

Perception of land consolidation by land owners: a case study

Zlatica Muchová^{1*}, Jaroslav Bažík¹, František Petrovič², Juraj Hreško²,
Lubomír Konc¹, Peter Michal¹

¹Department of Landscape Planning and Ground Design, Horticulture and Landscape Engineering Faculty, Slovak University of Agriculture in Nitra, Hospodárska 7, 949 76 Nitra, Slovak Republic

²Department of Ecology and Environmental Sciences, Faculty of Natural Sciences, Constantine the Philosopher University in Nitra, Tr. A. Hlinku 1, 949 01 Nitra, Slovak Republic

Abstract

MUCHOVÁ, Z., BAŽÍK, J., PETROVIČ, F., HREŠKO, J., KONC, E., MICHAL, P., 2015. Perception of land consolidation by land owners: a case study. *Folia Oecologica*, 42: 113–121.

Land consolidation in Slovak Republic is claimed to be negatively perceived, although, there is no empirical evidence of this. This is used by administration to interfere with land consolidation. Based on owners' opinion in cadastral area of Malý Báb, where land consolidation was carried out, we show that a positive view on land consolidation prevails (almost 80%). Groups of respondents with inclination to a negative perception (e.g. the seniors with bad experiences in the past, ignorant juniors) were identified, problematic areas (e.g. communication, mistrust, contributions to environmental measures) and lack of information (e.g. people with a lower education and juniors) highlighted. It seems that a positive attitude on land consolidation could be achieved with well-informed owners, provided their views and concerns will be respected.

Keywords

environmental measures, land consolidation, land fragmentation, owners' perception

Introduction

Fragmentation, unresolved ownership relations, and environmental issues characterize situation (not only) in Slovakia, see e.g. JUSKOVÁ et al. (2015). According to various sources, one of the most widespread tools for solving these problems is land consolidation. FAO (2004, 2008) defines land consolidation as a term used broadly to describe measures for adjusting property rights structure through co-ordination between owners and users. Land consolidation involves re-allocation of parcels to remove fragmentation effects but the term goes well beyond these actions. Land consolidation has been associated with broad economic and so-

cial reforms from the time of its earliest applications. HARTVIGSEN (2015) shows, that land consolidation is more than an outcome of normal land market transactions agreed between a few private landowners. Land consolidation is carried out through a project and connected with a certain geographical area (project area). Land consolidation outcome is the result of a planning process, facilitated by land professionals along with active involvement of landowners and other stakeholders in the project area. Reallotment plan, as a result of planning process, displays land parcels layout and connected ownership after a land consolidation project. THOMAS (2006) defines land consolidation as one of the most important elements in helping to solve the structural

*Corresponding author:
e-mail: zlatica.muchova@uniag.sk

problems of agriculture and agricultural production. International consultants recommend land consolidation procedures as a “secret weapon” for economic growth and shared wealth. Generally most of the definitions present land consolidation as a tool for solving 1) land readjustment (land use, ownership and other rights) and 2) spatial physical planning (roads, landscape and soil). Recently, authors especially highlight multi-functions of land consolidation, specifically comprehensive reallocation of (rural) land while addressing environmental issues.

First projects in Slovakia were aimed only at land readjustment to eliminate land fragmentation as defined by e.g. DEMETRIOU (2012). Over time, land consolidation in Slovakia adopted a multidisciplinary approach as defined by e.g. LISEC et al. (2014). They indicated that main aims of land consolidation are plots structure, road infrastructure improvements and that land consolidation is an important tool for agricultural and rural development. Also JÜRGENSON et al. (2010) consider land consolidations as tools of land management which can reduce land fragmentation and other disturbing factors of land use. Land consolidation is an excellent instrument to implement rural development projects with multiple purposes and goals, in a single land consolidation project. According to PAŠAKARNIS et al. (2013) land consolidation can even minimize the inequality between rural and urban areas, if the improvements include agricultural production, better housing, employment, infrastructure, education, health services, environment, cultural opportunities etc.

