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CHANGES IN THE STRUCTURE OF THE LANDSCAPE AFTER 1948 IN POPRAD BASIN

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Abstract: *The method of land use and changes that are going on, are the combination of different factors and conditions. The main aim of the article is to analyse the landscape structure of the Poprad Basin from the spatial-temporal aspect in the context of political changes. The Poprad Basin has held a very significant position in Slovak conditions. The article deals with landscape structure change at detailed scale in the Poprad Basin after the end of World War II. in the context of important changes in political situation (formation Communist regime and then its demise in 1989). By using orthophotomaps and older topographic maps, we are able to monitor the shifts from one class to another. Using a comparative method of the maps, we are able to analyse the differentiation within landscape structures during different political regimes 1956–2010. The article focuses on the consequences of political and economic processes as well as the determining influence of natural conditions on agriculture.*

Key words: *Land cover, Landscape structure, Poprad Basin, Slovakia*

INTRODUCTION

The current landscape and its structure is the result of gradual changes in the original natural landscape under the influence of a man (Feranec, Oťaheľ 2001). Landscape structure has an important status in a geosystem - it is its visible surface portion, comprising the physical elements of the human environment. It is a sphere, of which one has an interest and examining it from multiple perspectives and variety of factors and conditions are involved to its development. The aim of the article is to analyse the landscape structure of the Poprad Basin in the context of political and economic processes as well as the determining influence of natural conditions on agriculture. With examination of landscape structure on the territory of the Slovak Republic in their works deal Boltižiar, Olah (2013), Fazekašová et al. (2013), Petrovič (2005),

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Pucherová et al. (2007), Šolcová (2012), Vojteková (2013), Olah, Boltižiar, Petrovič (2006) and many others. Changes in land use are spatially differentiated in depending on physical-geographical and human-geographical conditions as well. In this context Simpson et al. (1994) presented that socioeconomic factors must be combined with the physical setting to fully understand patterns of change in human-dominated landscapes.

There are significant differences between regions, especially in the nature of the changes of land use, respectively land management (Michaeli 2005). One of the factors is political power aspects and their implications for the nature and evolution of landscape structure. On the landscape structure area, which was the subject of our research the following political changes has had the impact in observed period. After the end of the Second World War the German population left territory of Czechoslovakia, and it had a substantial impact on the population structure and changes in the country in Poprad Basin. There has been a weakening of the bond between the local landscape and its new inhabitants. Czechoslovakia in this period came under the influence of Soviet sphere. As Kováč (2000) states the victory of Communist and completed a coup d'état did not only led to establishing of communist totalitarianism, but the final submission of Czechoslovakia under power interests of Soviet Union. The political regime soon destroyed all the seeds of civil society. Under the planned economy enterprises and agriculture were nationalized. Development in the former Czechoslovakia entered a completely new direction after 1989, when the so-called "Velvet Revolution" changed almost all areas of human activity. The Revolution in 1989 represents the final stage of industrial society and the beginning of the transformation processes due to the emergence of two independent states – Czech and Slovak Republic. According to Ištok (2006) the processes of political integration after 1989 were – as throughout the 20th century – only exceptional phenomenon in the development of space-political structure of the world. The particular importance in the transformation process has a way of using the country where the private ownership of land gets to the forefront. Another important milestone in the political development of Slovakia was its entry into the European Union, which brought and still brings a number of advantages as well as disadvantages. The accession process to the European Union in terms of the preliminary conclusion of the pre-accession chapters Slovakia catch up states of the first wave of candidate countries and after fulfilling all the conditions on May 1, 2004 became along with the Czech Republic, Hungary, Poland, Slovenia, Malta, Cyprus, Estonia, Lithuania and Latvia full member of the European Union. Through the European regional policy (cohesion policy) instruments, based on financial solidarity between regions, opportunities to raise living standards, modernization of economy and creation more stable institutions have been opened to new Member States. Social development in the observed period significantly accelerated and the changes are best seen in the country. From the aspect of the landscape structure´s development is important to know not only the natural conditions which create it directly, but also indirect effects of human activity. That is why we have a wide range of conditions and factors chosen by policy changes.

