

LAND CONSOLIDATIONS IN SLOVAKIA, STEP FORWARD, TWO STEPS BACK?

ZLATICA MUCHOVÁ¹, MÁRIA LEITMANOVÁ¹, FRANTIŠEK PETROVIČ², JAROSLAV BAŽÍK¹, LUBOMÍR KONC¹, KAROL ŠINKA¹

¹Department of Landscape Planning and Ground Design, Horticulture and Landscape Engineering Faculty, Slovak University of Agriculture in Nitra, Tr. A. Hlinku 2, 949 76 Nitra, Slovak Republic; e-mail: zlatica.muchova@gmail.com, maria.leitmanova@gmail.com, jarobazik@gmail.com, lubomir.konc@gmail.com, sinka.karol@gmail.com

²Department of Ecology and Environmental Sciences, Faculty of Natural Sciences, Constantine the Philosopher University in Nitra, Tr. A. Hlinku 1, 949 74, Nitra, Slovak Republic; e-mail: fpetrovic@ukf.sk

Abstract

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This article describes the process of land consolidations in Slovakia. Fundamental goals of land consolidation are defined in the paper. Land ownership is briefly described with emphasis on historical development. Functional reorganisation of the territory is described in detail. The authors state that this objective is in land consolidation designs, often neglected and landscaping is shifted into the background. Preference is given to activities associated with ownership as evidenced by the common tendency to award contracts for simple land consolidation. The numbers of awarded contracts for comprehensive and simple landscape consolidations from 1990 to the present were evaluated. Reasons for the observed stagnation of comprehensive land consolidation projects have been mentioned. Causes have been found and the problem was displayed from various positions. Finally, possible solutions have been found in order to stimulate discussion on the topic: why there is stagnation in designing of land consolidations in Slovakia.

Key words: land consolidation, land fragmentation, sustainable rural development, landscape.

Introduction

Let us imagine historic field (plot) with an area of 3 ha, which is owned by Goodman and reclaim it. Over 100 years, three generations change. Goodman has five children. After his death, children inherit equal shares. Each from five descendants of Goodman has five own descendants. Based on this fact, 25 owners are registered to one plot. Half of them really divided that one plot and the result was 12 small, narrow plots and the other half of owners stayed farming in ideal shares (13 people). Two out of 13 owners have sold own shares to foreigners out of family. This fragmentation can continue for generation until present. Practice of law caused that one reclaimable plot transformed into tens of smaller plots or slightly bigger plots with many co-owners with different objectives. In following period, farming was conducted on big blocks, however, fragmented ownership relations stayed conserved by

forcibly consolidated land during socialism. The effort to establish regulation arose after the end of socialism with growing awareness of the value of land ownership. Long-term inaction in solving property ownership resulted in the need to optimise the ownership of the land, the location and shape of the plots. It is obvious that the ideal tool for the optimisation is the land consolidation. Generally, majority of definitions presents LC as a tool for solving land readjustment (land use, ownership and other rights) and special physical planning (roads, landscape, soil). FAO (see e.g. 2004, 2008) states that land consolidation is the re-allocation of parcels together with a broad range of other measures to promote rural development. Examples of such activities include village renewal, support to community-based agro-processing, construction of rural roads, construction and rehabilitation of irrigation and drainage systems, erosion control measures, environmental protection and improvements including the designation of nature reserves and the creation of social infrastructure including sports grounds and other public facilities. LC is a specific tool coordinated by politicians of the country. Political power determines how much time and money will be invested to the process of LC. From a questionnaire survey (by authors of this paper from 2014, hitherto unpublished), it has been found that LCs are actively carried out in Austria, Czech Republic, Germany, Denmark, Cyprus, Finland, Slovenia, Bosnia-Herzegovina and Sweden nowadays. No LC projects are carried out in Moldova, Latvia, Albania and UK. LC, as we know them in Slovakia (comprehensive LC), are carried out in a similar way mainly in the Czech Republic (Dumbrovský et al., 2004; Váchalová et al., 2011; Škoda et al., 2004), Germany (Hartvigsen, 2015; Vitikainen, 2004) and Austria (Hartvigsen, 2015; Seher, 2014). Its main goal is the protection and creation of environmental and sustainable rural development taking into account ownership of plots (Urban et al., 2013; Druga, Falfan, 2014; Van Dijk, 2003). LCs are hardly getting into the consciousness of the general population as a public tool despite clear feature benefits (for individuals, businesses, state). Land consolidation procedures can be successfully carried out only if the decision to take such measures is the outcome of attentive diagnosis and comprehensive analysis with precisely-defined goals with the use of special instruments and with careful attention paid to specific structural conditions. We share the view of many authors that LCs depend on the political, socio-economic and environmental demands of the particular countries or regions.

