Kabai R., Földi Z., 2011. Limits to settlement expansion from a landscape perspective.
The Problems of Landscape Ecology. Vol. XXX. 343-346.

Limits to settlement expansion from a landscape perspective

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Abstract: The research focuses on the attributes of the landscape that determine the expansion of settlements. Selecting two sample villages, we have collected data of their development reviewing various historical records. We have then analysed the phases of growth in relation with the surrounding landscape, trying to identify the actual character of the settlements and the features that constrained their expansion. Results showed that it is possible to determine the limits to growth in most historical periods, even if these had been exceeded at a later stage of development.

Key words: settlement expansion, landscape history, landscape character, ground modelling

Introduction

All settlements have their history of physical growth and shrinking throughout the centuries, as a resultant of the actual political, social, economic and environmental circumstances. Our research focuses on the process of growth, with an aim to identify those attributes of the landscape that determine the direction and extent of settlement expansion. We assumed that there are landscape features which impose a constraint to the expansion, even if these are exceeded at a certain phase of development.
In order to verify this assumption, we have chosen two Hungarian sample settlements, Nagykovácsi and Solymár. Both settlements are part of the Budapest Agglomeration, and the vicinity of the capital has imposed a significant development pressure on them, especially in the last fifty years. Regarding their history, both villages suffered a significant loss during the Ottoman occupation of the region, and were then resettled; therefore their growth is relatively well documented from the new beginning. These circumstances make them ideal for the case study.

Materials and Methods

In order to analyse the relation between the settlement expansion and the landscape, we have studied the history of the settlements. Historical maps (ordnance surveys and the civic surveys), historical aerial photographs and written sources were used to identify the phases of growth. The desktop results established were verified and refined in the course of a site-survey, where there were also photographic records taken of the units and the overall view of the settlement. Territorial data were then digitised, and processed with GIS programme. For the ground modelling and visualization we used the KeyTERRA-FIRMA module on a Bricscad platform. This was especially useful to analyse the settlement area in relation to the topography (fig. 1). Finally, we have interpreted the results, focusing on the landscape features and other factors that have determined the location and expansion of the settlements.

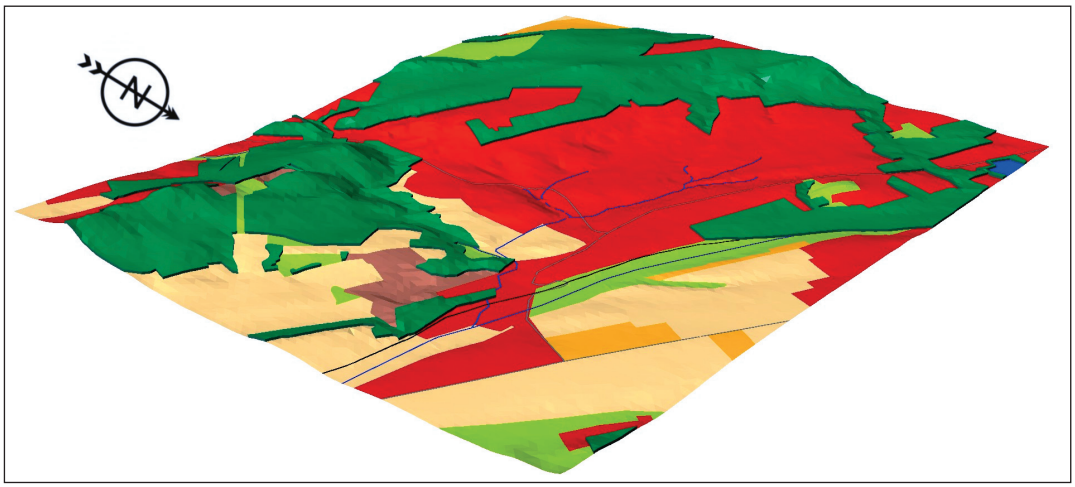

Fig. 1. Settlement areas (in red) of Solymár in 2011

Our research was focused on the settlement areas. Although there are interesting changes of the surrounding land use, we have not analysed these, except if related to the expansion. In the course of data processing some simplifications and generalizations have been applied (e.g. settlement areas cover all type of built land and the urban open space around the buildings, only major transport links are shown etc.) to an extent which does not affect the validity of the results.