DATA AND METHODS

Examined area is bounded by a geomorphologic line of the Poprad Basin, which is defined on the basis of geomorphologic division of the Slovak Republic. We selected the complex of the Poprad Basin with an area of 519,16 km^2 which is located in the north-western area of eastern Slovakia, southwards of the High Tatras (Fig. 1). The area has an elongated shape in the direction northeast - southwest with a total length of 45.082 km. In 2010 (31.12.2010), in the area of the Poprad Basin lived 151,033 inhabitants and with a density of 291 inhabitants per 1 km^2 is one of the most densely populated basin in the Slovak Republic.

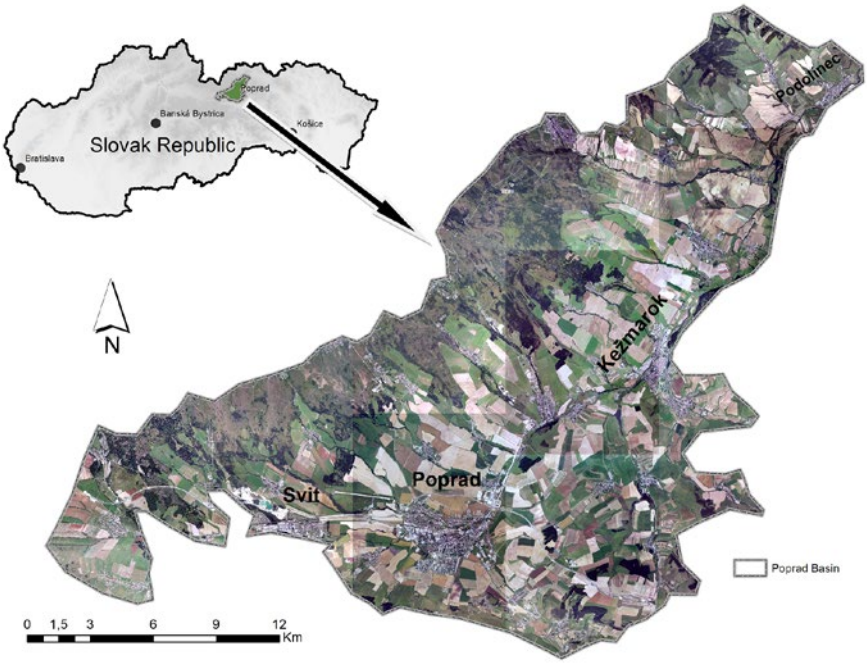

Fig. 1: *Localization of Poprad Basin in Slovak Republic*

By identifying and digitalization of landscape structure has been used the map data 1953-1957 military topographic mapping, topographic mapping of Czechoslovakia of the 80´s and orthophotomap from 2002-2003 and 2008-2010. Digital vector processing of the maps was performed using the Arc View 10 software base, where each polygon was assigned a numeric and verbal attribute. The analysis of the area of Poprad Basin makes use of the analysis of elements of secondary landscape structure in terms of the LANDEP methodology (Ružička 2000). Each complex was identified at landscape features detailed scale of 1: 1,000, according to legend of landscape structure from Petrovič (2005). Were identified polygons with a minimum width of 1 m and the meaning of legends landscape features have been grouped into 8 groups of landscape elements:

1 Forest and non-forest vegetation, 2 Permanent grassland, 3 Agricultural crops, 4 Subsoil and substrate, 5 Rivers and water areas, 6 Settlements and recreation areas, 7 Technical elements, 8 Transportation elements. The research results are presented to the rank of four horizons (1956, 1986, 2003 and 2010) with regard to policy changes and their consequences.

RESULTS AND DISCUSSION

In connection with the changes in the landscape structure and their political implications it is important to take into account the population living in the territory. In this context, the population is the most significant factor that influences the development of the country. Despite the transfer of the German minority there in the post-war years to the overall population increase. Main characteristics of the population Poprad Basin and the rate of urbanization are presented in the Tab. 1.

Tab. 1: *Population of the Poprad Basin 1956-2010*

Poprad Basin	**1950**	**1980**	**2003**	**2010**
Population	63 446	116 849	147 278	151 033
Rate of urbanization	42%	63%	64%	61%

Source: Kropilák et al.1977a,b, 1978; ŠÚSR

When evaluating the population distribution it is most commonly used indicator of the general population density, wherein the density of each important structural characteristic of the inhabited space (Mládek et al., 1993). The general population density Poprad Basin in the period under review increased from 128 inhab./km² to 291 inhab./km². Distribution of population in Poprad Basin in 1956 was evenly, but in 2010 there were already two significant concentration of the population around the towns of Poprad and Kežmarok (Fig. 2).