Problems with high land fragmentation in Slovakia

Ownership of plots is characterised by high number of co-owners in Slovakia. The average number of co-owners per plot is 11.11 (Urban et al., 2013). Plots with a width of only 2 metres and a length of 700 metres are common in some cases. Ownership is characterised by high dispersion of plots throughout cadastral areas. Such a large fragmentation of ownership is a historical consequence of the inheritance laws in the Austro-Hungarian Empire. Hungarian estate of inheritance was applied in the former territory of the present Slovak Republic (Štefanovič, 2004). All siblings inherited equally. Plots with a thin and long shape were generated by inheritance and division. Disorder of land ownership is characterised by these signs: high dispersion and fragmentation of plots (Urban et al., 2013), inappropriate shapes (Čičová, Stredanská, 2008) and by the lack of access to the plots (Váchal, Váchalová,

2004; Karouzis, 1977). High numbers of co-owners cause high numbers of ownerships (folios of proprietary rights). The Slovak Republic has 97.95 million land ownerships. From the statistical overview of the average land ownership in Slovakia, it is evident that: the average number of parcels per owner is 20.6; the average number of co-owners per plot is 11.1; number of parcels is 8.8 million; the average area of a plot is 0.55 ha; number of landowners is 4.1 million (Urban et al., 2013).

Problems in the landscape in Slovakia

Gigantic agricultural units dominate the image of Slovakia. This condition involves a large number of environmental problems, such as the washing off of topsoil, degradation of fertile land (Čičová, Stredanská, 2008), sudden local floods (Minár et al., 2005; Kliment et al., 2014), pollution and alluviation of watercourses (Halaj et al., 2012), damage to public buildings, low ecological stability (Hrnčiarová, 2001; Havlíček et al., 2012; Mojses, Boltžiar, 2011; Skokanová et al., 2012; Špulerová et al., 2011).

Ecological imbalance persists and deepens from the period 1948–1989, that is, from the onset of collectivisation (Štefanovič, 2004). By new organisation, areas were plowed of all the natural barriers in the landscape (hedges, free and accompanying greenery, crossings and roads between fields), plots have been associated to gigantic proportions. Landowners could not assert their property rights and gradually the relationship between owners and their land faded over decades. The importance of property rights subsided to right of use.

Our goal is to describe the stagnation of the whole process of LC in Slovakia. It is attempt at the original approach to solve land consolidation problems in Slovakia in a long-term perspective. Paper deals with following questions:

- Can the process of LC be used as a tool that will solve and recover ownership fragmentation and ecological stability of area?
- What are the facts against the designing of land consolidations in Slovakia?
- What are the reasons for the current poor state in the designing of land consolidations in Slovakia?
- Are there creative solutions and ideas that are able to move forward the process of land consolidation?

Material and methods

Methodically, this paper is divided into following parts:

- Description of the legislative framework and the resulting methodology of the LC process. The process is complicated and time-consuming and therefore, the authors developed its simplified diagram.
- Gathering information that provides us with direct evidence on the current situation in the processing of land consolidations in Slovakia by the end of the year 2014. Reasons for the stagnation are given in the discussion.
- Case study of high land fragmentation. Basic characteristics were compared, for example: number of plots, number of landowners, number of relations to a plot, the average area of plots, the average area of co-owners per plot, etc. Land fragmentation illustration is based on the data from the land registry. The data were statistically evaluated, including those related to the land fragmentation of owners entering the LC process. The draft of General principles of functional organisation of the territory (GPFO) anticipates new subdivision of plots.
- Subsequently, the new state of land is evaluated in case study with an aim to highlight land changes due to the project of land consolidation. Spatial representation of communication, erosion control and environmental

facilities and measures before and after the project was evaluated. GPFO was based on analyses of calculation of erosion, ecological stability and others that contributed to the new organisation of the territory.

- New arrangement of already consolidated plots was prepared in accordance with the conditions in the same area and land prices for every owner who took part in the land consolidation process.
- Evaluation of the reasons for the current poor state in designing of LC in Slovakia is given in the conclusion. Original solutions and ideas that could move the process of LC forward are also mentioned.

Legislative overview

The basic legislative regulation in the field of LC in The Slovak Republic is Act No. 330/1991 Coll. (the Act on LC). LCs are carried out frequently at once for the entire cadastral area in the rural zone. The process of LC is composed of geodetic and design activities, which are closely linked and may overlap in time. The whole process is complicated and time-consuming (the average duration of one project is 7 years), therefore, the authors elaborated the simplified diagram (Fig. 1) shown below.

