THE REALISATION OF LAND CONSOLIDATION PROJECTS: CASE STUDY OF CADAstral MUNICIPALITY RADENKOVIĆ

РЕАЛИЗАЦИЈА КОМАСАЦИОНИХ ПРОЈЕКАТА: СТУДИЈА СЛУЧАЈА КАТАСТАРСКА ОПШТИНА РАДЕНКОВИЋ

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Summary: This paper demonstrates an analysis of the effects of land consolidation, presented on the example of Radenković cadastral municipality (municipality of Sremska Mitrovica). The primary goal of land consolidation is to group segregated properties and to perform area management through various projects like road and channel network project, agricultural forest belts, etc. Accordingly, the research presented in this paper includes parameters that originate from the goals of land consolidation and refer to the number of lots before and after land consolidation, as on the relation of the surface covered with roads and channels, which undoubtedly indicates on the effects that can be achieved through the realization of land consolidation projects.

Keywords: land consolidation, land consolidation projects, land consolidation effects

1. INTRODUCTION

The primary and basic role of land consolidation is to group segregated agricultural properties and to advance

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Резиме: У овом раду анализирани су ефекти комасације, на примеру катастарске општине Раденковић (Општина Сремска Митровица). Примарни циљ комасације земљишта јесте да се груписане уситњене посед и да се изврши управљање простора кроз разне пројекте, као што су пројекат путне и каналске мреже, пољозащитни шумски појасеви, итд. У складу са тим, истраживање у овом раду обухвата параметре који произистичу из циљева комасације, а који се односе на број парцела пре и после комасације, као и однос површине под путевима и каналима, који несумњиво указују на ефекте који се могу остварити реализацијом комасацијских пројеката.

Кључне речи: комасација, комасацијски пројекти, ефекти комасације

1. УВОД

Првобитна и основна улога комасације земљишта је груписање уситњених пољопривредних поседа
agricultural production. Today, modern aspects of land consolidation significantly surpass the advancement of agricultural production frames. This process is becoming an instrument for complete land management, used to achieve a compromise in the fulfillment of different, often opposite demands: environmental protection, esthetic and functional space arrangement as well as intensive agricultural production. According to [1], land consolidation process is more often seen as an opportunity for resolving much more complex issues related to space arrangement.

Land consolidation projects are very complex and are most often linked to agricultural land arrangement, irrigation, drainage and field roads reconstruction and construction, established as very important parts of the overall improvement and advancement of agricultural production of ecological systems and economic development [2], [3], [4], [5], [6], [7], [8], [9].

Launching and realization of land consolidation projects is an ongoing field of work in our country like in the rest of the world. Many authors analyzed the effects of land consolidation after the project was completed, so according to [5] positive effects of land consolidation are portrayed in:

- structural improvement of properties in rural areas,
- more economical and efficient use of agricultural land,
- agricultural production improvement and
- population growth in rural areas.

Also, according to [10], positive changes that emerged through land consolidation implementation, can be divided in six main categories:

- available agricultural land,
- size and shape of the lot,
- field roads and lots accessibility,
- density and connectivity of irrigation system and drainage system,
- types of land use and
- and unapređenje pošućenopredne proizvodnje. Dana, savremeni aspekti komasacije zemljišta značajno prevežale okvir ne pošućenopredne proizvodnje. Ona postaje instrument kompletog uređenja zemljišta kojim treba da se postigne kompromis u ispunići različitih, često suprotnih, zahteva: zaštite životne sredine, estetskog i funkcionalnog uređenja prostora i intenzivne pošućenopredne proizvodnje. Prema [1], proces komasacije se sve češće vide kao shansa za решавање многосложениh problema vezanih za uređenje prostora.

Projekti komasacije zemljišta su veoma kompleksni i najčešće su povезани s uređenjem pošućenoprednog zemljišta, nаводњавањем, одводњавањем i реконструкцијом и izградњом атарских путева, за које je утврђено да imaju veoma значајну ulogu u унапређењу и побољшању pošućenopredne proizvodnje, еколошкиh sistema i економског разvoja [2], [3], [4], [5], [6], [7], [8], [9].

Покретање и реализација комасационих пројеката представља област коja je veoma актуелна, како код нас, тако и у свету. Многи аутори анализирали су ефекти комасације након реализације пројеката, па према [5] позитивни ефекти комасације се огледају у:

- побољшању структуре посе
da u руралним подручјима,
- економичниjем и ефикасниjем коришћењу поšućenoprednог zemljišta,
- побољшању pošućenopredne производње и
- повећању броjа становника u руралним подручjима.

