

Evaluation of formation and reparcelling of land parcel projects

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The article presents an analysis of two subjects: the motives of formation and reparcelling of land parcel projects and evaluation of their solution effects on landscape, and rationality and compatibility of projected land use.

The main intentions of the projects were estimated after the research. The first intention is to divide land parcels according to parts belonging to co-owners (to form separate parcels). The second intention is to divide land parcels in order to sell or grant to other persons. The third intention is to specify borders between owned and neighbouring parcels.

An analysis of ecological balance rate indicators of project solutions shows a result that a scarcely stable territory was in 8 parcels ($K_{es} = 0.34-0.50$), a totally ecological unstable territory was in 13 parcels ($K_{es} \leq 0.33$), and a moderately stable territory was only in 2 parcels. It was noticed that in many cases there were small negative changes of the ecological balance rate. It depends on the dividing process of arable land and more ecologically stable territories.

Key words: ecological balance, land use rationality, reparcelling

INTRODUCTION

Land must be rationally planned in order to use it. By using the properly planned land you must ensure to keep the required production level of agriculture, soil protection, ecological stability of terrain, and agricultural land use improvement.

Land use planning is a system of tools, used by the Government to implement land property and its usage section politics: applying terrain planning tools to organize consumption of land fund, that is valid academically, rational and favourable for environment, and that does accounting of country's land fund, forms land parcels, measures boundaries of administrative units, attaches land to agriculture activity territories and other sections of utilitarian environmental management (Tarvydienė, 2008).

The order of rational agricultural landholding depends on the law, Government's decrees, and other decrees that regulate documents of terrain planning. They define the principal specific purpose of land use of a particular territorial segment, the method and nature of the use of a land parcel, and

other conditions and regulations (Kavaliauskienė, 2008).

Rational agricultural land-holding is planned by land use planning and other projects. Various farm holding branches that require land use are adjusted by these projects. Furthermore, there must be considered natural resources saving subject and other interests of society requirements.

Formation and reparcelling of land parcel projects are being prepared and implemented when it is needed to divide, partition, merge or amalgamate land parcels that are registered in the Immovable Property Register. This common land use service is used by land owners who want to regulate land, which is recovered from the agrarian reform or acquired by other means. According to the Planning Department's survey, formation and reparcelling of land parcels projects were arranged 1–1.5 k times in rural area yearly (Aleknavičius, Liaskovskaja, 2009).

In projects of land parcel formation and reparcelling the principal specific purpose of land use, the method and nature of the use of a land parcel must be defined. It is regulated by the Government's

decree and rules ratified by the Ministers of the Departments of Environment and Agriculture (Lietuvos..., 2004). Other Government's decree is used when it is needed to identify or eliminate land easements (Žemės servitutu..., 2004).

Land parcels must be formed properly in order to use them rationally and to avoid deterioration of ecological, recreational conditions and possibilities to develop agricultural activity. While separating solid arable land, meadow and forest parcels, land parcels must be formed compactly, in a rectangular or similar form and suited rationally (Žemės sklypu..., 2004). But in the current law there is no requirement for the minimum size and the form of the agriculture parcel, for example: the width of the parcel (Aleknavičius, 2012). Results of the research demonstrate that a key indicator in the human system (i. e. the parcel size and changes in the parcel size), which is driven by socioeconomic processes as well as policy, has direct implications for indicators in the natural system (Robinson, 2012). Land-use convenience, time and labor costs allocated to economic activities, good-neighbourly relations highly depend on the use of land use boundary configuration (Sližienė, 2010).

The aim of this article is to analyze the motives of formation and reparcelling of land parcels projects, evaluate their solutions' effects on landscape and rationality, compatibility of projected land use.

METHODOLOGY OF RESEARCH

In order to do research, there were analyzed 331 projects for formation and reparcelling of land parcels, they were created in eastern Lithuania from 2005 to 2010. There were 2 parameters to evaluate projects during the analysis: project solution effects on environment and landscape; rationality and compatibility of projected land use.