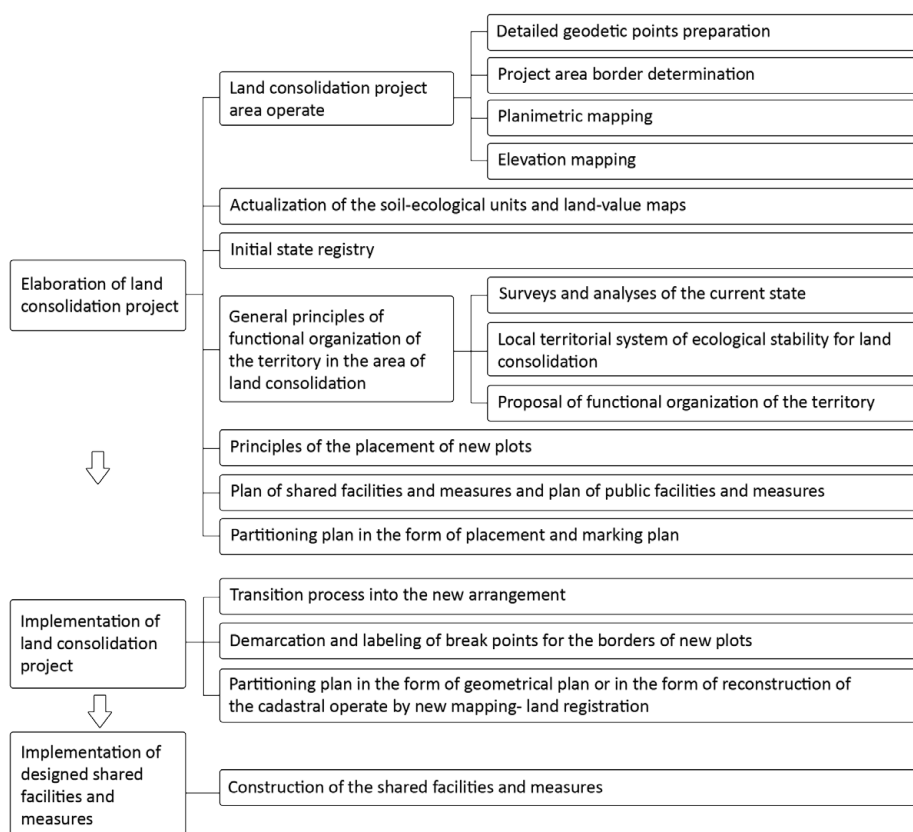


Fig. 1. Content of the LC project in Slovakia - simplified diagram.

The process of LC in Slovakia does not indicate the satisfaction despite the expected advantages and benefits. Fig. 2 displays the number of projects in Slovakia since 1991. Currently (Registry of the Ministry of Agriculture of the Slovak Republic as of 12.31.2014), LCs are being carried out in 426 cadastral areas in Slovakia. LCs have been completed in 261 cadastral areas and further elaborated in 165 cadastral areas. Successful LC projects cover approximately 12% of the area of the Slovak Republic (Vašek, 2014).

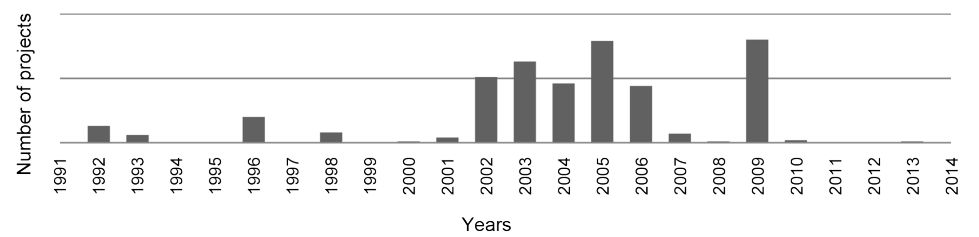


Fig. 2. Number of land consolidation projects entered in the relevant year.

Case study

LC project results are presented for the cadastral territory Velké Vozokany (Fig. 3). Project of LC is already finished in this area. The authors of this paper were actively involved in (Muchová et al., 2007). Some details on LC project are given in Table 1. Cadastral territory of Velké Vozokany is in Nitra region (Western Slovakia), district Zlaté Moravce. The surface area is 987.61 ha. Velké Vozokany belongs to the Danube uplands. In geological terms, the greater part of the cadastral territory is formed by Quaternary sediments. The area has warm and dry climate with mild winters. The river network is poorly developed. A significant part of the area of interest shows signs of transformation due to human activities. Soil plots are especially intensively used as arable land. Timber species are present mainly in the form of bank vegetation along streams, on bounds, vegetation in ravines, in the form of inherent vegetation of roads and as a solitaire. Just 8.26% of the area is covered by forests (81.59 ha) (Muchová et al., 2007, 2014).