Такође, према [10], позитивне промене настале успел имплементације комасације, могу се поделити у шест главних категориja:

- расположиво поšućenopredno zemljište,
- величина и облик парцеле,
the number of lots per household in land consolidation area.

In the Republic of Serbia, the launching and realization of land consolidation are expanding. Land consolidation is mostly implemented over the land in Vojvodina (around 60%), followed by Central Serbia (around 9%), while the smallest coverage is in Kosovo and Metohija (around 5%). By the year of 2011, land consolidation was realized in 897 cadastral municipalities in the Republic of Serbia, with the total surface of 1,892,624 acres, which represents around 25% of the total agricultural land. Based on these data, and considering the condition of the properties, we can clearly conclude that this topic will be vividly present in the following years.

Although a significant number of projects were realized, and many projects are ongoing at the moment, there was no research about the effects of land consolidation projects so far. Accordingly, research in this paper is oriented on the parameters that originate from the basic goals of land consolidation.

Thus, the paper analyses the parameters regarding the number of lots before and after land consolidation and the relation of surfaces under road and channel network, since the rate of projected field roads and their field connectivity, as well as the density of irrigation and drainage systems, have a significant impact on the increase of land consolidation positive effects.

Also, the paper includes the effects that cannot be mathematically expressed but are certainly positive and affect the final contribution of land consolidation in land arrangement and the improvement of living conditions for the people on that area.

The effects of land consolidation can also be seen from the aspect of sustainable development and environmental protection. However, this paper does not present the analysis of these aspects.
2. MATERIAL AND METHODS

3. Characteristics of land consolidation area

The research in this paper includes the area of Radenković cadastral municipality. CM Radenković is a settlement of the city of Sremska Mitrovica, which was, according to the statistical data from 2001, enlisted as a medium developed municipality of Vojvodina. CM Radenković is located in the southern part of the city territory. Asphalt road passes through the village and connects the settlement with Sremska Mitrovica. Radenković cadastral municipality is characterized as a village, so its future development is based on agriculture and forestry. According to the 2002 census, there are 295 households in the cadastral municipality, from which around 80% practice agriculture. This area is characterized by plain relief and low terrain level, with an average altitude of around 79 m. On the other hand, there is an expressed abundance of micro-depressions, which subsequently leads to water accumulation. The total surface of CM Radenković is 1447 ac, divided into 3275 lots (Table 1). The surface of the construction area is 168 ac. CM Radenković is also characterized by a large surface of forest land (250 ac 14 а 37 m2).
Table 2 shows a review of the number of lots by real estate folios and property form.

<table>
<thead>
<tr>
<th>Cadastral municipality</th>
<th>Private property</th>
<th>Other property forms</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. RE</td>
<td>Number of lots</td>
<td>Average</td>
</tr>
<tr>
<td>Radenković</td>
<td>485</td>
<td>3136</td>
<td>6,5</td>
</tr>
</tbody>
</table>

Table 2 - Преглед броја парцела по листовима непокретности и облику својине

On a very small surface of the cadastral municipality territory, a channel network was implemented. These channels have recipients in the form of natural watercourses that gravitate towards Zasavica River, that is Sava River. Due to the low water level in the channel network, in the period characterized by the necessity for irrigation and high investments in the equipment, this agrotechnical step in agricultural households is not performed in a satisfying extent. At the moment, there is no precise register of individual agricultural producers that use water resources and deal with irrigation. Irrigational channel network was built on around 25 % of the surface, where necessary. There is no intensive maintenance of the channel network during the last few years, which significantly reduces its planned productivity. The territory of this cadastral municipality is also characterized by a high level of underground waters. By regulating the underground waters regime, the withdrawal of excess water would be made so all the necessary conditions for the regulation of land territory with land consolidation would be made. Within the cadastral municipality, there are no unclassified roads functioning as a connection of Radenković settlement and surrounding settlements with the activities in the district. These roads mainly have an earthly driveway and need to be spatially arranged during the land consolidation process. The total surface under roads is 10 ac 57 a 07 m2. A special explanation regarding the necessity of water regime and road network regulat-