History and Expansion of Solymár

Due to the limit to the length of this article, we introduce only one of the settlements analysed. The relation with the landscape is more characteristic in the case of Solymár, therefore it is more suitable to illustrate the processes observed. The history and the phases of growth of the nearby Nagykovácsi have been analysed similarly and contribute to the conclusions made.

Like most of the neighbourhood villages, the settlement became deserted during the Ottoman period. According to the sources (Cservenyi 2002), the first new inhabitants were Serbian refugees around 1700. They were then followed by Germans, arriving within the frame of organised colonisations in the course of the 18th century. The first documented map (The First Military Survey 1783) of the layout of the new settlement shows that the village was built to the west from the supposed location of the earlier village, on a mound at the foots of the Buda Hills (Phase 1 on figure 2). This mound is confined by steep valleysides of creeks from three directions, which provides a protected location and also constraints to the expansion. The initial streets arranged in straight lines along the slopes provide a clear pattern to the settlement.

The 1841 map shows that a new street was opened in the axis of the church built in 1782-85. This way the width of the mound is filled, and another street appears on the opposite side of the northern valley. There is also a minor extension to the east. Although these developments (Phase 2) exceeded the actual confines imposed by the topography, their lines follow the existing pattern, running east to west parallel to the earlier streets.

From 1883 to 1940s (Phase 3) there are still “organic” extensions of the initial pattern, including development on the western part of the mound around the church and the one to the south along the main road leading to Budapest. Although the low gradient slopes adjacent to the settlement to the east are suitable for housing, the arable fields remain unbuilt here. Therefore the edge of development along the main road provides the eastern boundary of the settlement this time.

The end of the Second World War brought dramatic changes in the life of the village. Once again, the population suffered a significant loss. Sentenced to be collectively guilty, German inhabitants were forced to leave their homes and transported to Germany, and newcomers arrived from Mezőkövesd town along with Hungarians deported from Czechoslovakia (Seres 1993). The houses left behind by the Germans provided sufficient homes,