The concentration of population is closely linked with the process of urbanization. Poprad administrative earmarked in 1946 creates a continuous built-up area of land between the smaller neighbouring settlements Poprad, Veľká, Spišská Sobota, Matejovce, Stráže and Kvetnica. Other municipalities are Kežmarok Poprad Basin, Svit, Spišská Bela and High Tatras. Due to time horizons examined, the highest 64% urbanization rate in 2003 and thereafter are reflected suburbanisation processes around these cities. The term in 1956, we have identified within the landscape structure 8 groups, 33 subgroups landscape elements and 65 elements. The largest part was the Agricultural crops with 23 977.88 ha. The communist government in 1948 has left the consequences onto structure of the country, where directed a short period of democracy in 1945 it has been replaced by mandatory mode of governance and management. The most significant change occurred in the Agricultural crops where the fields become due the forced agricultural collectivisation one of the dominant element of the group. They are mainly located outside local cadastral areas of the central area of the Poprad Basin (Fig.3).

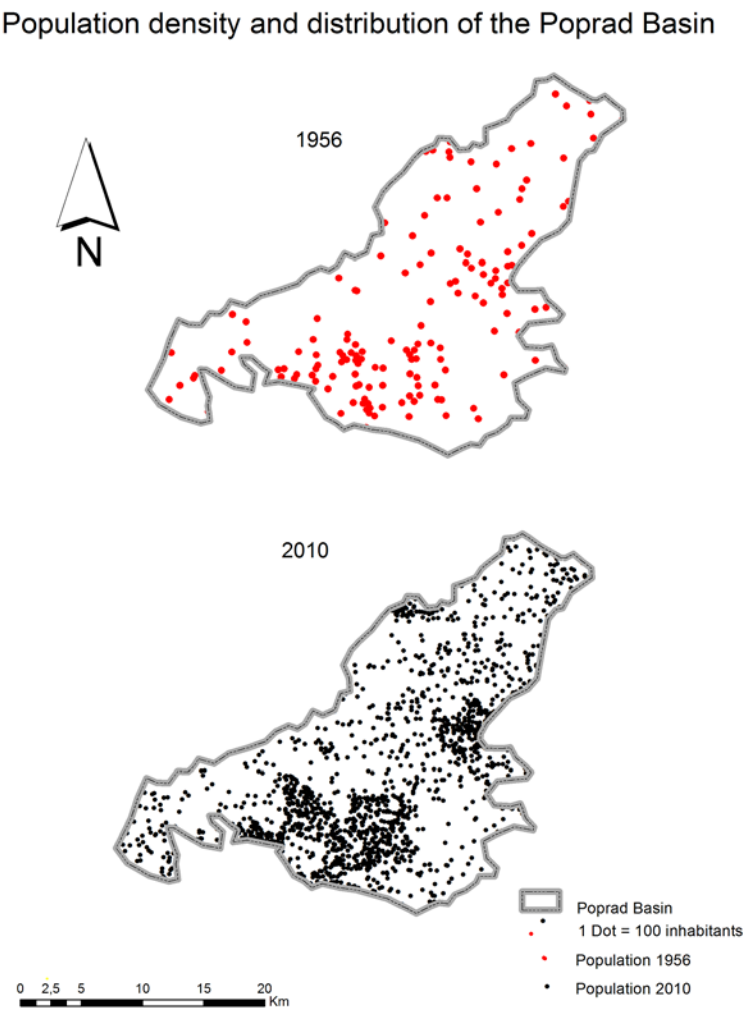

Fig. 2: *Distribution of population 1956-2010*

Collectivization brought new forms of land management called Collective farming that formed the basis for agricultural production and their functionality was reflected across the Poprad Basin (Solar 2011). In this period in the southeast of Poprad the first orchards has incurred. As a result of mining there have incurred bedrock outcrops in the west of the Spišská Teplica at Gerlachov, hot and Kvetnica. With the development of water management arise regulated rivers, lakes and other bodies of water. In Settlements and recreation areas, we recorded a brand new place in Poprad Basin and the Mlynčeky, Svit, Starý Smokovec and Tatranská Lomnica. The sprawling industrial complex is going to be built within the boundaries of the city Svit, other smaller in Poprad and Kežmarok. New elements were farms and farmyards,