T a b l e 1. Basic information about project of land consolidation in the model area.

Start of project	End of project	Duration	Area [ha]	Number of ownership relations
03.03.2004	15.11.2011	7 years	988	16,581

Results

Basic property statistics of area were processed in order to determine what benefits have been brought by the land consolidation project for the owner’s and the country. The state of ownership before the LC can be characterised as an average one. Facts about plots (Fig. 4A) on the basis of the land registry are as follows: Number of initial plots - 3916, Number of landowners in the initial state - 1201 (known 870, with unknown residence 331), Number of ownership relations in the initial state - 16,581, Average area of plot in the initial state - 0.22 ha, Average number of co-owners per plot in the initial state - 4.01, Average number of plots per owner in the initial state - 13.81.

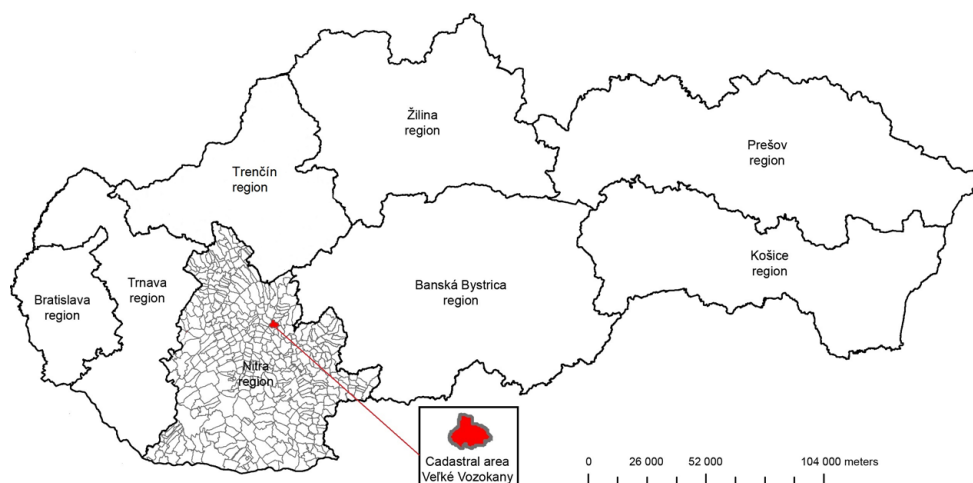


Fig. 3. Map of broader relations.

The state of land and property ownerships after the LC project can be characterised as follows (Fig. 4B): Number of new plots - 2340, Number of landowners - 1201 (known 870, with unknown residence 331), Number of ownership relations - 3000, Average area of a new plot in hectares - 0.38, Average number of co-owners per a new plot - 1.28, Average number of new plots per owner - 2.50. LC project in the cadastral area has brought simplification and clarification of property rights. The number of plots was reduced nearly twice, the number of ownership relations was reduced approximately six times and also the average number of



Fig. 4. Land fragmentation before (A) and after the project of LC (B).

plots per owner was reduced six times. Cadastral documentation has a new cadastral map with an accurately determined boundary of plots in the district of the project. New situation in the terrain corresponds with the cadastral documentation, including accurate definition of areas and types of plots.

The GPFO project stage addresses the landscape aspects. The main principles of the draft of GPFO plan are: to gain maximum benefit from existing facilities and measures, to create blocks in order to ensure accessibility for subsequent division of plots, to limit possibility of occurrence of water and wind erosion, to protect rural areas against flash water, to direct agricultural production as much outside of the urban area as possible, to bring back green areas to the country, to connect road networks with neighbouring cadastral areas. It is necessary to prepare the whole system of GPFO to fulfil the demands of landowners and to preserve functionality of the whole system via the lowest negative occupation of land. In the case of lack of state and municipality land (no booked plots), landowners must help with their own land. Landowners contribute with a percentage, which is determined by the designer of LC project proportionally to their summary area of plots before the LC process.

