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THE ANALYSIS OF PLANNING POSSIBILITIES OF RURAL MANAGEMENT WORKS AS EXAMPLIFIED BY THE KOZŁÓW COMMUNE

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Summary

Rural management works are carried out for the purpose of creating more favourable conditions for management and use of agriculture areas. The activities are fundamental to comprehensive development of a village, farm and the protection and maintenance of natural environment. The principal goal of these works is the improvement and development of the structure of rural areas.

The paper indicates priority areas for planning of rural management works and especially for land consolidation works. The research was based on The programme of rural management works in the Kozłów commune [Program prac urządzeniowo-rolnych... 2011] and on geodesic and planning materials. Combination of various kinds of data obtained at District and Voivodeship offices of geodesy and cartography and their appropriate analysis have proved effective in identification of areas in the Kozłów commune most urgently requiring the improvement of the use and ownership structure of lands and in defining the areas where the current land use structure should be transformed. The condition of reasonable planning of rural management works, leading to an indication of priority areas for this kind of activities are – on the level of voivodeships – the consistent and synchronized spatial databases founded on the land and property register.

The analysis of geographic, natural, environmental, socio-economic, demographic conditions and of cartographic documents with the use of GIS tools led to the identification of three precincts: Przybysławice, Bryzdzyn and Wierzbica, urgently requiring rural management works.

Keywords

agricultural structure • rural development • land and property register • agricultural geodesy

1. Introduction

Rural management works (*prace urządzeniowo-rolne*) are carried out to create more favourable conditions of management and use of agricultural areas. The activities are fundamental to a sustainable development of villages, farms and environment protection. Their general goal is an improvement and development of rural structures.

Agriculture in Małopolska is characterized by a considerable regional diversity, unfavourable agricultural structure that largely maintained its traditional character. This state of affairs is a result of historical, natural and socio-economic factors and especially regional tradition [Wytyczne „Monitorowanie zmian..." 2000].

Therefore rural development must be based on comprehensive structural changes, which would help in modelling the proper agricultural structure, including the area structure of farms. The agricultural structure can be improved substantially by: land sales, land consolidation and land exchange, a system of structural pensions and creation of producers' groups [Litwin 1997].

The principal objective of this article is an analysis of data gathered from land and property register, of results of land inventory and pieces of information found in planning studies, and as a result of the analysis – an indication of those precincts in the commune, where land consolidation is most advisable. For local and economic reasons it is necessary to identify the areas that are most problematic and that most badly need repair works, such as:

- improvement of agricultural structure and functioning of farms,
- improvement of living and working standards of rural population,
- protection and modelling of environment.

2. Range and methods of the study

The range of the study covers the Kozłów commune in the Miechowski district, in the north part of Małopolska Voivodeship, situated within the Miechowska Upland.

The study is based on the data gathered in the analysis of land and property register (with respect to parameters of size and number of land plots and farms), information on the manner in which agricultural lands are used, the cartographic documentation and the programmes of the commune development plans with its specific tasks related with the scope of the research. The statutory tasks of the commune defined in the development strategy were taken into account in the questionnaire and in the inventory of the actual state of lands use. The record data were verified in the field while taking the above-mentioned inventory, which covered the assessment of agricultural production environment (space), environment and cultural landscape.

Technological process included the use of a commercial software ArcGIS, SWDE Manager and many geodesic and information technologies, which required supplying of vector and raster databases with information layers for the whole Kozłów commune in the form of:

- digital aerial orthophotomaps (RGB) of terrain resolution 0.25 m, validity date: 2009–2010 (sources: Voivodeship Centre for Geodesic and Cartographic Documentation; LPIS),
- record data in the form of.shp and.dbf,
- digital soil and rural land maps in the form of the ESRI Shapefile (source: Voivodeship Centre for Geodesic and Cartographic Documentation),

- layers: buildings and roads included in the Topographic data base (source: Voivodeship Centre for Geodesic and Cartographic Documentation),
- layers: forests and protected areas included in the Topographic data base (source: Voivodeship Centre for Geodesic and Cartographic Documentation),
- the topographic map of scale: 1 : 10 000 (source: Voivodeship Centre for Geodesic and Cartographic Documentation),
- the digital map of changes in a way of land use in the form of ESRI Shapefile, made in 2011 on the base of high resolution satellite photos dated 1986–2011, of terrain resolution 30 m and 5 m (source: Voivodeship Centre for Geodesic and Cartographic Documentation),
- the map of land inventory and the map of the land and property register of scale 1 : 2000,
- abridged copies of data from the land and property survey,
- surveys for the Kozłów commune: The Commune development strategy for 2009–2015 and The Commune local development plan for 2009–2013 and The Programme of rural management works.