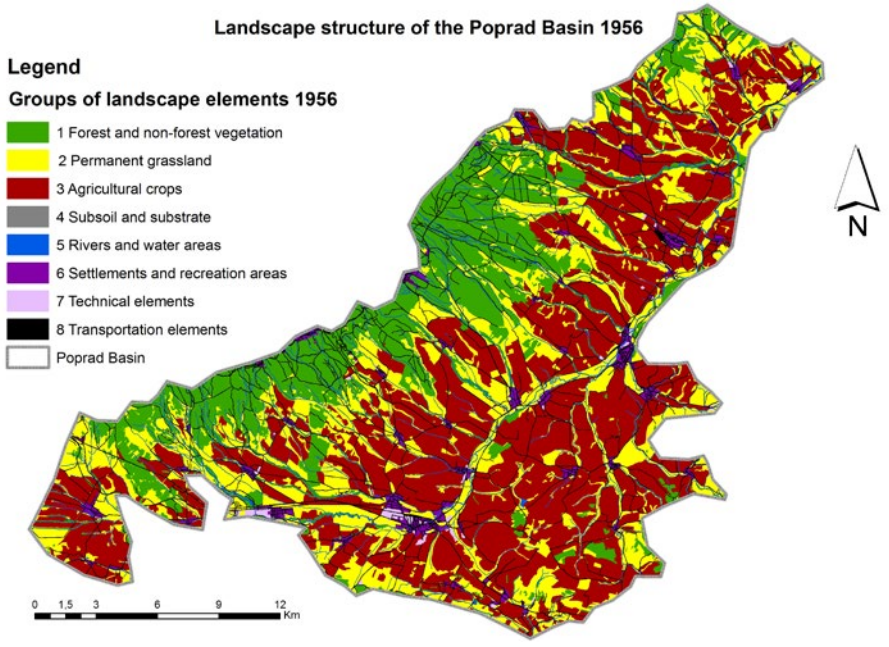

Fig. 3: *Landscape of structure of the Poprad Basin 1956*

which were created for almost every municipality mainly due to the collectivisation of agriculture. From the point of development of transport infrastructure, we recorded new elements: car parks, bus and gas stations and airport west of Poprad. Changes in the landscape structure with respect to the previous period are not very significant changed in particular land uses and their ownership, enshrined in the newly adopted regulations and laws. Nearly 40-year period marked by violations of human and civil rights as well as inefficient management is reflected in the landscape structure. Supporting processes such as industrialization and collectivization of agriculture in line with population growth caused most notable changes in the landscape structure within that period. The result is a landscape structure in the timeframe 1986 comprised 8 groups, 33 subgroups landscape elements and 72 landscape elements. Area was the largest Agricultural crops with 23 137.63 ha. Coniferous forests form the largest part of Forest and non-forest vegetation. In this period incurred the orchards in the south of Gerlachov. Creation of 7 water reservoirs and ponds with a total area of 64 ha. As a result of the development of the tertiary sector created new landscape elements: sports halls and gyms, ski slopes, ski lifts and allotment. Growing populations have also noted an increase in built-up area and a surface area of nearly 3,800 ha. Within the Transportation elements occupy the largest area of tertiary roads (353.37 hectares).