Land consolidation means (BLAŽEK et al., 2014; HAVLÍČEK et al., 2014; IVANOVÁ et al., 2013; LI et al., 2014; LIGA et al., 2014; MURGAŠ, 2009; TARASOVIČOVÁ et al., 2013) introduction of land arrangement changes of a certain territory, in order to create an integrated soil management according to the needs of individual landowners, in addition to the social demands on the landscape, environmental and construction issues. LOUWSMA et al. (2014) emphasize land consolidation as being an improvement of distribution of agricultural plots, water management and infrastructure. To improve the structure of rural areas, land consolidation is aimed at creation of a functional and attractive rural environment, in which it is pleasant to work, live and recreate for residents and visitors alike. Land consolidation arranges land plots spatially and functionally, consolidates or splits them up to provide conditions for effective management by landowners. Besides that, it also enables environmental improvement, soil conservation, water management and increasing ecological stability (KADLEC et al., 2014; DUMBROVSKÝ et al., 2004). Land consolidation refers to a series of activities, which deal with improvement of productivity and working conditions in rural areas, production of reconstruction plans for rural settlement, and improving rural life (LONG, 2014). If land consolidation is implemented in a comprehensive way, it could support environmental protec-

tion and management of natural resources. JÜRGENSON (2010), OLAH and BOLTŽIAR (2009), ŠPULEROVÁ et al. (2011) summarized, that land consolidation can solve land use conflicts for example in the infrastructure, nature, environment and furthermore it can cover public demands of land, sustainable land management and improve general livelihood in rural areas. Land consolidation can be used to make agriculture and forestry more competitive, can help to improve access to plots, can support environmental management and sustainable development in rural areas.

Despite their obvious benefits, land consolidations in Slovakia struggle with public recognition as a useful tool that works for individuals, communities, state, environment, improves possibilities for managing land market as well as tax collection. THOMAS (2006) reminds that many people are surprised/disappointed if after finishing initial projects some of the expected gains do not materialize. Land consolidation procedures can be successfully carried out, only if decisions to take such measures are an outcome of attentive diagnosis and comprehensive analysis, with precisely-defined goals. Careful attention must be paid when using special instruments for specific structural conditions. It is agreed by many authors, that land consolidation is dependent on political, socio-economic and environmental demands of particular countries or regions.

Land consolidation projects may be justifiably criticized for a lack of feedback from potential participants (PODHRÁZSKÁ et al., 2015), who are directly affected (with major consequences). It is possible to determine an appropriate strategy and tactic for further positive development (and public perception) of land consolidation by focusing on the views of residents and owners themselves.

Authors of this contribution aimed at collecting empirical evidence on participants' opinion/perception of landscape consolidation and derivation of some implications. Our goal is to find the main target groups of population in terms of age, education and gender, on which it will be appropriate to focus education and promotion regarding land consolidation. Based on a survey, we try to identify the most negative attitudes and (perceived) problems that may result in rejecting the entire process. Suggestions are also discussed, how to positively influence the public for supporting full-scale implementation of comprehensive land consolidations.

Material and methods

Research of satisfaction and opinion about land consolidation was carried out in Malý Báb cadastral area, where a land consolidation project was completed (Fig. 1). Table 1 shows some details about this land consolidation project. The cadastral area is located in the western part of Slovakia.

Table 1. Basic information about land consolidation project in the case study area

Malý Báb	
Start	1. 6. 2005
End	28. 12. 2011
Duration	6 years
Area (ha)	879
Number of ownership relations	7,673

For a better understanding of the whole land consolidation process timeline, Table 2 shows time requirements for individual stages. This project lasted for 6 years and 3 months, costing 347,289 EUR. Table 3 shows ownership parameters of the area.

Data on landscape consolidation perception was obtained by interviews using a standard questionnaire

with 15 questions. Interviewers were prepared to explain any uncertainties. Questions were formulated as confirmatory (i.e. respondent either confirms – YES, or does not confirm – NO) and binary (YES/NO – 1/0). 60 questionnaires in the cadastral area of Malý Báb were collected.