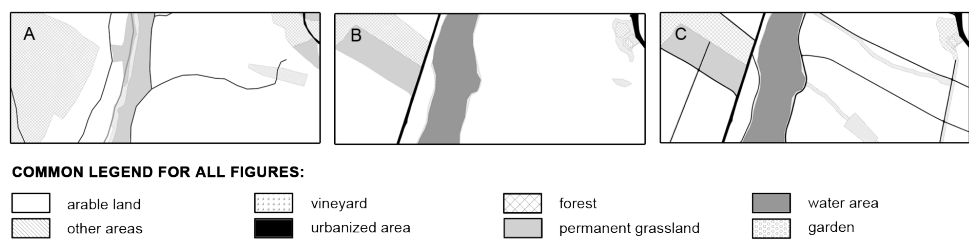


Fig. 5. Land use A) year 1860, B) year 2007 before LC project, C) new state after LC project.

Designing works, connected with the reorganisation of territory, consisted of reviewing communication, erosion control, water management and ecological conditions with regard to the protection and development of the country are shown in Fig. 5. The total length of the field roads in the territory is 31.181 km, of which existing roads are only 1.155 km, 8.197 km of roads are proposed for reconstruction and 22.168 km of roads are newly proposed field roads. It can be concluded, on the basis of calculation of accessibility for owners, that the proposed network of roads will give access to each new plot. Six locations with evidence of surface water erosion were identified. The causes of erosion are connected to gradients and slope lengths. They are co-influenced by improper farming techniques and growing low resistant crops to water erosion. The corrections are based mainly on organisational measures. It is recommended to farm the threatened soil units in the direction of contours. Soil threatened by water erosion should not be left without adequate vegetation cover or at least the cover of crop residues. Erosion control measures of biological character were designed for the area of 2.8 ha. Existing interactive elements in the area on 7.89 ha and new interactive elements on 5.89 ha were approved based on the local territorial system of ecological

stability (LTSES) for LCs. Also, existing local bio-centres were approved on 26.07 ha and bio-corridors on 10.10 ha.

Drafts of ecological facilities and measures faced the biggest obstacles in their acceptance. The issue about ecological measures and facilities was questioned and subsequently, radically rejected by owners (due to the efforts to reduce the contribution of owner's land). Here are few opinions to the priorities in the territory, which were presented at the meeting of owners.

Positive reaction to the GPFO: *'Once, there was beautiful environment... We had beautiful garden lanes ... And when it is built, farmers cannot destroy it? ... Finally tractors will not move under the windows and we will be able to open the windows. .. If you can solve water problems, we will be immensely grateful'*

Other reaction to the GPFO: *'I've lived for 50 years without ecology, so do not tell us that we need something like that ... I understand that you want to build roads and reservoirs, but why do we need new "green" areas? ... It is necessary to kill all the animals, animals only do damage ... Do not bamboozle us with ecology ... I only want to sell it (plots), nothing interests me... Please, don't solve anything, return our country to 100 years ago and we all will be happy ... Do not bother me with ecology and erosion protection, my house does not suffer from the floods ... I do not need roads with garden lanes, because my plot is easily accessible ... I do not give even a mm²...'*

Why it is that? Reflection

Negatives of LC process from the position of landowners, users and all whose rights and obligations may be affected were identified on the background of work meetings with landowners, as:

- Reducing the area of agricultural land and impulses for capital construction on the basis of recovery of the land market.
- Monopolisation of land ownership in the project area by buying shares and dictating terms by investors.
- Negative perception of the transfer of ownership to foreign hands, especially by current managements of agriculture farms.
- Restrictions of central planning authorities on the development of the country due to ecology and nature conservation.
- None, respectively minimal realisation of common facilities and measures.
- Lack of confidence to the national approach due to bad historical experience with the consolidation of plots.
- Complicated forest management.
- Blind corner and difficult hunting law - establishment of hunting grounds and associations.

Negatives as perceived by the authorities are related to the economic part of the process, mainly:

- Financial demands of the projects.
- Financial demands of the realisations.
- Long-term duration of the process.

Disadvantages, as seen by experts, specialists, contractors, are:

- Low labour supply.
- Complicated public procurement of contracts.

- Inadequate/incorrect procurement criteria - the only criterion is the price, not the quality of the candidate.
- Devaluation of quality due to constant price drop.