На веома малој површини територије катастарске општине изведена је мрежа канала, који за реципијенте имају природне водотоке који гравитирају према реци Засавици, односно Сави. Због ниског нивоа воде у каналијском мрежу, у време потребе за наво-ђивање и високих улагања у опрему, ова агroteхничка мера код пољопривредних газдинстава се не спроводи у задовољавајућем обиму. Тренутно не постоји прецизна евиденција индивидуалних пољопривредних производача који користе водне ресурсе и баве се наводњавањем. Каналска мрежа за одводњавање је изграђена на око 25 % површине, тамо где је она била потребна. Последњих година нема интензивног одржавања каналиске мреже, што значајно смањује њену планирану продуктивност. Територију ове катастарске општине карактерише и висок ниво подземних вода. Регулисањем режима подземних вода, извршило би се одвођење вишка воде и уопште, створили неопходни услови за приступање уређењу земљишне територије комасацијом. У оквиру катастарске општине постоје некатегорисани путеви који су у функцији остваривања везе насеља Раденковић и околног насеља са садржајима у атару. Ови путеви су углавном са земљаним коловозом и морају се у поступку комасације просторно уредити. Укупна површина под путевима износи 10 ха 57 а 07 м2. О неопходности уређења водног режима и путне мреже кроз поступак
tion through the process of land consolidation is not needed, primarily due to the experiences coming from the rest of the world in these performances, which lately reached our country as well.

2.2. Reasons for land consolidation in CM Radenković

Reasons for the launching of land consolidation project in CM Radenković concur with the reasons issued in article 31. of Agricultural Land Law [11], i.e. land consolidation should be launched because of:

- The necessity to group segregated cadastral lots belonging to agricultural land owners (with an average size of 0.39 ac), as well as grouping of state property;
- Projecting a new network of field roads in accordance with technical solution for the first and second order roads, channels and agricultural belts and recultivation of the surface of old field roads;
- Construction of agro-protective forest belts;
- Correction and expansion of construction region borders;
- Realization of agricultural land irrigation and drainage system projects, established for land consolidation area;
- Resolving property-legal relations and providing a new state diameter and real estate cadastre.

Besides unregulated property, the reason for land consolidation project launch is the outdated state diameter. Diameter of cadastral municipality Radenković was performed in 1967. Fifty-year-old cadastral plan folios are very obsolete. Graphical changes on immovable properties are hard to register and are very unreliable. In 1953, a basic state map was created for the same area, also unreliable.
Everything mentioned above lead to the necessity to launch and realize land consolidation project in CM Radenković.

2.3. Material

With the goal of performing an analysis of land consolidation effects in CM Radenković, it was necessary to gather data about the condition of the property before land consolidation, so that a reliable representation of the achieved effects of land consolidation would be obtained. A vast amount of data was collected during the research, and some of them are presented in tables 1 and 2. The necessary data for the analysis were taken from competent services, and the resulting effects of land consolidation were analyzed.

2.4. Methods

In this paper, the analysis of parameters that indicate on the land consolidation effects was performed with standard statistical methods. Data describing the old pre-land consolidation condition were compared with the new state, after land consolidation was performed. As a result, the achieved effects are expressed in percents.

3. RESULTS

The most significant measurable effects originating from the basic goals of land territory management with land consolidation were expressed through the following indicators:

- A decrease of the number and increase of the lots size on land consolidated surfaces;
- An increase of the surface under road and channel network on the land consolidated area.

3. РЕЗУЛЬТАТИ

Најзначајнији мерљиви ефекти који проистичу из основних циљева уређења земљишне територије комасацијом исказани су преко следећих показатеља:

- смањења броја и повећања величине парцела на комасираним површинама;
- повећање површине под путном и каналском мрежом на комасираним подручју.
Table 3 presents a comparison of the number of lots, as well as of the surfaces under roads and channels, state before and after land consolidation on the territory of CM Radenković.

У табели 3. дат је упоредни приказ броја парцела, као и површина под путевима и каналима, стања пре и после комасације на територији КО Раденковић.

<table>
<thead>
<tr>
<th></th>
<th>Old condition</th>
<th>New condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total lots</td>
<td>3275</td>
<td>1781</td>
</tr>
<tr>
<td>Surface under roads</td>
<td>10 ас 57 а 07 m²</td>
<td>33 ас 91 а 54 m²</td>
</tr>
<tr>
<td>Surface under channels</td>
<td>3 ас 64 а 73 m²</td>
<td>19 ас 91 а 54 m²</td>
</tr>
</tbody>
</table>

Besides a significant decrease in the number of lots, the realization of land consolidation project resolved two other important questions in CM Radenković – the lack of road and channel network. Namely, before land consolidation took place, a significant number of owners did not have an access road to their lots, which represented a considerable problem. Farmers trespassed over each other properties with their machinery; which resulted in frequent conflicts between lot owners, and at the same time in the formation of dents on the lots, due to frequent crossings of heavy machinery over the ground. By having

Реализацијом комасационог пројекта, поред значајног смањења броја парцела, решена су и два горућа питања у КО Раденковић, а то су недостатак путне и каналске мреже. Наиме, пре реализоване комасације земљишта, велики број власника није поседовао приступни пут до своје парцеле, што је представљало велики проблем. Пољопривредници су машинеријом прелазили једни другима преко поседа, услед чега је долазило до честих конфликтног између власника парцела, а уједно и до стварања увратина на парцелама, услед преласка преко
land for common necessities, it is made possible that each owner has an access road to their lot after land consolidation took place.