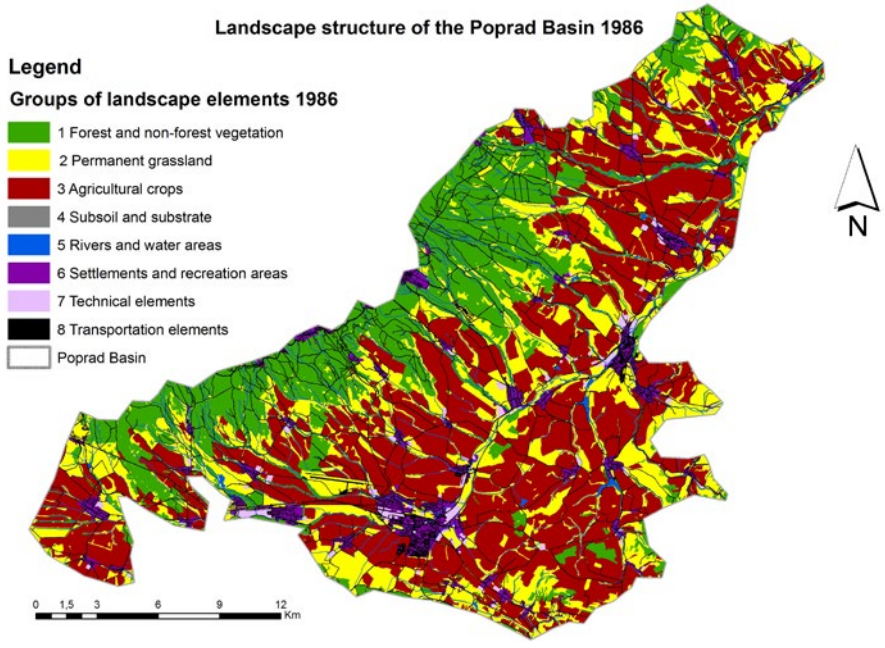

Fig. 4: *Landscape of structure of the Poprad Basin 1986*

The period of transformation marks a major shift from a society dominated by the communist ideology to a civil society and market economy based on trade and price liberalization, the extensive land and privatization property, and the shaping and defining of a new legislative and institutional paradigm. This transformation involved major social consequences and translates into the area of agriculture as well (Balej, Anděl 2010). This desintegration of Czechoslovakia, the onset of democracy, and especially changes in land ownership are the most important agents of change in landscape structure. The term in 2003, we have identified 8 groups, 33 subgroups landscape elements and 75 landscape elements. The most extensive was again Agricultural crops with area of 24 441.22 hectares and 47.08% share in the areas of the territory. As a result of the return of land to private ownership has expanded surface mosaic structure with the used and unused agricultural parcels. In Settlements and recreation areas, there has been only 1.61% increase in the proportion of the total area. Industry transformation after 1989 and the arrival of foreign investors created new businesses such as Whirlpool, Scametatra, Polyform etc.

The post-industrial period and post-industrial society is characterized by the rapid development of communication and information contacts (which results in pressure on the transport and communication infrastructure) and a growing tertiary sector (services and travel industry). Within the settlement structure, there is an integration of the system and arrival of new trends as suburbanization and satellite communities (Balej, Anděl 2010).