The ecological balance rate is counted according to the following formula:

$$K_{es} = \sum k_e \times P / \sum P, \quad (1)$$

where K_{es} is the ecological balance rate, k_e is the land type ecological balance rate, P is the land type estate (area).

The measured land ecological balance rate is given in Table 1.

Table 1. **Ecological balance rate (Aleknavičius, 2008)**

Land	Ecological balance rate K_{es}
Arable lands	0.14
Meadows	0.62
Pastures	0.68
Gardens	0.43
Forests	1.0
Flora of trees and bushes	0.4
Marshes	0.79
Water basins	0.79
Closed territories, roads	0.0
Impaired lands (quarries)	0.0
Other lands	0.68

When the ecological balance rate (K_{es}) average value is 0.67 or more, the territory is balanced ecologically, when it is 0.51–0.66, the territory is stable moderately, when this value is 0.34–0.50, the territory is scarcely stable, and if K_{es} is less than 0.34, the territory is unstable. To form a land parcel of arable land or sowed meadows, its length and width proportion must be 1:3 or less. Land parcel boundaries must be identified with natural contours or artificial objects. If there are not any natural or artificial objects, land parcel boundaries must be projected straight to compose regular boundaries of an arable land parcel.

There were used cartographical, logical and analytical thinking methods.

RESULTS

While forming a real estate object, partitioning or dividing it, newly formed real estate objects must meet these requirements:

- 1) The used method must not contradict with documents of terrain planning;
- 2) The principal specific purpose of land use and the nature of farm holding use must not contradict with documents of terrain planning;
- 3) These objects can function independently from each other unless law defines otherwise;
- 4) Possibility to estimate and calculate each object's value (Žemės sklypu..., 2004).

Land parcels can be formed to prepare not only land use planning projects, but also detailed plans that implement terms of land administration:

- 1) A land parcel with buildings on it can be divided or partitioned only in a way to be able to

exploit the building in a single parcel. Several land parcels cannot be formed under one registered building;

2) Formative land parcel boundaries between corner points must compose a closed contour. Several land parcels divided by other real estate objects (roads, streets, railroads, unprivatized objects, etc.) must be formed as separate land parcels;

3) If there are not any possibilities to partition a land parcel into parts indicated by co-owners, formative parcel area must be rounded up, but the whole land parcel's area must not be changed. In the case when the area of a land parcel is calculated in hectares, the rounded value is 2 numbers after comma;

4) While modifying land parcel boundaries and size, forming new land parcels, it is a must to follow defined requirements of rational use of land, detail plans and land use planning project preparation.

There were analyzed 331 projects for formation and reparcelling of land parcels created from 2005 to 2010 and owned by 455 possessors. The most usual operation is parcel dividing (218 cases, 66.9%) – present parcels are divided into 2 or 3 land parcels (Table 2).

The majority of projects, i. e. 74, were developed in 2007 during the economic boom and more intense selling of land parcels. For this reason the parcels were divided into smaller ones. 55 projects

separating a part of the area were compiled (it equals to almost 17% of all projects analysed).

One can make an assumption that owners of land parcels when pursuing projects of land parcel separation do not take into consideration the criteria of parcel rationality, ecological balance, etc. The main aim is protection of ownership, which, having separated a part of a land parcel, allows one to dispose of his / her property irrespective of co-owners. In addition, the tendency of land parcels analysed was observed – the area of separated land parcels is at least 50 ares. Under the guidance of Rural Development project preparation schemes of selecting a location for a farmstead can be designed within a parcel no smaller than 50 ares.

The main reasons to prepare the projects of land parcel formation and rearrangement are as follows:

1) To partition land parcels according to parts belonging to co-owners (to form separate parcels);

2) To divide land parcels in order to sell or grant to other person;

3) Using the land parcel for a farmstead (especially in the suburbs).