On the other hand, considering there is a very high level of underground waters on the territory of CM Radenković, vast problems appeared during the spring sowing, when the underground water breaks out on the surface. Lot owners had to wait until the water withdraws so that they can process their lots. Furthermore, it is not uncommon for a certain number of lots to stay unprocessed throughout the entire year.

Figure 2 presents a folded depiction of a part of CM Radenković district before and after land management via land consolidation was performed. The new situation is presented with red color. After observing the entire image, we can clearly see the difference in shape and the number of lots in this...
area. Also, all new lots have an access road. Besides a successful fulfilment of the main goals of land consolidation, several extra effects were accomplished. Although these effects cannot be mathematically expressed, they hold an important contribution and significance on the arrangement of the area. It is known that through land consolidation, a renewal of diameter is also performed, that further solves the outdated state diameter problem. Also, an updated register of immovable properties is maintained, which undoubtedly leads to progress and advancement of the Immovable Properties Cadastre Service, as well as of other related institutions that acquire data for this service. A huge advantage was given to locals by cost-free solving of property-legal relations, resolved in the process of factual state establishment. What is specific for CM Radenković is that before land consolidation project took place, around 36 ac of surface was under coast. That surface was marked as an arable territory in the Immovable Properties Cadastre but was abandoned and without any use. Considering that the average surface in the property of one household in CM Radenković is around 4 ac, we can conclude that the surface under coast can support around nine households. Now, after land consolidation is realized, all coasts are organized and the land is adapted to its purpose - it is arable. Stated parameters immeasurably contribute to the positive effects of land consolidation.

4. CONCLUSION

Land consolidation is a very significant procedure for the development of agriculture and village itself because its realization helps to group segregated and scattered lots of each individual owner and helps to project a new channel network so that each lot has an access road. Also, all new lots have an access road. Besides a successful fulfilment of the main goals of land consolidation, several extra effects were accomplished. Although these effects cannot be mathematically expressed, they hold an important contribution and significance on the arrangement of the area. It is known that through land consolidation, a renewal of diameter is also performed, that further solves the outdated state diameter problem. Also, an updated register of immovable properties is maintained, which undoubtedly leads to progress and advancement of the Immovable Properties Cadastre Service, as well as of other related institutions that acquire data for this service. A huge advantage was given to locals by cost-free solving of property-legal relations, resolved in the process of factual state establishment. What is specific for CM Radenković is that before land consolidation project took place, around 36 ac of surface was under coast. That surface was marked as an arable territory in the Immovable Properties Cadastre but was abandoned and without any use. Considering that the average surface in the property of one household in CM Radenković is around 4 ac, we can conclude that the surface under coast can support around nine households. Now, after land consolidation is realized, all coasts are organized and the land is adapted to its purpose - it is arable. Stated parameters immeasurably contribute to the positive effects of land consolidation.

4. ЗАКЉУЧАК

Комасација је веома значајан поступак за развој пољопривреде и села, јер се њеном реализацијом групишу расцепкане и разбацане парцеле сваког појединачног власnika и пројектује се нова путна
access-road. With the realization of land consolidation projects, easier and more economic processing of agricultural land is performed, which amply facilitates country living. This paper holds the analysis of the effects originating from the basic goals of land consolidation and includes the number of lots before and after land consolidation, as well as the relation of the surface under road and channel network.

Furthermore, the paper also includes the immeasurable parameters which cannot be expressed through percents, but which undoubtedly indicate on the positive effects of land consolidation. With the analysis of land consolidation procedures and by reviewing the conditions before and after land consolidation, we can conclude that the following effects were achieved after land management with land consolation:

1. Decreased number of lots per 42%
2. The increased surface under road network per about 3 times
3. The increased surface under channel network per about 6 times
4. Resolved property – legal relations on the land
5. Resolved 36 acres under-coastal surface problem
6. Performed renewal of the diameter and acquired current data in IPCS, etc.

Based on everything presented in this paper, we can conclude that the benefits of land consolidation are extensive and that an organized land is the result of land management via land consolation. This facilitates land cultivation for the owners, supported by an updated register in all institutions that hold competence over the land.

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