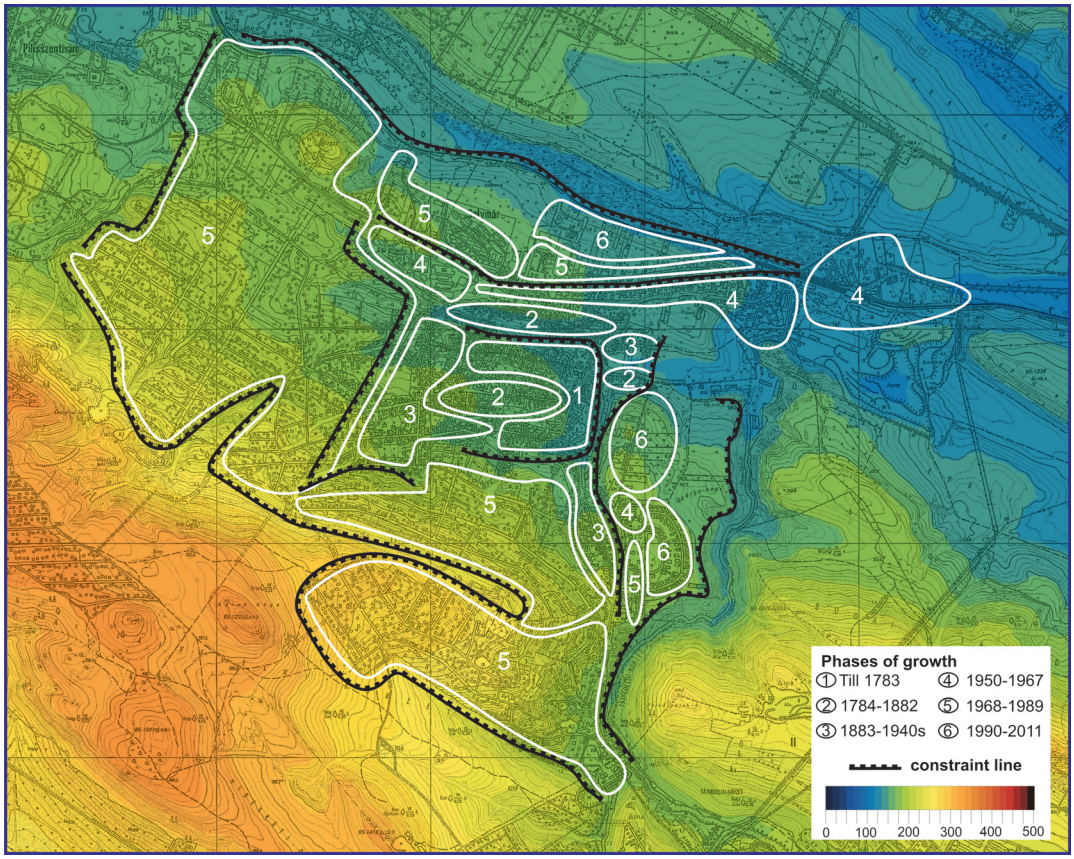

Fig. 2. Phases of growth in relation to the topography

thus there was no need for residential development this time.

The end of the 1950s brought significant industrial development to the village. Northeast of the settlement, there was a brick factory established adjacent to the railway line. Another industrial plant producing plastics was located at the north-western edge of the village, adjacent to the main traffic road. In between these two locations, residential development spread along the main road (Phase 4).

A new epoch of development (Phase 5) starts at the end of 1960s. The architecture of family houses changes, and spacious, two storey houses are built. These appear at the northern edge, along a new street parallel to the main road. There was also an urban style housing estate of multi-storey concrete blocks built this time, opposite the plastic factory. But the greatest expansion was brought by allowing the ownership of second homes in Hungary, resulting in an extremely rapid spread of holiday homes. These appear on the grounds of former orchards and agricultural land around the settlement, on the slopes of Buda Hills. Steep (15-20%) slopes marked the boundary of the development, as they had done of the cultivation earlier.

Since the 1989 change of the political regime, the physical growth (Phase 6) has not been so significant. However, this is the period when the former agricultural land to the east from the settlement is noticeably reduced for the sake of development, and there has been some expansion to the north as well. Major changes appeared at existing built areas, by the conversion of holiday homes into residential buildings.

Looking at the current situation, the limits to the expansion seem to be clear. At the northwest, there is either the settlement boundary or steep slopes; therefore there is no opportunity for further growth. At the north, the railway line and the adjacent wetlands impose a strong confine, although the development near the railway station implicates the danger of further extension towards the visually sensitive, open valley floor. At the east, the valley of the Paprikás Creek sets a topographic boundary, supported by the landscape protection area following it. Looking at the map, we can see that there is still some potential of development on the agricultural land between

the creek and the village, although visual impacts on the nearby castle ruins have to be considered. At the south, development has climbed up to the edge of steep slopes, except for a short section. Nevertheless, the landscape designation constrains further development into this direction. As we can see, the potential growth of the settlement is rather limited, especially if landscape protection aspects are considered. Time will tell us whether development will exceed these actual constraints identified, as it has happened several times in the past.

Conclusions

Our research has explored the nature of expansion of the sample settlements. We have established various attributes of the landscape that played a significant role in the location of new development and contributed to the character of the villages. For the settlements analysed, we have identified the following features that limited the expansion at a certain stage:
– Natural valleys and those generated by human interventions (linear erosion on agricultural areas) set limits, and their steep slopes remain unbuilt even later when exceeded.
– Orchards and arable land near the settlements had been valuable assets and had constrained the expansion. Later, when their economic value fell, they became the main grounds for development.
– Steep slopes (above 15-20%) remained unbuilt.
– Most of the wetland areas on the valley floors still remained unbuilt.
– Since shrinking natural habitats in the region became protected, the designation has become a constraint to development.
– Although we focused on landscape issues, it is important to mention that the pattern and direction of development has also been significantly affected by the property structure of the land.
The results of the project support the research on landscape character with a regard to urban development. The methodology using GIS for the analysis proved to be very useful to assess the expansion in relation to the topography. Similar analyses would be useful to apply in the planning process, to assist formulation of landscape protection policies.

Acknowledgements: The study was prepared as part of the TÁMOP-4-2.1.B-09/1/KMR- 2010-0005 research project

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