While reparcelling agricultural land, it is important that after reparcelling there would be better conditions to use land according to its defined purpose. That is why instructions are the same as to form new land parcels during the reform. Furthermore, it must be estimated if private interests to divide land parcels do not contradict with the purpose to make better conditions for land use (arable land cultivation or other agricultural activity).

During the analysis of the prepared projects, it was estimated what size and form composed the arable land and how much they are rational from a standpoint of mechanical land cultivation.

Land parcels must be formed properly to use them rationally and to avoid deterioration of ecological, recreational conditions; possibilities to develop agricultural activity; activity conditions for nearby land parcels' users (Aleknavičius, 2001; Lankelis, 2002). As we can see in Fig. 2, there is a road projected beside the parcels. After forming the dividing project parcels remain compact and each of them has road access (Figs. 1, 2).

Many parcels before dividing and reparcelling projects were formed like trapeziums (37.12%).

Table 2. Reasons of formation and reparcelling of land parcels

Year	Number of owners	Number of dividing projects	Reasons of land parcel dividing			
			Between co-owners	To separate premises or forest	To separate a part of the area	Because of taking the land for public needs
2005	67	39	13	6	18	2
2006	70	54	17	1	33	3
2007	98	74	8	10	55	1
2008	88	64	12	8	44	–
2009	96	72	16	9	47	–
2010	36	28	5	2	21	–
Total:	455	331	71	36	218	6

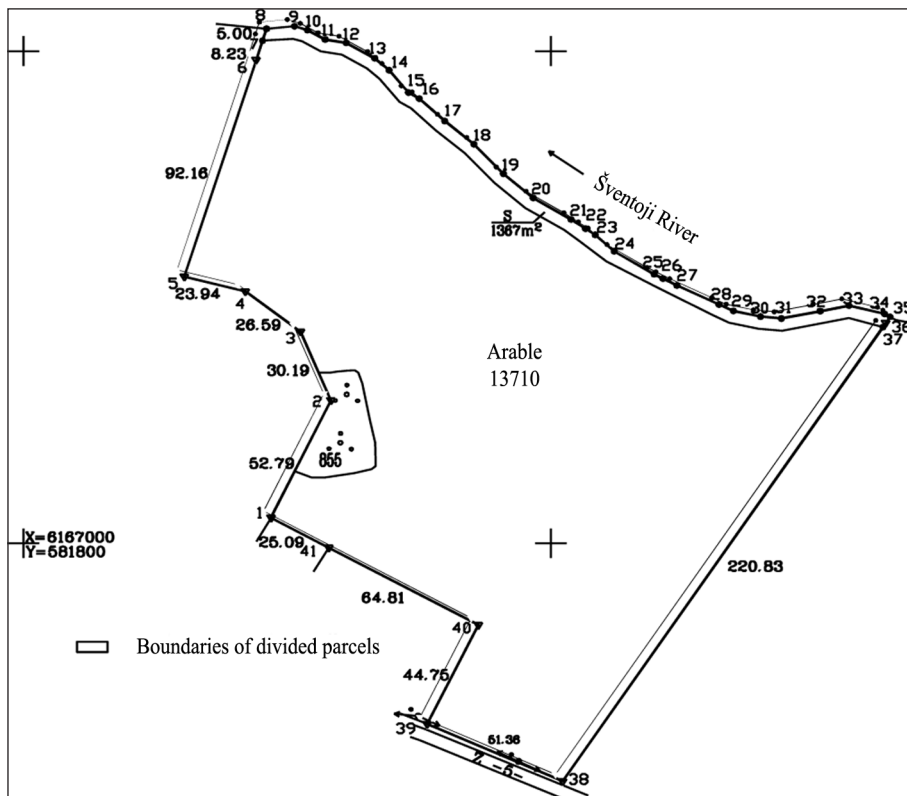


Fig. 1. The land parcel owned by N possessors before the dividing and reparceling project