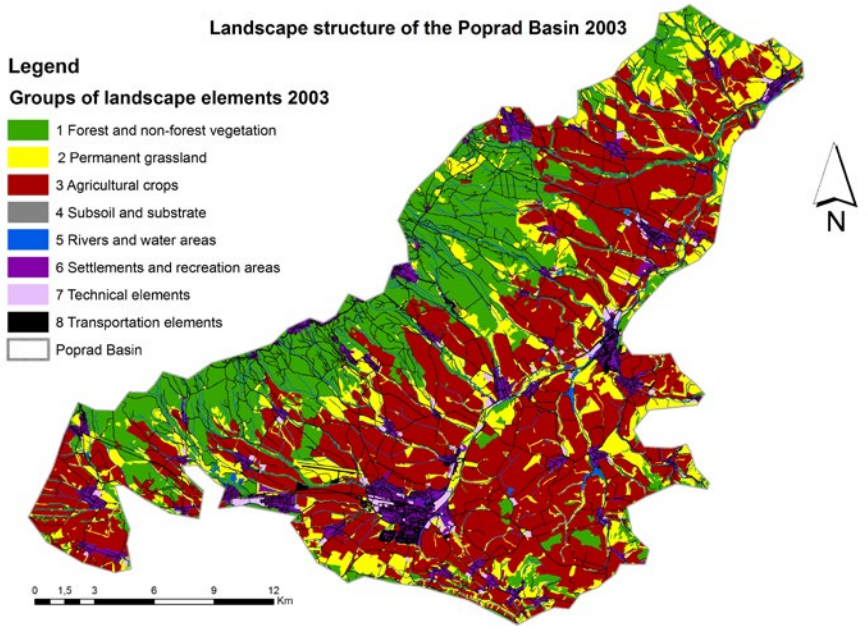

Fig. 5: *Landscape of structure of the Poprad Basin 2003*

Within the time horizon of 2010, we have identified 8 groups, 34 subgroups landscape elements and 78 elements. The largest group of elements was Agricultural crops with 24 026,64 ha and a total share of 46.28%. In Forest and non-forest vegetation we saw a significant change as a result of the disaster in the High Tatras in 2004. Broken forests accounted for only 48% of the total area of the group of landscape elements. In relation to gravel extraction in rural village Batizovce was created Batizovská water reservoir with an area of 8 hectares. Suburbanization process stimulated the development of construction in the village around Poprad and Kežmarok. The new elements became golf courses situated north of the Veľká Lomnica with an area of 107.01 hectares. By accession to the European Union and the possibility of using structural funds in 2009 were built motorway sections Važec-and Mengusovce, Mengusovce-Jánovce that gave the Poprad Basin across significant anthropogenic barrier. There has been established the industrial park Poprad-Matejovce with an area of 10 ha. Trade in the context of transport development in the last decennia more pronounced landscape structure was affected mainly the construction of large commercial and entertainment and business centres at strategic trunk routes and hubs. The largest concentration of these centres is recorded in the urban centres of the city of Poprad and the Poprad and Svit.

Proportion of different groups of landscape elements in the overall structure of the country Poprad basin presents Table 2. During the period 1956-2010 we register a total loss only in Permanent grassland and the largest increase was in the area Settlements and recreation areas. For spatial reflect of the changes in landscape structure, we have created the following Figure 7, where some stable surface features of

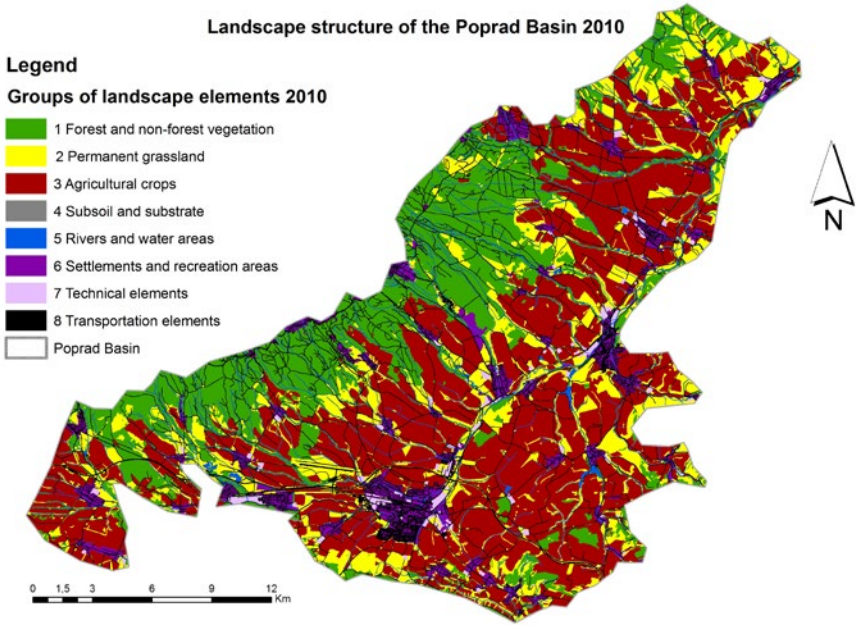

Fig. 6: *Landscape of structure of the Poprad Basin 2010*

Tab. 2: *Area groups of landscape elements (in ha)*

Poprad Basin	**1956**	**1986**	**2003**	**2010**
1 Forest and non-forest vegetation	10681	11342,35	12647,01	12428,58
2 Permanent grassland	14295,07	12648,07	9027,11	9330,28
3 Agricultural crops	23977,88	23137,63	24441,22	24026,64
4 Subsoil and substrate	4,44	6,58	7,85	7,73
5 Rivers and water areas	320,99	366,42	366,29	373,4
6 Settlements and recreation areas	1552,37	2708,85	3470,46	3665,12
7 Technical elements	294,31	759,83	843,46	848,11
8 Transportation elements	790,22	946,73	1113,1	1237,54
∑	51916	51916	51916	51916

the landscape throughout the period under review, mainly located in the central part (green color) and the areas where there is a change in at least one of the examined time horizon (red color).

The largest identity within each landscape element was the time horizon of 2003. The most significant changes were the maximum in Permanent grassland. The box highlighted identical within each area of landscape features during the 1956-2010 (Table 3).