The obtained vector layers were subjected to a topology and attributes control in the software ESRI ArcGIS. The analyses were carried out in the coordinate system of "1992" of GRS 80 system, created on the basis of mathematically unequivocal assignment – according to the Gauss-Krüger cartographic projection theory – of the points on the surface of the Earth to adequate points on a plane.

On the basis of the information obtained in the land inventory, on the land and property register map of scale 1 : 2000, covering the total area of 7765 ha, the forests not revealed in the land and property survey, devastated, neglected areas, tree and shrub planting of between-fields, roadside and along ditches were marked. The currently non-existent roads, revealed in the land and property survey, were indicated as well as existing roads, not revealed in the land and property survey, and roads' technical condition and the kind of their surface together with technical condition of ditches were also determined. Moreover wetlands and water holes were localized and photographic documentation of the above-mentioned areas was made.

On the basis of the inventory of the *status quo* and conclusions drawn from the analysis of environmental conditions of agricultural production space as well as the socio-economic conditions, the technical infrastructure and the agricultural production environment of the commune the following issues were worked out:

1. Directions of agricultural production environment development.

   The connections between the programme of rural management works and other planning studies for the commune were demonstrated. Weaknesses and strengths of agricultural production environment were shown as well as threats and opportunities for the commune development. The need for rural management works, their scope and kind was determined.

2. Water management (basic and specific land reclamations).
3. Landscaping (or landscape modelling: natural and landscape values, afforestation, trees and shrub planting).
4. Land management and improvement of agricultural structure (exclusion of lands from use for agricultural purposes, development of area structure of farms).
5. Improvement of agricultural land layouts (lands consolidation, rural roads).
6. Directions of agricultural production development (crop and animal production).
7. Comparison of planned rural management works (determining the kind and scope of essential proceedings, assessment of the demand for the works, their general cost and sources of their financing).

In the preliminary selection of areas, where the reasonable arrangement of agricultural production environment would be most appropriate, the following factors were taken into account:

- the opinions of local community leaders,
- the number of farms in a village,
- the mean number of land plots (parcels) in a farm,
- the quality of soils,
- unfavourable shape of land plots,
- the need for road network management,
- land plots without road access,
- the current state of land use.

3. Results

The land inventory showed that the environment of arable lands, in relation to data derived from land register, has diminished in total by 320 ha in all studied precincts, except for the Kozłów village. The biggest depletion of arable lands was noted in Przysieka (64 ha), Kępie (59 ha), Karczowice (52 ha) and Przybysławice (43 ha). The space of grasslands has increased by 170 ha. The biggest increase of grasslands was observed in Przysieka (6 ha). The space of orchards has diminished by 89 ha, of which the least decrease was noted in Wierzbica, and the biggest loss – in Kozłów. Woodlands and tree-covered areas have expanded by 273 ha. The biggest increase took place in Kępie, Przybysławice, Marcinowice and Bryzdzyn (Table 1).

As a result of the comparison of data gathered from land inventory with land and property register data the following can be noted:

- arable lands are smaller by 320 ha (about 5%),
- grasslands are bigger by 170 ha (about 22%),
- orchards space has diminished by 89 ha (about 58%),
- woodlands and tree-covered areas have expanded by 273 ha (about 30%).

Table 1. Comparison of land inventory with land register data

Precinct	Arable land	Grasslands	Orchards	Woodlands and tree-coverd areas
	Difference [ha]			
Bogdanów	–2	6	–10	6.97
Bryzdzyn	–16	5	–8	27
Kamionka	–22	10	–4	13
Karczowice	–52	48	–3	5
Kępie	–59	–3	–8	96
Kozłów	10	–3	–17	16
Marcinowice	–24	9	–8	30
Przybysławice	–43	–6	–8	56
Przysieka	–63	68	–11	9
Rogów	–7	3	–7	7
Wierzbica	–3	11	–2	4
Wolica	–39	22	–3	3
Total	**–320**	**170**	**–89**	**273**

Source: Program prac urządzeniowo-rolnych... 2011

The changes in the size of agricultural lands result mostly from transformation of arable lands to grasslands or from natural succession.