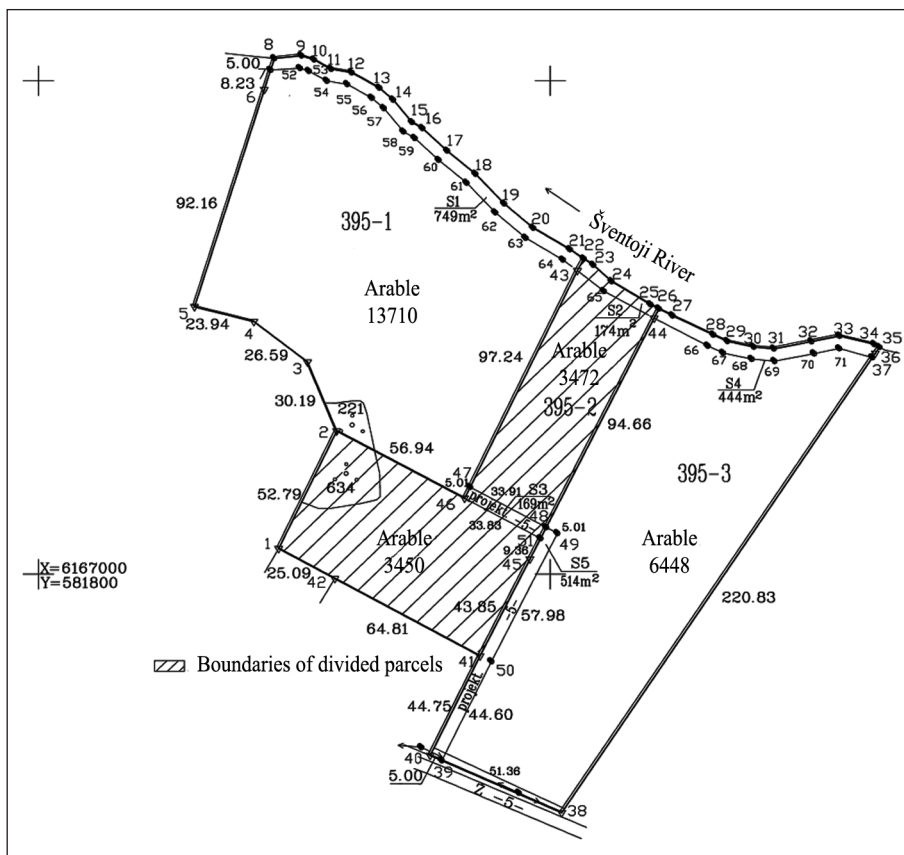


Fig. 2. The dividing and reparceling project of the land parcel owned by N possessors

After dividing and reparcelling projects, the number of regular parcels increased considerably (73.17%) (Fig. 3).

To sum up, it can be said that quality of parcels improved in terms of configuration but there are still many irregular form parcels. There are various reasons why irregular form parcels occur after forming and reparcelling projects. Usually these kinds of parcels are formed beside lakes, every parcel owner on request wants to have access to the shore of a lake.

It is usual that residential or other constructional land parcels are formed from agricultural land which has a polygonal or patch form (Ramanaukas, Dringelis, 2011). An example of an incompact parcel is shown in Fig. 4.

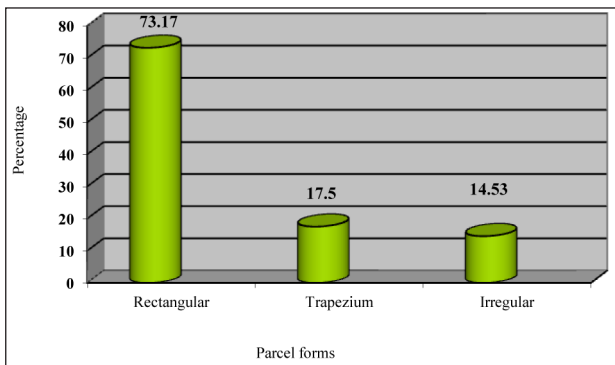


Fig. 3. The number of land parcels in terms of their forms after formation and reparcelling projects

The parcel project is implemented under owner’s request and it is an example of an incompact parcel dividing and reparcelling project. This kind of projects usually occurs in “prestigious” places because citizens request access to the lake or, like in this instance, a pond that is requested to have by a 7-1 parcel owner.

