development characteristics of the area located in the immediate vicinity of the area covered by the application. Although the Act on spatial planning and development indicates several institutions with which such a decision should be agreed, but instead it skips the obligation to check whether the proposed investment is consistent with the study of conditions and directions of spatial development [1]. The consequence is the emergence of numerous investments in Poland which are contrary to the study. From the point of view of the proper spatial planning, such a situation should not take place.

4.2 Taking into account landslide areas in planning documents

As a part of the planning documents described above, information about the landslide areas are also included. Due to the diversity and detail, the data is recorded variously.

The current national spatial development concept provides that, as prevention and adaptation actions, a full inventory of landslide areas and other areas at risk of mass movements of the earth will be made. The inventory will also include the transformations and ground surface deformations associated with mining and extraction of minerals, affecting the degree of

protection against natural hazards. Landslide areas are to be made absolutely excluded from the development.

The current provisions of the Act on spatial planning and development [9] do not indicate the obligation to take into account landslide areas in spatial planning of the provinces, but since the hierarchy of planning documents is in force in Poland, and the concept for the whole country mentions them, they should be included.

Spatial planning at the local level takes into account both in the study and in the local plan, the areas of subsidence of soil masses. The commune is obliged to consult the records of the study, then a local plan, with the competent geological administration authority, and the changes resulting from such consultations to incorporate into planning documents.

In the absence of the local zoning plan, issuing a planning permission for investment purposes shall be carried out in agreement with the competent geological administration authority with reference to the areas at risk of subsidence of soil masses. These regulations seem to be satisfactory. The problem that occurs here is primarily a frequency of the analysis of the topicality of local planning documents. Under the current regulations, the authorities of the commune are required to perform this analysis at least once during the term of office - and, unfortunately, in general, the analysis is carried out only once every four years, and changes are introduced every 6-8 years.

4.3 Special procedure applied in situations of mass movements

In Poland there are also legal regulations which can be implemented exceptionally, in the event of an action of the element. There is an act on special rules for reconstruction, expansion, renovation and demolition of buildings destroyed by the action of the element [8], which was amended in 2010 and currently it also contains special rules for land use and the rules and procedures for acquisition of property in connection with landslides.

Under the provisions of this Act, the Prime Minister shall determine by way of a regulation the commune on the area where the mass movements occurred. The commune council within 3 months from the date of this regulation entering into force, by way of a local act, designates areas in which reconstruction can take place exclusively after permanent stabilization of the area with the use of appropriate technical methods defined in the geotechnical project, and after obtaining a building permit. If on the commune area in which the destruction or damage to facilities occurred due to landslides was not entered in the record of areas at risk of soil mass movements conducted by the staroste, the mayor applies to the staroste to enter the area into the record. The staroste is required to enter information in the record within 7 days from the date of filing a motion.

The commune council within 3 months from the date of the regulation entering into force, on the areas listed in the staroste's record, at the request of the mayor, may designate by way of a local law, an area where it is prohibited to execute the erection of the new buildings, reconstruction and development, reconstruction and superstructure of the existing buildings, driven by the need to ensure the safety of people and property. The persons who, in connection with the entry into force of these acts of the local law, will not be able to use the property or part thereof in the current manner or in accordance with the present purpose, may claim from the commune:

- compensation for the suffered damage, or

- repurchase of the property or part thereof.

The implementation of this requirement should take place within 6 months from the date of the submitted application by the hitherto owner of the property. The commune is obliged to pay compensation or to repurchase the property.

5. SUMMARY

In connection with the prevalence of mass movements in southern Poland, systemic actions have been taken to identify, document and indicate the area of the occurrence of landslides. The SOPO project, however, is only at the initial stage of development. The concept to create a central, unified database of landslides in Poland is appropriate. Landslide maps developed within the SOPO project will have all the necessary data needed to the study of conditions and directions of spatial development, local development plans and planning permissions.

However, at present, starostes responsible for maintaining and updating the record of landslide areas have very limited information. They can gain data from archival studies, as well as geological and engineering documentation, geological maps, or landslides catalogs. However, these are fragmentary materials, at different scales and with different specificity, and in addition, in most cases they are obsolete. Apart from the geological and engineering documentations, other cartographic materials are not suitable for use in spatial planning. Thus, information on areas at risk of mass movements is recognized in planning documents only at a small degree. No such information leads to the development of risk areas, and ultimately puts people at risk, as well as generates costs of securing buildings destroyed by a landslide, and in certain cases, the repurchase of the area by the commune.

Assuming the creation of the SOPO base until the end of 2016, it is necessary to point out the problem of updating the data it contains. According to the regulation of the minister on information on mass movements of the earth [3], the starostes are held responsible to update and verify the maps of landslides and areas at risk, as well as of carrying out monitoring after the SOPO project.

The starostes are not completely prepared substantially, technically and financially to carry out such a task. There is no legal regulation of this problem. One must clearly indicate the sources of financing, as well as individuals responsible for obtaining correct information. Another issue that has not been included in the current legislation is the frequency of updates of the basic planning documents - a study of conditions and directions of development of the commune and the local development plan. Currently, the topicality of these documents is assessed once every four years, and making changes is even rarer. It is necessary to develop rules for the admissibility of the allocation for development of sites at risk of mass movements, as postulated in the National Spatial Development Concept, as a total ban on building sites landslide is a too general approach. Should in this context, the term "landslide area" be understood as an active landslide that threatens mass movements? But the most important problem is the constant updating of planning documents for information from the SOPO database. The local spatial development plan is an act of local law. Therefore it may be applicable only after its adoption by the commune council and the publication in the Official Journal of the Province. Each change to the local plan requires the same complex procedures, such as the adoption of the plan itself. Thus, in the provisions of spatial planning, must appear additional regulations to allow continuous updating of planning documents based on

information from the SOPO database.

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