Survey questions were divided into three categories:

- 1st category of questions aims at finding out if respondent had heard of land consolidations and if he/she had been an active participant in the project. If the answer is YES, interviewer asks questions from the 2nd category. If the answer is NO, interviewer asks/answers questions from the 3rd category.
- 2nd category of questions dealt with a specific information to determine positive and negative opinion of respondents about the entire process of land consolidation.

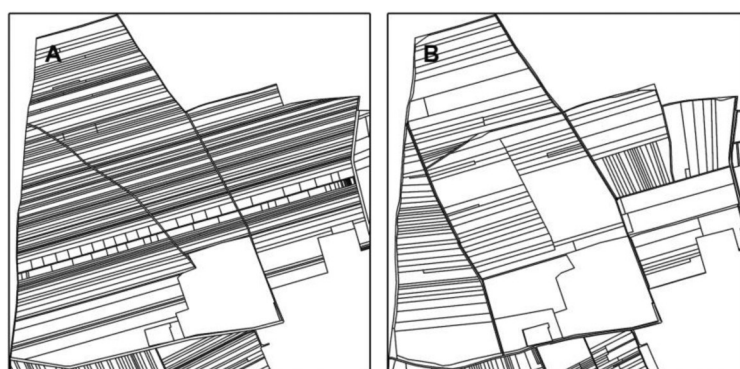


Fig. 1. Demonstration of initial ownership relations (A) compared to the new reallocation plan (B).

Table 2. Timetable for land consolidation project

Stage name	Date
Decision about regulation of land consolidation	1. 6. 2005
Geodetic grid	30. 7. 2005
Decision of land consolidation area	31. 10. 2005
Planimetric mapping	31. 10. 2006
Elevation mapping	31. 10. 2006
Land valuation	31. 7. 2007
Initial state registry	31. 7. 2007
Local territorial system of ecological stability	31. 7. 2007
General principles for functional territorial organization	31. 5. 2008
Principles of reallocation of new plots	31. 1. 2009
Proposal for common and public facilities and measures	30. 9. 2009
Reallocation plan in the form of placement and marking plan	30. 9. 2010
Implementation of land consolidation project	30. 4. 2011
Updating documentation on new mapping and geodetic plan	30. 9. 2011
Registration in the Land Registry	28. 12. 2011

Table 3. Basic information about ownership before and after the land consolidation project in the case study area

	Number of ownership relations	Number of parcels	Average number of co-owners per parcel	Average number of parcel per owner	Average area per parcel (ha)
Before the project	7,673	1,600	4.80	7.85	0.55
After the project	2,867	1,336	2.15	2.93	0.65

- 3rd category of questions collects parametric information: EDUCATION, AGE and GENDER. Based on this information, we attempted to find dependencies.

Questionnaire

QAR. Have you heard of land consolidation?

- YES [1]
- NO [0] (If the answer is NO, interviewer goes on to question Qx1R about education).

QBR. Do you perceive land consolidation as positive?

- YES [1]
- NO [0]

QCR. Have you been an active participant of land consolidation before?

- YES [1]
- NO [0]

QDR. Do you feel that land consolidation helped you with something?

- YES [1]
- NO [0]

QER. Have the procedures of land consolidation project been sufficiently explained to you?

- YES [1]
- NO [0]

QFR. Do you have now a better overview of your ownership/property than before the land consolidation project?

- YES [1]
- NO [0]

QGR. Do you know the location of your parcels now?

- YES [1]
- NO [0]

QHR. Have new parcels been discovered during the land consolidation project you were unaware of?

- YES [1]
- NO [0]

QIR. Do you have information about environmental aspects of the land consolidation project?

- YES [1]
- NO [0]

QJR. Do you agree with the contribution for common facilities and measures?

- YES [1]
- NO [0]

QKR. Do you evaluate the approach of planners and other participants (mayor, deputies, authorities, etc.)

positively?

- YES [1]
- NO [0]

QLR. Based on your experience, would you agree (again) with the initiation of a project in your cadastral area?

- YES [1]
- NO [0]

Qx1R. Have you completed (technical) university (bachelor, master, engineer)?

- YES [2] (It is treated as higher education.)
- NO [1] (It is treated as secondary and lower education.)