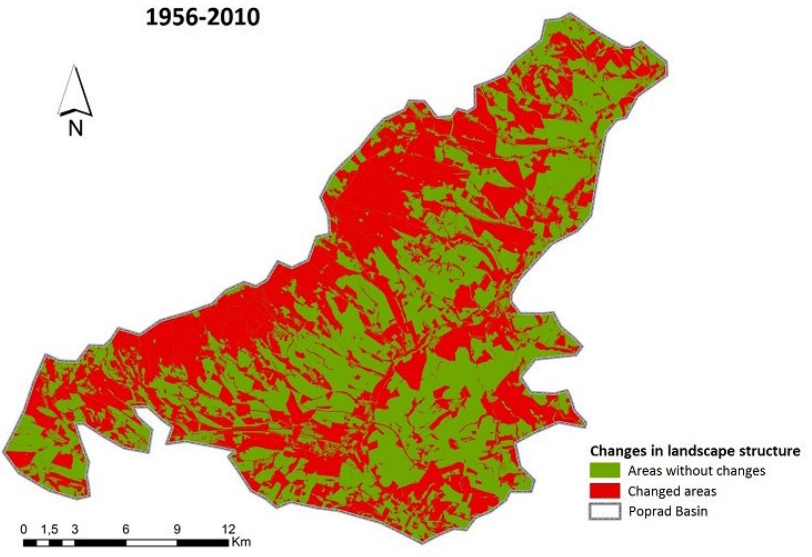

Fig. 7: *Changes in landscape structure of the Poprad Basin 1956-2010*

Tab. 3: *Transformation matrix changes in landscape structure 1956-2010 (in ha)*

in ha		Group of landscape elements 2010								
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Spolu**
Group of landscape elements 1956	**1**	9 840,76	588,81	73,59	2,05	12,95	110,13	7,03	45,71	10 681,03
	2	2 355,56	6 345	3 854,67	2,12	110,07	1 120,43	325,02	182,65	14 295,53
	3	179,23	2 333,02	20 037,49	2,37	7,35	854,26	302,57	240,77	23 957,05
	4	1,39	1,82	0,03	1,16	0	0	0,05	0	4,44
	5	36,5	20,86	10,33	0	238,48	9,66	2,6	4,42	322,84
	6	2,65	11,92	24,75	0	1,19	1 478,4	10,71	43,86	1 573,48
	7	3,55	12,5	2,75	0	2,92	65,83	190,02	16,73	294,31
	8	8,94	16,53	22,95	0,02	1,85	26,43	10,16	705,17	792,04
	∑	12 428,59	9 330,46	24 026,56	7,73	374,82	3 665,13	848,15	1 239,31	51 920,74

Notes: 1 Forest and non-forest vegetation, 2 Permanent grassland, 3 Agricultural crops, 4 Subsoil and substrate, 5 Rivers and water areas, 6 Settlements and recreation areas, 7 Technical elements, 8 Transportation elements

CONCLUSION

In this article we focused on in-depth analysis of the landscape structure in the post-war period from the aspect of political changes and their consequences. The obtained amount of information depends on the implementation of the evaluation scale landscape structure. Therefore, we have applied our research in assessment of land-

scape structure on the most detailed level possible, but the results given the relatively large database data are presented at the level of groups of landscape elements. Examination after the Second World War, due to the maps presented in four time horizons (1956, 1986, 2003, 2010) is characterized by dynamic development company with concomitant changes in the country. The period to 1956 is characterized by reconstruction of the country after World War II and the communist takeover of the aspect of political development. Period in 1986 reflects industrialization and collectivization of agriculture in the context of population growth Poprad Basin. A further period until 2003 provides information on the transformation of the country from the aspect of the landscape structure with respect to the independence of the Slovak Republic and the advent of democracy. The nature of land ownership and in particular the development of the tertiary sector necessitated amendments by landscape elements, especially in the area of settlement building. The last year (2010) represents the current landscape structure changing as a result of the Slovak Republic to the European Union. Although the most significant change in its appearance caused a windstorm in 2004. The political changes are in line with the natural conditions and human actions that are the decisive factor in changes in the country. As well as stated Vaclavik and Rogan (2009) also our results suggest that the scale and intensity of land changes do not entirely follow the patterns of land transformation identified in other Central and Eastern European countries. This means that privatization of state property and transformation of agricultural collectives in the Poprad Basin resulted in marginalization of farmland but at a smaller scale than in Poland or Ukraine (Sabates-Wheeler, 2002; Angelstam et al., 2003)

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