The process of LC in Slovakia does not indicate the satisfaction despite the expected advantages and benefits. Projects of LCs in Slovakia are assigned to designers via public competitions disproportionately as can be seen in Fig. 1. The main reasons are: cycles of programming periods of EU funds, political priorities in land management, huge predominance of supply over demand and price distortions and obstruction in the process of evaluation of tenders. Based on the conception of arrangement of land ownership, most of the projects were stopped in the phase of 'register of initial state' because of the huge fragmentation of ownership in 1993. Register of the renewed land registration according to Act No. 180/1995 Coll. had to be carried out before LC process in every cadastral territory. Its goal was to record the plots on the folios of property rights. It has been completed and registered, into cadaster of real estates; only 12 projects had a lengthy delay from the previous 52 in Slovakia. LC projects were carried out mainly in environmentally degraded areas of High Tatras and in Žiar basin during the years 1996 and 2003 (Vašek, 2014). A period of contracting of new projects began in the years 2002–2006. Unfortunately, there were also years with no projects of land consolidation initiated. A particularly bad period, despite quite accurate methodology, has occurred since 2010. This difficult period is a consequence of eloignment of LCs in the background due to political decisions. This situation was reflected by the professional community with activities in the field of simplification, reduction of prices and acceleration of the whole process from approximately 2010. There was a draft of new technological processes and a proposal of new price lists. However, these activities did not bring recovery in the process of LCs. € 80 million has been allocated for the purpose of LC from the EU funds during the new programming period from 2014 to 2020. All activities related to LCs are now in the hands of the politicians. Nobody knows how and for which purposes, the funds will be used.

Discussion

The process of land consolidation has stagnated in Slovakia. Comparative study with the Czech Republic (Jusková et al., 2015) clearly shows this trend. We would like to highlight basic needs and solutions that could reverse the trend in the future based on experience, surveys, consulting and seeking answers from/for owners, users, government, contractors, that is, finding vision for LC process.

1. The government should understand the importance of LCs - experts can explain the pros based on long-term economic benefits for the country. Advantages from LC addresses for example, Jürgenson (2014), claiming increased competitiveness of agricultural and forestry production. Benefits in the economic sphere are backed also by Pasakarnis et al. (2013); Tarasovičová et al. (2013).
2. LC should be perceived and popularised positively in the population. It means that explanation on LC process will be presented also in an interesting way in popular media with emphasis on the final profit of the individual participants and the whole population of the region. Importance of the research and missing feedback from the owners cannot be stressed enough, see, for example, Karásek et al. (2014); Kupidura et al. (2014).

3. Sufficient funding from domestic and European financial resources will be found and divided by proportionately between the design and implementation of the proposed measures.
4. Professional assurance by coordination with professionals from practice and the assurance of the stability of the legislative and technological base of LCs are needed.
5. Competent management and governing authorities with qualified professional personnel in relevant positions are necessary.
6. Clear and mandatory criteria for all projects should be provided. Given the available literature, only Louwsma et al. (2014) define an allotment barometer based on the quality of agricultural parcel structure before and indication of financial benefits after the improvement and then use it for ranking the urgency and expected benefits of LC projects. In most cases, only some listings of territories are available with rankings that are not always founded on an objective assessment.
7. Establish nationwide delivery requirements of individual projects and its parts defined on the basis of the latest technical knowledge in response to the information structure to which the project will be incorporated (e.g. INSPARE). Single-purpose outputs are degrading LCs. Despite large collection of quality maps with database, the results are not used further except for cadastral evidence. As an example, Leitmanová et al. (2013) present a new approach to data from the LC projects called OKTOPUS.
8. A correct and transparent mechanism for procurement of projects ensuring the quality and integrity of supplies based on extensive assessment of the full capacity and qualitative indicators of selected companies. Missing transparency leads to an unhealthy completion in SR.
9. To avoid the gradual devaluation of the quality of projects, depending on the low offer and high demand for work (impact of competitive struggle and continuous pressure to price drop).

Finally, we would like to highlight perhaps the biggest problem, why the land consolidation process does not work. Historic experience led owners and people in general to apathy and resignation. There is still disinterest to act and thus, take care of one's own land and the surrounding countryside. There is no support from owners group. Landowners, unfortunately, sometimes rather refuse the whole process with distrust to the national approach due to poor experience from consolidations in the history. For this reason, the discussion on the topic of LCs is important. Positive examples from abroad can bring the chance of long-lasting favourable opinion.