Qx2R. Age of respondent (determined by interviewer!)

- Lower [1] (obviously junior)
- Middle [2] (“productive age”)
- Higher [3] (obviously senior)

Qx3R. Gender (determined by interviewer!)

- Male [2]
- Female [1]

For the collected data evaluation, conventional methods of descriptive statistics and multivariate methods were used (cluster analysis for identification of similar groups of respondents). To study connections of responses based on parameters GENDER (1 – female, 2 – male), AGE (1 – juniors /18–24 years/, 2 – middle age /25–64 years, “productive age”, 3 – seniors /above 65 years/) and EDUCATION (1 – without higher education, 2 – higher education) analysis of contingency tables with chi-square test (p-value < 0.05) was used (<http://cran.r-project.org>).

Results

In Malý Báb cadastral area (Table 4) positive responses prevailed in questions QAR “Have you heard of land consolidation?” (90%), QBR “Do you perceive land consolidation as positive?” (77%), QDR “Do you feel that land consolidation helped you with something?” (57%), QFR “Do you have a better overview of your ownership/property than before the land consolidation project?” (65%), QGR “Do you know the location of your parcels now?” (82%) and QLR “Based on your experience, would you agree (again) with the initiation of a project in your cadastral area?” (57%). Questions QDR (57%), QFR (65%) and QLR (57%) were answered positively, but there was a high number of

Table 4. Summary percentages of responses to the questions asked in the survey without regard to the education, age and gender. Questions are listed in Material and methods

Responses	QAR (%)	QBR (%)	QCR (%)	QDR (%)	QER (%)	QFR (%)	QGR (%)	QHR (%)	QIR (%)	QJR (%)	QKR (%)	QLR (%)
YES	90.00	76.67	48.33	56.67	46.67	65.00	81.67	33.33	26.67	41.67	48.33	56.67
NO	10.00	23.33	51.67	43.33	53.33	35.00	18.33	66.67	73.33	58.33	51.67	43.33

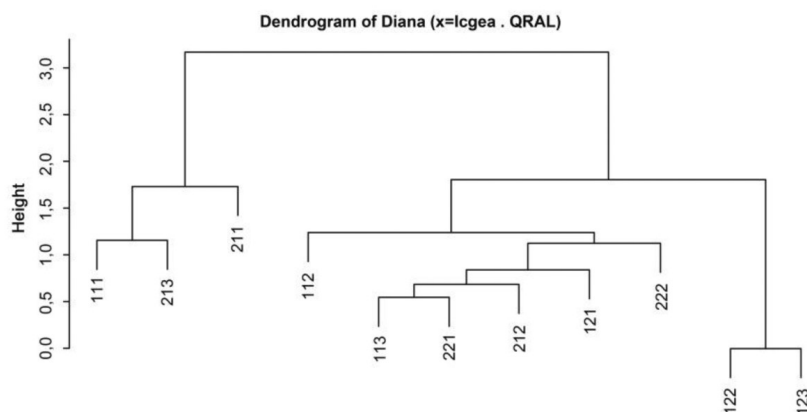


Fig. 2. Dendrogram – Diana (agglomerative clustering) for all available (nonempty) gender (1 or 2); education (1 or 2); age (1, 2 or 3) groups with regard to questions A to L responses.

negative answers. Negative answers were recorded in questions QCR “Have you been an active participant of land consolidation before?” (52%), QER “Have the procedures of land consolidation project been sufficiently explained to you?” (53%), QHR “Have new parcels been discovered during the land consolidation project you were unaware of?” (67%), QIR “Do you have information about environmental aspects of the land consolidation project?” (74%), QJR “Do you agree with the contribution for common facilities and measures?” (68%) and QKR “Do you evaluate the approach of the planner and other participants (mayor, deputies, authorities, etc.) positively?” (52%), but with a rather high number of positive answers. It can be concluded that respondents answered 50% of the questions positively and 50% of the questions negatively, an equal ratio.

Dendrogram (Fig. 2) shows similarity of responses in groups which are arranged by gender, education and

age. The first number in the three-digit code means: 1 – female, 2 – male; second number: 1 – lower education, 2 – higher education; third number: 1 – junior, 2 – middle age, 3 – senior.

