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Analysing land use change in the Gödöllő Hills during 1990's

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Abstract:: *In Hungary, economic and social transformation after the political changeover played a major role in the evolution of the rapidly changing structure of the landscape. In order to reconstruct the earlier conditions, we need to familiarise ourselves with the history of the landscape. As the quality of the landscape has been deteriorating at a growing pace, we also need to examine the main parameters of the landscape components. Moreover, we need to devote special attention to the areas most sensitive from the perspective of nature conservation (e.g. the situation of wetlands and forest lands) to be able to monitor their alteration and mitigate the anthropogenic impact if possible. The main objective of this research work was focused on surveying land use change during 1990's.*

Keywords: *land use, land use change,*

INTRODUCTION

The area that my research has focused on is the Gödőllő Hills, a micro-region situated near the capital, in the metropolitan belt of the city. The proximity of the capital is both an advantage and a drawback for the Hills. Thanks to the favorable traffic system and its geographical situation, its population has been steadily growing. The development of the area has been determined not only by population growth, but also by industrial suburbanization [1, 2, 3].
However, all of the above may turn into a disadvantage: the growing number of inhabitants entails a heightened burden on the environment, one of the biggest stress factors for the region. Despite the trends of suburbanization, society has a growing need for a natural, "intact" environment, and ironically, in some cases, this desire seems to be the very motif of suburbanization. This is why research monitoring changes in landscape use is so important – research that simultaneously examines the extent of degradation and stability of the landscape. Regarding their physical geography, the Gödöllő Hills constitute an area of geomorphological transition, but due to their natural and landscape values their preservation is a key priority. Another reason why the specification of natural and quasi-natural areas is a quintessential task is that there are more and more factors leading to or projecting changes in this area.
The primary analysis of research findings concerning the presentation of changes in the landscape and in land cover is based on the examination of historical maps [4, 5, 6, 7, 8, 9, 10, 11], aerial photography [12, 13, 14, 15], as well as (GIS based) satellite images [16, 17, 18, 19]. The advantage of such approaches is that they make it possible to understand current events and to explore future possibilities. They can provide a basis for exploring the differences and similarities or the stability and changes between two or more points in time, even in terms of land use categories. They may also help to resolve disputed land ownership issues.

This study applies the latter direction, i.e. out of the different approaches; I have chosen the method that utilizes digitalised maps which showing the 1990 years.

MATERIALS AND METHODS

Location of the area under examination:
According to the micro-region typology of Marosi & Somogyi [20], as well as Dövényi (2010), the Gödöllő Hills are part of the macro-region called North Hungarian Mountains. Within that, they are located in the northern part of the group of micro-regions called Gödöllő–Monor Hills in the meso-region of the Cserhát. The Gödöllő Hills (stretching over 550 km2) are situated between 130 and 344 m above sea level, and gradually become lower towards the southeast [20]. Their location, geological and climatic conditions make them a transitory zone between the North Hungarian Mountains and the Great Hungarian Plain. Their independent hills are wedged between the latter two macro-regions.

Land covers survey:
I examined the changes in the landscape use of the Gödöllő Hills on the basis of literary sources and a topographic survey (EOV 1989) and a Corine survey (Corine land Cover Map 1998) in order to identity 1990 years structure of the landscape.
Using GIS tools and the ArcView 3.2 software, I digitalized the maps, identified the typical land use types, and prepared a comparative analysis between adjacent survey dates, displaying my findings on a map. I used Microsoft Excel to prepare a mathematical statistical analysis: I calculated the distribution of the individual land use types and expressed the difference between the various periods in percentage.
I distinguished seven typical land use forms: built-up/residential areas (artificial surfaces: built-up areas, farm buildings and industrial buildings, traffic routes); forests (scrublands and bushes); wetlands (surface waters, reedy marshlands); meadows and pastures; hobby plots and orchards; and vineyards.

RESULTS AND DISCUSSION

Regarding land use forms, the land cover map (1989) prepared on the basis of the EOV topographical map showed the sustained preponderance of arable lands (36.32%) in addition to forests (37.06%) in this period (Table 1). True enough, there was a decrease compared to the previous period: up until the 1970s, the proportion of arable lands dropped in nearly all of the settlements of the Gödöllő Hills. The growth (9.18%) of residential areas (built-up areas, industrial areas, traffic roads) signalled the restructuring of the micro-region. There was an increase in the distribution of hobby plots and orchards. This growth could be clearly put down to the flourishing of recreational areas in settlements near the capital. Not only orchards gained territory, but vineyards as well.

Table (1) Evolution of different land use types in Gödöllő Hills based on EOV topographic map (1989)

Land use type	Area (ha)	Area (%)
Built up area	4599.42	9.18
Forest	18573.33	37.06
Wetland	496.14	0.99
Pasture, meadow	5657.76	11.29
Arable land	18204.59	36.32
Orchard	2072.82	4.14
Vineyard	512.29	1.02

Although the time interval between the EOV survey and the CLC50 survey is shorter than the period previously examined, it still demonstrates the restructuring of the spatial structure of the landscape at the time of the political changeover. Transformation manifested itself in the form of the growth of the residential (or rather, built-up) areas (15.11%). This process was driven by the population increase due to the proximity of the capital. In the 1990s the settlements of the Gödöllő Hills, too, were increasingly affected by

suburbanisation. Population swelled in each of the settlements: in the north, the growth rate was above 60% while it remained well below this figure in the middle and southern areas. It was especially high in Veresegyház (124%), where the number of inhabitants doubled in comparison with 1990, whereas in Erdőkertes (89%) and in Szada (86%), there was almost a twofold increase. The population of these two settlements has been growing at the same rate ever since.

CONCLUSION

There are three categories that can be distinguished according to the changing trends. The first category includes land use forms where we can see a clear increase, such as in the case of built-up areas: at the end of the 18th century, urban development was 0.62%, which leaped to 15.11% by the end of the 20th century. Growth was permanent, with no setbacks in any of the periods. The growth in the number of inhabitants also affects certain aspects of nature conservation as the latter is closely interrelated with the expansion of settlement and traffic infrastructure (construction of real estate, public buildings, industrial areas, railway lines and motorways). This further reinforces anthropogenic influence, and consequently leads to the reduction and fragmentation of undisturbed natural areas, diminishing the quality of the remaining areas.

The second category contains wetlands, meadows and pastures, and vineyards. These land use forms were characterized by a steady decrease due to the growing need for land (parallel to the trends described above). With the exception of vineyards, this led to a reduction in the size of lands that would have been potentially valuable from the perspective of nature conservation. The shrinking of the size of lands covered by water is a phenomenon whose relevance is not restricted to the territory of the Gödöllő Hills – it is typical of other areas in Hungary as well [21, 22]. The increasing importance of agriculture and settlements has played a major role in that.

The third category includes those land use forms where there were changing, yet opposite trends in the period examined, in the case of forests and arable lands. The forest lands of Hungary – and of the Gödöllő Hills – have become larger over the past 90 years [23]. However, there is a significant difference between the proportions of forest cover in the country and in this micro-region: the forest cover of the Gödöllő Hills is nearly twice as high (approx. 21%) as the national average and is nearly 10% higher than the average of the North Hungarian Mountains [23, 24].

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