Conclusion

Professional communities of Slovakia deal with the issue of the effectiveness and success of land consolidation projects. The aim of this discussion is to encourage the design of land consolidation. Processing of land consolidation project was demonstrated on the example of the cadastral territory of Veľké Vozokany. Results of the project have brought simplification and clarification of property rights. On the basis of data on land fragmentation before and after land consolidation project, it can be stated that the number of parcels was reduced almost twice; the number of ownership rights six-fold and the average number of parcels per owner six times. The draft of new organisation of the territory has been supplemented by erosion control measures on the area of 2.8 ha. The road network was completed by the 22.168 km of new field roads and enables asses to

all plots. New elements from ecological and landscape drafts were accepted on the area of 5.89 ha from initially proposed 30 ha. It can be concluded that positive decision-making of land owners on behalf of new ecological elements in the area is complicated. Activities related to promotion of land consolidations are necessary to clearly explain the situation to the landowners and inhabitants, who live in the area but do not own the land. Based on observations of participant's reactions of the project during common discussions, it can be stated that landowners are willing to accept mainly drafts of new roads. Landowners' attitude to water management measures is positive only if their plots are evidently and directly endangered. If their plots are not endangered, they strongly refuse these drafts. Ecological measures are not important to them at all. Despite advantages of LC, the process does not show expected and stable dynamics according to the needs of Slovakia as seen by experts. Negative sides of LC process have been shown in this contribution. Negative attitude towards LC in Slovakia by some groups is co-caused by the financial and time demands of projects and frequently unrealised projected measures. Scientific and public debates, directed to solving above-described problems, could successfully help to overcome obstacles for land consolidations in Slovakia.

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References

- Čičová, T. & Středanská A. (2008). Influence of the selected factors on the shape and size of plots in the agricultural cooperative Šaľa (in Slovak). In *Študentská vedecká konferencia FZKI 2008. Zborník príspevkov a prezentácií zo študentskej vedeckej 19 konferencie s medzinárodnou účasťou* (CD-ROM) (pp. 54–61). Nitra: Fakulta záhradníctva a krajinného inžinierstva SPU v Nitre.
- Druga, M. & Faltan V. (2014). Influences of environmental drivers on land cover structure and its long-term changes: A case study of the villages of Malachov and Podkonice in Slovakia. *Moravian Geographical Reports*, 22(3), 29–41. DOI: 10.2478/mgr-2014-0016.
- Dumbrovský, M., Mezera, J., Strítecký, L. & Burian Z. (2004). *Methodology instruction for elaboration of land consolidation proposals (in Czech)*. Brno: Českomoravská komora pro pozemkové úpravy.
- FAO (2004). *Operations manual for land consolidation pilot projects in Central and Eastern Europe*. FAO Land Tenures Studies, 6, 59 pp.
- FAO (2008). *Opportunities to mainstream land consolidation in rural development programs of the European Union*. FAO Land Tenure Policy Paper, 2, 58 pp.
- Halaj, P., Velísková, Y., Sokáč, M., Bárek, V. & Bářeková A. (2012). Application of hydrodynamic models for studies of factors affecting the pollution dispersion in streams. *Ecology & Safety*, 6(2), 221–227. <http://www.science-journals.eu>
- Hartvigsen, M. (2015). *Experiences with land consolidation and land banking in central and eastern Europe after 1989*. Rome: Food and Agriculture Organization of the United Nations.
- Havlíček, M., Krejčíková, B., Chrudina, Z. & Svoboda J. (2012). Long-term land use development and changes in streams of the Kyjovka, Svratka and Velička river basins (Czech Republic). *Moravian Geographical Reports*, 20(1), 28–42.
- Hrnčiarová, T. (2001). *Ecological optimization of agricultural land (model territory Dolná Malanta) (in Slovak)*. Bratislava: Veda, vydavateľstvo SAV.
- Jürgenson, E. (2014). *Overview of land consolidation in Estonia*. Riga: Baltic Land Consolidation Workshop.
- Jusková, K., Muchová, Z. & Pochop M. (2015). State of land consolidation in Czech Republic and in Slovak Republic or "When two do the same, it's not always the same" (in Czech). *Geodetický a Kartografický Obzor*, 6(4), 72–81.
- Karásek, P., Stejskalová, D. & Ulčák Z. (2014). Analysis of rural social aspects in the context of land consolidations and land use planning, the case study, Czech Republic. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 62(3), 507–515. DOI: 10.11118/actaun201462030507.
- Karouzis, G. (1977). *Land ownership in Cyprus: Past and present: With special reference to Greek and Turkish ownerships*.

Nicosia: Cosmos Press.