Splitting the tree at the height of 2.0 leaves us with two groups. The smaller one on the left consists of young females and males without higher education and older males without higher education (which are surprisingly closer to the young females than males). The large group has three prominent subgroups. Productive and senior females with higher education on the right, productive females without higher education on the left and the rest of the combinations in between.

We attempted to find answers’ dependency on gender (Table 5), education (Table 6) and age (Table 7), based on the outputs of contingency tables (chi-square with $p\text{-value} < 0.05$).

Statistically significant dependency on gender was found in responses to QFR “Do you have a better over-

Table 5. Summary percentages of responses to the questions asked in the survey with regard to the gender. Questions are listed in Material and methods. Statistically significant response dependency on gender is denoted by the + sign next to the particular response

Responses	QAR (%)	QBR (%)	QCR (%)	QDR (%)	QER (%)	QFR+ (%)	QGR (%)	QHR (%)	QIR (%)	QJR+ (%)	QKR (%)	QLR (%)	Gender
YES	96.55	79.31	58.62	62.07	55.17	79.31	86.21	41.38	31.03	58.62	58.62	62.07	1
NO	3.45	20.69	41.38	37.93	44.83	20.69	13.79	58.62	68.97	41.38	41.38	37.93	1
YES	83.87	74.19	38.71	51.61	38.71	51.61	77.42	25.81	22.58	25.81	38.71	51.61	2
NO	16.13	25.81	61.29	48.39	61.29	48.39	22.58	74.19	77.42	74.19	61.29	48.39	2

Table 6. Summary percentages of responses to the questions asked in the survey with regard to education. Questions are listed in Material and methods. Statistically significant response dependency on education is denoted by the + sign next to the particular response

Responses	QAR (%)	QBR (%)	QCR (%)	QDR (%)	QER (%)	QFR (%)	QGR (%)	QHR (%)	QIR (%)	QJR (%)	QKR (%)	QLR+ (%)	Education
YES	86.05	69.77	46.51	51.16	44.19	60.47	76.74	34.88	23.26	34.88	44.19	46.51	1
NO	13.95	30.23	53.49	48.84	55.81	39.53	23.26	65.12	76.74	65.12	55.81	53.49	1
YES	100.00	94.12	52.94	70.59	52.94	76.47	94.12	29.41	35.29	58.82	58.82	82.35	2
NO	0.00	5.88	47.06	29.41	47.06	23.53	5.88	70.59	64.71	41.18	41.18	17.65	2

Table 7. Summary percentages of responses to the questions asked in the survey with regard to age. Questions are listed in Material and methods. Statistically significant response dependency on age is denoted by the + sign next to the particular response

Responses	QAR (%)	QBR+ (%)	QCR (%)	QDR (%)	QER (%)	QFR (%)	QGR (%)	QHR (%)	QIR (%)	QJR (%)	QKR+ (%)	QLR+ (%)	Age
YES	85.71	78.57	35.71	64.29	42.86	64.29	85.71	35.71	21.43	50.00	50.00	57.14	1
NO	14.29	21.43	64.29	35.71	57.14	35.71	14.29	64.29	78.57	50.00	50.00	42.86	1
YES	90.00	95.00	45.00	60.00	60.00	75.00	85.00	25.00	20.00	40.00	70.00	80.00	2
NO	10.00	5.00	55.00	40.00	40.00	25.00	15.00	75.00	80.00	60.00	30.00	20.00	2
YES	92.31	61.54	57.69	50.00	38.46	57.69	76.92	38.46	34.62	38.46	30.77	38.46	3
NO	7.69	38.46	42.31	50.00	61.54	42.31	23.08	61.54	65.38	61.54	69.23	61.54	3

view of your ownership/property than before the land consolidation project?” and QJR “Do you agree with the contribution for common facilities and measures?”, dependency on education in question QLR “Based on your experience, would you agree (again) with the initiation of a project in your cadastral area?” and dependency on age in questions QBR “Do you perceive land consolidation as positive?”, QKR “Do you evaluate the approach of the planner and other participants (mayor, deputies, authorities, etc.) positively?” and QLR again.