In the next example (Fig. 5), there are forming narrow land parcels that contravene the recommendable length and width and cannot ensure rational land use.



Fig. 5. Land parcel, owned by N possessor, being divided

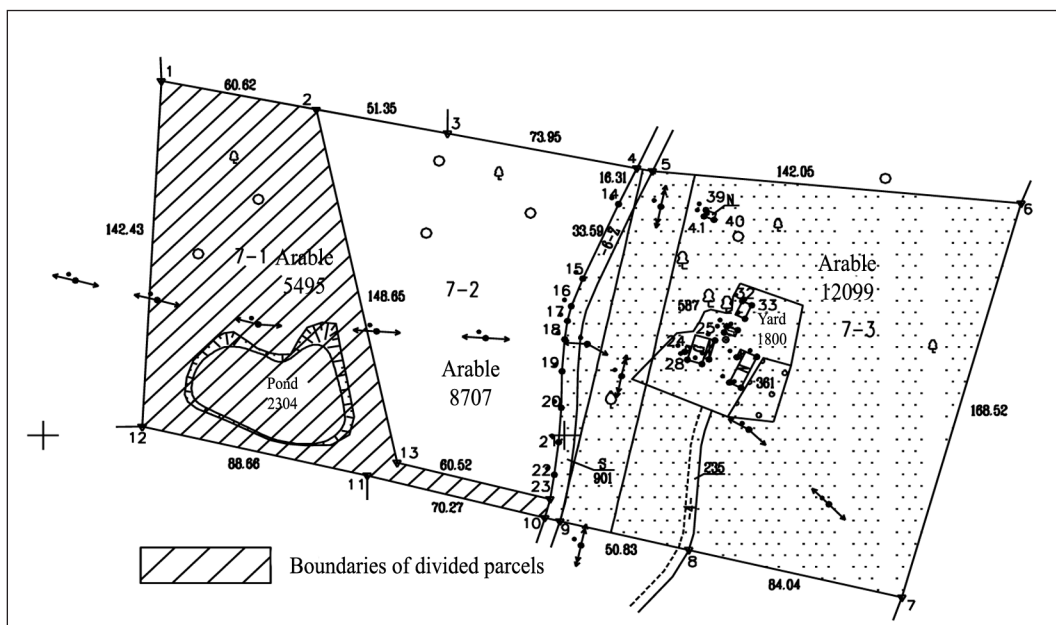


Fig. 4. The dividing and reparcelling project of the land parcel owned by N possessors

General requirements of instructions cannot provide sufficiency for the projector to the object against land owner's requests, which usually deteriorate conditions. It is like that because there are no particular standards in project preparing instructions. During the analysis, there were noticed several cases when agricultural purpose parcels were 1) divided into a narrow strip or even zig-zag; 2) partitioned into several small parcels for premises; 3) parcel corners were composed into various geometrical forms even in reclaimed lands, flat relief. Eventually that burdens mechanical cultivation (Aleknavičius, Liaskovskaja, 2009).

Agricultural territory land use planning is secure when projected means meet requirements of landscape forming. In order to optimize landscape, it is a must to analyze its state – natural and semi-natural sprouting places and their functions; also it is needed to calculate the ecological balance of a particular territory (Sudonienė, 2003).

There were made calculations of the ecological balance for some parcels on purpose to estimate the partitioned land parcels' effect on the landscape. Evaluated parcels were those, which were partitioned into three separate parcels and which ecological balance before reparcelling was unstable, scarcely stable or moderately stable. Project solution ecological balance rate indicators were analyzed. As a result, it was estimated that a scarcely stable territory was in 8 parcels ($K_{es} = 0.34-0.50$), a totally ecological unstable territory was in 13 parcels ($K_{es} \leq 0.33$), a moderately stable territory was only in 2 parcels (Table 3).