- Kliment, T., Gálová, L., Ďuračiová, R., Fencík, R. & Kliment M. (2014). Geospatial information relevant to the flood protection available on the mainstream web. *Slovak Journal of Civil Engineering*, 22(1), 9–18. DOI: 10.2478/sjce-2014-0002.
- Kupidura, A., Luczewski, M., Home, R. & Kupidura P. (2014). Public perceptions of rural landscapes in land consolidation procedures in Poland. *Land Use Policy*, 39, 313–319. DOI: 10.1016/j.landusepol.2014.02.005.
- Leitmanová, M., Muchová, Z. & Středanská A. (2013). Concept of information system for land consolidation projects (in Slovak). *Acta Horticulturae et Regiotechnicae*, 16(2), 40–43. DOI: 10.2478/ahr-2013-0010.
- Louwsma, M., van Beek, M. & Hoeve B. (2014). A new approach: participatory land consolidation. In *FIG Congress - Enhancing the relevance Kuala Lumpur, Malaysia 16–21 June 2014* (pp. 1–10).
- Minár, J., Trizna, M., Barka, I. & Bonk R. (2005). *Flood potential in Slovakia (in Slovak)*. Bratislava: Geo-grafika.
- Mojšes, M. & Boltžiar M. (2011). *Using spatial metrics for assessment of the landscape structure changes of the Beša dry polder*. *Tájökológiai Lapok*, 9(2), 415–428.
- Muchová, Z., Raškovič, V., Barát, J., Konc, L. & Petrovič F. (2007). *General principles of functional arrangement of the territory in the circuit of the land consolidation project in the Velké Vozokany (in Slovak)*. Nitra: Geodetická profesionálna agentúra.
- Muchová, Z., Leitmanová, M. & Petrovič F. (2014). Process of land consolidation in Slovakia (Case study of Velké Vozokany). *Advances in Educational Research*, 49(1), 69–76.
- Pasakarnis, G., Morley, D. & Maliene V. (2013). Rural development and challenges establishing sustainable land use in Eastern European countries. *Land Use Policy*, 30(1), 703–710. DOI: 10.1016/j.landusepol.2012.05.011.
- Seher, W. (2014). Land consolidation in Austria - contributions to landscape and water management. In A. Lisec, A. Prosen & M. Ceh (Eds.), *Land rearrangement as the challenge for land surveying. 42nd Slovenian Surveying Day*. Ljubljana, Slovenia.
- Skokanová, H., Havlíček, M., Borovec, R., Demek, J., Eremiášová, R., Chrudina, Z., Mackovčín, P., Rysková, R., Slavík, P., Stránská, T. & Svoboda J. (2012). Development of land use and main land use change processes in the period 1836–2006: Case study in the Czech Republic. *Journal of Maps*, 8(1), 88–96. DOI: 10.1080/17445647.2012.668768.
- Škoda, S., Váchalová, R. & Váchal J. (2004). The influence of structural and functional changes in the landscape to geo factors of small catchments (in Czech). *Agrorregion*, 21(2–3), 91–95.
- Špulerová J., Dobrovodská, M., Lieskovský, J., Bača, A., Halabuk, A., Kohút, F., Mojšes, M., Kenderessy, P., Piscová, V., Barančok, P., Gerhátovej, K., Krajčí, J. & Boltžiar M. (2011). Inventory and classification of historical structures of the agricultural landscape in Slovakia. *Ekológia (Bratislava)*, 30(2), 157–170. DOI: 10.4149/ekol_2011_02_157.
- Štefanovič, M. (2004). *Land law (in Slovak)*. Bratislava: Eurounion.
- Tarasovičová, Z., Saksa, M., Blažik, T. & Faltán V. (2013). Changes in agricultural land use in the context of ongoing transformational processes in Slovakia. *Agriculture*, 59(2), 49–64. DOI: 10.2478/agri-2013-0006.
- Urban, J., Dobrucká, A., Bujňák, J., Vanek, J. & Vašek A. (2013). *Land consolidation tool to resolve the fragmentation of land ownership, land revitalization and rural development (in Slovak)*. Bratislava: Komora pozemkových úprav SR.
- Van Dijk, T. (2003). Scenarios of Central European land fragmentation. *Land Use Policy*, 20(2), 149–158. DOI: 10.1016/S0264-8377(02)00082-0.
- Vašek, A. (2014). Land consolidation in Slovakia yesterday, today and tomorrow (in Slovak). In *11. Medzinárodná konferencia o katastri nehnuteľností. Časť A-Papierníčka*.
- Váchal, J. & Váchalová R. (2004). Methodology of the antropoecological stabilization of landscape. *Collection of Scientific Papers*, 21(4), 387–394.
- Váchalová, R., Matějková, Š., Váchal, J., Pártlová, P., Dumbrovský, M. & Jurík L. (2011). Evaluation methods of agricultural potential in rural areas including environmental function. *Annals of Warsaw University of Life Sciences, Land Reclamation*, 43(2), 87–97. DOI: 10.2478/v10060-008-0095-1.
- Vitikainen, A. (2004). Overview of land consolidation in Europe. *Nordic Journal of Surveying and Real Estate Research*, 1(1), 25–44.