Discussion

Based on responses it can be clearly concluded that respondents are aware of the existence of land consolidation and most perceive it positively. They are also aware of irregularities and chaos in property rights because they experience (d) this phenomenon in various areas of life. They perceive naturally the fact that it would be appropriate to make some amendments. Due to lack of information, however, they cannot consider whether the proposed method of solution through the land consolidation is suitable and natural human fear of the unknown manifests itself.

After the project they are clearly better informed about the location of their parcels. Unfortunately, only at the end of the project, the participants are able to fully perceive the benefits of land consolidation. This is based on the fact that they can easily compare, without any complicated explanation, the state of their owner-

ship before and after the project.

Contributions to the common facilities and measures are perceived negatively, since the participants of land consolidation provide “free of charge” a certain percentage of their property and they cannot (are unable to) verify whether any value and benefits will reach them.

A land consolidation project provides an additional review of existing ownership relations, which may, in certain cases, notify owners about new property. In the majority of cases, plots “lost” due to historical development have not been discovered mirroring the quality of the land evidence.

Environmental aspects were not explained sufficiently. Due to detachment from the ownership in the past, perception of a need to protect the natural environment, awareness of the aesthetic and staging potential of rural area is absent. We expect the situation to improve with a change of generations, because ecology and environment are gaining weight with time in the whole European Union. Landscape should be consolidated and maintained so as to be attractive for living, recreation, business, investment and be sustainable.

Facts and implications from our survey highlighted some groups of respondents. Well-educated respondents of “productive” age consider land consolidation as an appropriate tool for handling a large range of issues related to ownership and rural development. This result was expected. Based on the age of respondents, we can assume that most of them are owners of certain land area possibly through an inheritance, purchase or

other legal act. Farm managements are also members of this group. Their education enables them a potential management of the property for a benefit (private/business use, selling, leasing).

Alternatively, seniors (males in particular) with a lower education show a negative view of some aspects of land consolidation. We assumed the opposite. We believed that this group would have the greatest interest in land consolidation. In this group, experience prevails over knowledge. They remember the injustices that landowners suffered during forced collectivization. Based on these experiences, in many cases, they reject any manipulation of land ownership, land transfers and contribution of land for common facilities and measures. They do not fully understand the land evaluation criteria, the difference to a market price in particular.

In our opinion the key are juniors under 24 years, who expressed lack of knowledge, lack of information, insecurity and particular ignorance to the process. A small subgroup already owns the land. Some of them are economically active. Unfortunately, many of them follow the passive-consumerist lifestyle of the modern age.

If processes of land consolidations are to be successful, promotion needs to target groups that reject or don't have any interest in land consolidation and clearly show that benefits dominate over eventual disadvantages (e.g. by visualization and "success stories").

Using comparison of base demographics of the case study area and the Slovakia (Table 8) we can try to estimate the evolution of public perception of landscape consolidations.

Available data shows, that in Slovakia, "productive" age represents 69% of the population and higher education has 20% of the population. Let us assume that "productive" age population perceives land consolidation positively, by a vast majority, while maybe 2/3 of seniors perceive land consolidation negatively. It can be expected that the group of seniors will contain more and more educated/well-informed ("pro land consolidation") people on the basis of natural regrouping of population in the "productive" age amongst seniors (and by interaction/communication between generations) thus shifting the perception. Positive differences

between the situation before and after a land consolidation should be explained to juniors, who will eventually become the economically active population. They will gradually acquire the ownership of the land. Relevant campaigns, journals, advertising, promotional materials are available which can be aimed at specific target groups. The process can be made more attractive to them using examples of realizations that can promote their interests such as cycling, relaxation areas, playgrounds etc.