Summarizing the estimated ecological balance rate indicators, it was noticed that after reparcelling of an initial parcel into more parcels, in many cases this indicator does not change considerably, yet it increases. In separate occasions ecological balance decreases (17.4% of the 23 parcels analysed). It is determined by arable land partition from ecological stable territories. Therefore, while partitioning land parcels land separation should be mosaic or a part of the projected territory should be transformed into more ecologically stable one to ensure natural variety.

Table 3. Change of ecological balance rate

Ecological balance rate before reparcelling	Ecological balance rate after reparcelling		
	1 parcel	2 parcels	3 parcels
0.32	0.43	0.43	0.20
0.14	0.14	0.32	0.32
0.17	0.14	0.21	0.52
0.15	0.15	0.15	0.15
0.48	0.45	0.30	0.45
0.20	0.20	0.20	0.20
0.45	0.50	0.50	0.35
0.40	0.43	0.43	0.35
0.13	0.13	0.13	0.13
0.29	0.25	0.30	0.45
0.45	0.35	0.45	0.48
0.30	0.40	0.45	0.40
0.35	0.30	0.30	0.40
0.60	0.55	0.60	0.66
0.50	0.50	0.45	0.30
0.25	0.30	0.30	0.25
0.25	0.25	0.25	0.15
0.20	0.20	0.15	0.15
0.45	0.40	0.50	0.50
0.65	0.50	0.50	0.60
0.34	0.42	0.45	0.30
0.15	0.15	0.15	0.20
0.13	0.13	0.13	0.13

CONCLUSIONS

1. Having analysed the data of project solution ecological balance coefficient indicators of the parcels, which were subdivided into three parcels and the ecological balance of which before the rearrangement was low or average low, it was obtained that a scarcely stable territory was in 8 parcels ($K_{es} = 0.34-0.50$), a totally ecological unstable territory was in 13 parcels ($K_{es} \leq 0.33$), and a moderately stable territory was only in 2 parcels.

2. Many small changes of the estimated ecological balance rate indicators were noticed after land parcel dividing. They depend on the dividing process of arable land and more ecologically stable territories.

3. During the partitioning of land parcels, land separation should be mosaic or a part of projected territory should be transformed into more

ecologically stable one to ensure natural variety. In order to make projects of formation and reparation of a land parcel, it is important to evaluate both land use rationality and ecological stability.

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ŽEMĖS SKLYPŲ FORMAVIMO-PERTVARKYMO PROJEKTŲ VERTINIMAS

S a n t r a u k a

Straipsnyje analizuojami žemės sklypų formavimo-pertvarkymo projektų rengimo motyvai, įvertintas projektų sprendinių poveikis kraštovaizdžiui ir suprojektuotų žemėnaudų racionalumas bei kompaktiškumas. Atlikus tyrimą nustatytos pagrindinės projektų rengimo priežastys: žemės sklypai atidalinti pagal bendraturčius priklausančias dalis (suformuoti atskiri sklypai); žemės sklypai padalinti siekiant juos parduoti ar dovanoti kitiems asmenims; patikslintos sklypų ribos tarp kaimyninių žemės savininkų. Išanalizavus projektinių sprendinių ekologinio stabilumo koeficiento rodiklių duomenis, gauta, kad mažai stabili teritorija buvo 8 sklypuose ($K_{es} = 0,34-0,50$), visiškai ekologiškai nestabili – 13 sklypų ($K_{es} \leq 0,33$), vidutiniškai stabili – tik dviejuose sklypuose. Dažniausiai stebėti nedideli neigiami pokyčiai, kuriuos lemia ariamosios žemės atskyrimas nuo ekologiškai stabilesnių teritorijų.

Raktažodžiai: ekologinis stabilumas, žemėnaudų racionalumas, sklypų pertvarkymas