The large part of arable lands in the Kozłów commune are still cultivated in accordance with their intended use. The biggest area of lands not used for agricultural purposes has been noted in the villages of Kępie and Marcinowice (in total about 155 ha), and a part of these lands was afforested or became subject to natural succession of forest flora – a result of prolonged non-usage of lands and proximity of forests. The largest areas of lands that became subject to a process of natural succession were in Przybysławice, Marcinowice and Kępie, and of afforested lands – in Marcinowice and Przybysławice. The smallest share of lands excluded from cultivation was noted in Karczowice (0.7% of arable lands), the biggest share – in Przybysławice (over 14%). Therefore, to sum up the data gathered in the study, one can conclude that only less than 9% of agriculture lands of the Kozłów commune is excluded from agricultural use. In the commune many naturally valuable areas were found, which should be covered by legal protection. More than 60% of rural roads in the commune do not meet technical requirements that would allow the use of modern agricultural machinery. Therefore it can be said that the whole network of rural road transport should be comprehensively modernized. Post-consolidation management, being a part of consolidation and exchange of lands, is an opportunity for improvement of roads quality and land reclamation structures [Program prac urządzeniowo-rolnych... 2011]. It should be noted however that rational planning of new layout of land plots can considerably shorten

the length of roads needing modernization, which would allow for creating modern network of agriculture transport during the post-consolidation arrangement. Data analysis gathered from the land and property register showed that around 10% of land plots in the Kozłów commune do not have access to public road. Moreover, the current condition of open ditches was judged as bad – needing maintenance or reconstruction. Undoubtedly it is related with the increasing threat of inundations during heavy rainfalls. And it means that there is an urgent need to take actions to avert the danger [www.kozlow.pl/strategiczne.php].

Within the commune small farms up to 5 ha prevail and they constitute 84% of all farms. The mean size of a land plot is 0.72 ha and the mean size of a farm is 2.95 ha. The number of farms in the precincts is within 48–239 range. Within the Kozłów commune there are 12 775 land plots, of which only 8367 belong to family farms and the rest are not part of farms. The largest number of those belonging to family farms was counted in Kępie – 1877, Kozłów – 1209, Wierzbica – 1146, Bryzdzyn – 1142, whereas the smallest number of them in the villages of Rogów – 220 and Bogdanów – 227. The mean number of land plots in a farm ranged from 2 to 11.

Based on the results of the land inventory, land register map and valid Study of conditions and directions of spatial development of the Kozłów commune, an agricultural-forest boundary line was suggested and grasslands as well as forest complexes were marked off, which included afforested areas, areas undergoing natural succession and areas proposed for afforestation.

By taking into account the results of the analysis, three priority precincts for rural management works within the Kozłów commune were identified, namely: Przybysławice, Bryzdzyn and Wierzbica.

In the Przybysławice precinct the most important arguments for carrying out the works are:

1. An opinion of soltys (village leader) of Przybysławice, who said that there was a need for consolidation works in at least part of the precinct.
2. High land fragmentation (Table 2).
3. Unfavourable shape of land plots (elongated, narrow land plots prevail in part of the complexes).
4. Insufficient road network and bad technical condition of roads.
5. Substantial percentage of land plots without road access (81 land plots).
6. Demand for anti-erosion protection.

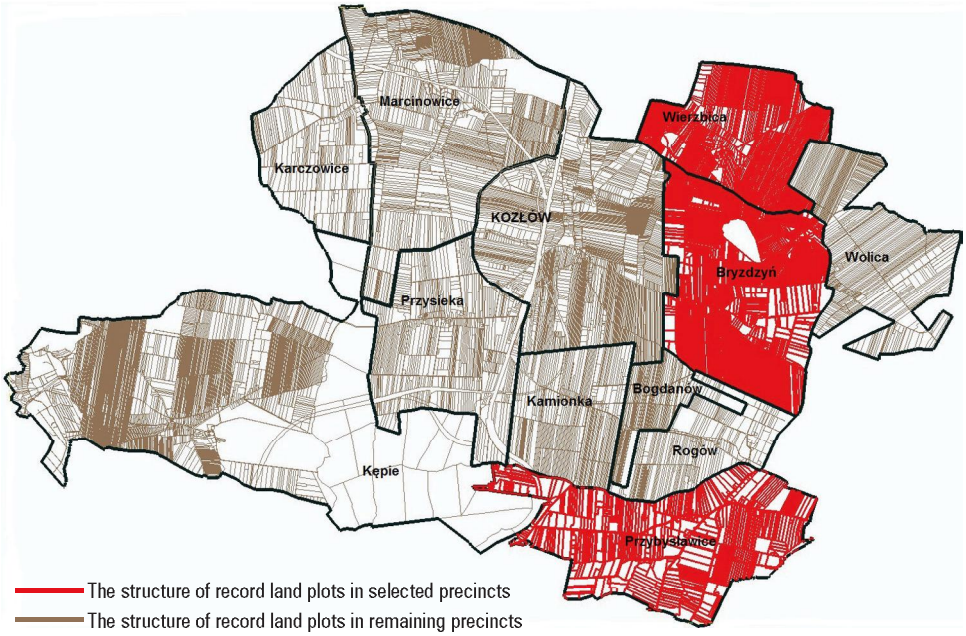
The factors that prove the need of the consolidation works in Bryzdzyn and Wierzbica are:

1. High land fragmentation and unfavourable shape of land plots (Table 2).
2. Insufficient road network and bad technical condition of roads.
3. Substantial percentage of land plots without road access (136 in Bryzdzyn and 58 in Wierzbica).

Table 2. The area structure of farms and the number of land plots in the Kozłów commune

Precinct		Total number of farms	Mean size of a farm [ha]	Number of land plots	Mean number of land plots	1–5 [ha]			5–10 [ha]			10–15 [ha]			15–50 [ha]		
						Number of farms		Mean number of land plots	Number of farms		Mean number of land plots	Number of farms		Mean number of land plots	Number of farms		Mean number of land plots
						Number	%		Number	%		Number	%		Number	%	
Bogdanów		48	2.4247	227	4.73	45	94	4.49	2	4	12.00	1	2	1.00	0	0.00	0.00
Bryzdzyn		191	3.1858	1142	5.98	162	85	5.12	23	12	9.48	4	2	16.00	2	1.05	15.50
Kamionka		119	2.8338	342	2.87	103	87	2.48	16	13	5.44	0	0	0.00	0	0.00	0.00
Karczowice		104	3.6904	252	2.87	84	81	1.99	15	14	4.00	5	5	5.00	0	0.00	0.00
Kępie		173	4.5885	1877	10.85	111	64	6.09	48	28	16.27	12	7	30.17	2	1.16	29.00
Kozłów		239	2.7398	1209	5.06	210	88	4.12	24	10	10.79	3	1	12.00	2	0.84	24.00
Marcinowice		230	3.2094	1077	4.68	189	82	3.95	39	17	7.90	2	1	11.50	0	0.00	0.00
Przybysławice		227	2.8096	551	2.43	204	90	2.15	19	8	3.84	4	2	9.75	0	0.00	0.00
Przysieka		193	2.451	503	2.61	183	95	2.35	7	4	6.43	2	1	6.50	1	0.52	15.00
Rogów		80	2.4171	220	2.75	76	95	2.72	4	5	3.25	0	0	0.00	0	0.00	0.00
Wierzbica		109	3.7188	1146	10.51	84	77	6.73	18	17	18.44	6	6	35.00	1	0.92	39.00
Wolica	114	3.6776	458	4.02	86	75	2.9	25	22	6.76	3	3	13.33	0	0.00	0.00	
Total	**1827**	**3.1535**	**9004**	**4.93**	**1537**	**84**	**3.66**	**240**	**13**	**9.87**	**42**	**2**	**19.36**	**8**	**0.44**	**23.88**	

Source: Program prac urządzeniowo-rolnych... 2011



Source: author's study

Fig. 1. Map of areas recommended for rural management works in the Kozłów commune

The results of the analysis show that the above-mentioned precincts recommended for rural management works are areas that need these works most urgently. Undoubtedly the remaining precincts in the commune also strongly need this kind of works. The main reasons for planning and carrying out these actions are the observed adverse phenomena which can only be corrected as a results of the works. These phenomena are most of all: land fragmentation and unfavourable shape of land plots, poor condition of road network in rural areas, lack of road access to land plots, large areas that require the regulation of hydrographic conditions.

4. Discussion

One of the most fundamental goals of spatial planning is the development of spatial order on all levels of aggregation: on the level of the whole country, on the level of regions, cities, communes or small spatial units, such as precincts.

The agricultural structure order can be corrected by using a geodesic and rural management tool such as land consolidation and land exchange works, which are essential to comprehensive development of villages, farms and to protection and modelling of the natural environment. The most important task of Voivodeship authorities is the adequate and justified indication of areas that most urgently require this kind of

rural management works. Taking into consideration the great demand for structural changes in Małopolska Voivodeship and high costs of land consolidation works and post-consolidation proceedings, which are defined by separate regulations, one has to deliberately and responsibly determine what should be done.

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