Conclusions

Efforts to obtain empirical evidence about land owners' perception of land consolidation and analysis of collected data showed the following key findings. Awareness about land consolidation is high (90% on average), positive perception also (77%). They are considered helpful/useful in some way (57%) and seen as contributing to a better overview of ownership (65%). A majority (57%) would even agree with additional land consolidation. Among issues with a negative perception can be mentioned the contribution to the common facilities and measures (42%), a lack of information about ecological aspects (27%) and land consolidation as a whole (47%). Also the participants do not feel that new plots have been discovered that they were unaware of (33%). As essential groups, we consider respondents of higher education in "productive" age (they perceived land consolidation as a tool for consolidation of the country), seniors of lower education (much more conservative than we expected, prominent lack of trust based on bad experiences in the past is shown, by males in particular) and juniors (group with a lack of information, lack of knowledge or even ignorance). We think that addressing problematic groups of respondents/population, especially juniors, is important, so they can be educated about land consolidation. Natural demographic development should strengthen positive opinion/support for implementation of land consolidation among seniors. Information campaigns should focus on juniors, who will soon be economically active, so

Table 8. Base demographics of the case study area and the Slovak Republic

Parameter	Description	Parameter representation (%)	
		c. a. Malý Báb	Slovakia
Gender	1 Female	48	48
	2 Male	52	52
Age	1 18–24 years – juniors	23	15
	2 25–64 years	33	69
	3 Above 65 years – seniors	44	16
Education	1 Without education and secondary	72	80
	2 University education	28	20

they can make decisions about their interests/quality of life (i.e. “not only” ownership but also “nice” country, “healthier” environment, opportunities for relaxing...). Seniors’ concerns can be mitigated by better communication with examples of successful completion of land consolidation (including common facilities and measures and environmental impact). In this way, positive pressure on the administration could be established, for greater extent of land consolidations in Slovakia. Also any proposed measures should be implemented in accordance with the needs for landscape development, ecological stability, quality of life of citizens and the following generations.

Acknowledgements

Results obtained in the research projects VEGA no. 1/0574/13 and KEGA no. 025UKF-4/2015 have been used in this paper.

References

- BLAŽEK, V., HÁJEK, V., LIČÍK, L., NIŽNANSKY, B., POPKOVÁ, K., ŠMÍDA, J., 2014. Urban places and spaces from point of view of the three different methods using old maps and plans (on the example of the urban space in the Liberec town). *International multidisciplinary scientific geoconference Surveying geology and mining ecology management, SGEM*, 3, 2: 1039–1046.
- DEMETRIOU, D., 2012. *The development of an integrated planning and decision Support system (IPDSS) for land consolidation*. PhD thesis. Garstang North: University of Leeds, School of Geography. 353 p.
- DUMBROVSKÝ, M., MEZERA, J., STRÍTECKÝ, L. 2004. *Metodický návod pro vypracování návrhů pozemkových úprav* [Methodical instructions for the draft of land consolidation]. Brno: Českomoravská komora pro pozemkové úpravy. 190 p.
- FAO, 2004. *Operations manual for land consolidation pilot projects in Central and Eastern Europe*. FAO Land tenures manuals 1. Rome: Food and Agriculture Organization of the United Nations. 69 p.
- FAO, 2008. *Opportunities to mainstream land consolidation in rural development programmes of the European Union*. FAO land tenure policy series 2. Rome: Food and Agriculture Organization of the United Nations. 58 p.
- 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. 128 p.
- HAVLÍČEK, M., PAVELKOVÁ, R., FRAJER, J., SKOKANOVÁ, H., 2014. The long-term development of water bodies in the context of land use: The case of the Kyjovka and Trkmanka river basins (Czech Republic). *Moravian Geographical Reports*, 22 (4): 39–50.
- JÜRGENSON, E., HASS, H., MAASIKAMÄE, S., 2010. The impact of land fund characteristics on the land reform results in Estonian rural municipalities. *Lžūu Mokslo Darbai*, 86: 65–70.
- IVANOVÁ, M., MICHAELI, E., BOLTŽIAR, M., 2013. Analýza zmien priestorovej štruktúry krajinej pokrývky územia severne od vodnej nádrže Zemplínska šírava. *Geografický Časopis*, 65: 235–250.
- JUSKOVÁ, K., MUCHOVÁ, Z., POCHOP, M., 2015. Stav pozemkových úprav v České republice a Slovenské republice aneb “Když dva dělají totéž, není to vždy totéž”. *Geodetický a Kartografický Obzor*, 61: 72–81.
- KADLEC, V., ŽÍŽALA, D., NOVOTNÝ, I., HEŘMANOVSKÁ, D., KAPIČKA, J., TOPPL, M., 2014. Land consolidations as an effective instrument in soil conservation. *Ekológia (Bratislava)*, 33: 188–200.
- LI, Y., LIU, Y., LONG, H., CUI, W., 2014. Community-based rural residential land consolidation and allocation can help to revitalize hollowed villages in traditional agricultural areas of China: evidence from Dancheng County, Henan Province. *Land Use Policy*, 39: 188–198.
- LIGA, J., PETROVIČ, F., BOLTŽIAR, M., 2014. Land cover changes in Slovakia 1990–2006 related to the distance from industrial areas and economic development. *Geografický Časopis*, 66: 3–20.
- LISEC, A., PRIMOŽIČ, T., FERLAN, M., ŠUMRADA, R., DROBNE, S., 2014. Landowners’ perception of land consolidation and their satisfaction with the results – Slovenian experiences. *Land Use Policy*, 38: 550–563.
- LONG, H., 2014. Land consolidation: an indispensable way of spatial restructuring in rural China. *Journal of Geographical Sciences*, 24: 211–225.
- LOUWSMA, M., VAN BEEK, M., HOEVE, B., 2014. A new approach participatory land consolidation. *XV International FIG congress, Engaging the challenges – enhancing the relevance, Kuala Lumpur, Malaysia, 16–21 June 2014*. 10 p. [cit. 2015-10-3]. https://www.fig.net/resources/proceedings/fig_proceedings/fig2014/papers/ts02d/TS02D_louwsma_van_beek_et_al_7020_abs.pdf
- MURGAŠ, F., 2009. Quality of life and its spatial differentiation in districts of Slovakia. *Geografický Časopis*, 61: 121–138.
- OLAH, B., BOLTŽIAR, M., 2009. Land use changes within the Slovak biosphere reserves zones. *Ekológia (Bratislava)*, 28: 127–151.
- PAŠAKARNIS, G., MORLEY, D., MALIENE, V., 2013. Rural development and challenges establishing sustainable land use in Eastern European countries. *Land Use Policy*, 30: 703–710.
- PODHRÁZSKÁ, J., VAISHAR, A., TOMAN, F., KNOTEK, J., ŠEVELOVÁ, M., STONAWSKÁ, K., VASYLCHENKO, A.,

- KARÁSEK, P., 2015. Evaluation of land consolidation process by rural stakeholders. *European Countryside*, 7 (3): 144–155.
- R DEVELOPMENT CORE TEAM, 2015. *R: a language and environment for statistical computing*. Vienna: R Foundation for Statistical Computing [cit. 2015-11-12]. <http://www.r-project.org/>
- ŠPULEROVÁ, J., DOBROVODSKÁ, M., LIESKOVSKÝ, J., BAČA, A., HALABUK, A., KOHÚT, F., MOJSES, M., KENDERESSY, P., PISOVÁ, V., BARANČOK, P., GERHÁTOVÁ, K., KRAJČÍ, J., BOLTIŽIAR, M., 2011. Inventory and classification of historical structures of the agricultural landscape in Slovakia. *Ekológia (Bratislava)*, 30: 157–170.
- TARASOVIČOVÁ, Z., SAKSA, M., BLAŽÍK, T., FALĽAN, V., 2013. Changes in agricultural land use in the context of ongoing transformational processes in Slovakia. *Agriculture*, 59 (2): 49–64.
- THOMAS, J., 2006. What's on regarding land consolidation in Europe? *Proceedings of the XXIII International FIG congress 2006, Shaping the change, Munich, 8–13 October 2006*. 16 p. [cit. 2015-10-31]. https://www.fig.net/resources/proceedings/fig_proceedings/fig2006/papers/ts80/ts80_03_thomas_0311.pdf

Received December 18, 2015

Accepted February 1, 2016