

WINE AND LAND USE IN NAGYMAROS, NORTHERN HUNGARY:  
A CASE STUDY FROM THE DANUBE BEND

A. KISS<sup>1</sup>, Z. SÜMEGHY<sup>2</sup>, A. CZINEGE<sup>1</sup> and Z. KARANCSI<sup>3</sup>

<sup>1</sup>*Department of Physical Geography and Geoinformatics, University of Szeged, P.O.Box 653, 6701 Szeged, Hungary, E-mail: kissandi@earth.geo.u-szeged.hu*

<sup>2</sup>*Department of Climatology and Landscape Ecology, University of Szeged, P.O.Box 653, 6701 Szeged, Hungary*

<sup>3</sup>*Department of Geography, Juhász Gyula College, University of Szeged, 6725 Hattyas sor 10, Szeged, Hungary*

**Összefoglalás** – A tanulmányban a szőlőtermesztésnek a tájhasználatban s annak változásaiban betöltött szerepét vizsgáljuk, különös tekintettel a szőlőművelés által érintett területek térbeli kiterjedésére, melyek részben az erózió által amúgy is veszélyeztetett meredek déli lejtőkön helyezkedtek el. Habár a szőlőtermelés elsődrendű fontosságát általában már legkésőbb a 14. század elejétől nyomon követhetjük, a szőlőnek a tájban betöltött szerepére vonatkozó első közvetlen leírás a 16. század elejére datálható. A 16. század végétől a 17. század végéig tartó visszaesést a 18. század elejétől a szőlőterületek még feltehetően a késő-középkorinál is nagyobb mértékű kiterjesztése követte, különösen a déli lejtőkön, egészen a csúcs-régióig. A 19. század végétől a filoxéra és más betegségek illetve egyéb, gazdasági és társadalmi folyamatok hatására mára a szőlő gazdasági jelentőségét és egykori, tájképet meghatározó szerepét teljesen elvesztette. A szőlő húzóágazat szerepét előbb a gyümölcs- és szőlőtermesztés, majd az egyre jelentősebb méreteket öltő turizmus vette át, míg az egykor a tájképet meghatározó, kiterjedt szőlőművelésre már csak a közben visszaerdősült, helyenként meredek déli hegyoldalak felső régióinak pusztuló kősorai és teraszai utalnak.

**Summary** – In this study, the possible impacts of wine cultivation on landscape and land-use changes in Nagymaros is discussed with special consideration on the spatial extension of cultivation in the area of the endangered steep southern hillslopes of former vine cultivation. Primary importance of wine production can be proved from early 14th centuries, but the first direct evidence for the description of extensive vineyards in the landscape comes from the early 16th century. Decline can be detected from the late 16th century to the late 17th and early 18th centuries. By the end of the 18th century, vineyards in southern top-hill regions reached probably their greatest extent. Caused by the phyloxera disease, greatest landscape changes occurred at the end of the 19th century when hill-slope vineyards were almost entirely destroyed. Due to diseases and several other, mainly socio-economic reasons, wine production today has minor or practically no importance while other functions, such as fruit and grape production and then tourism, had growing impact on the landscape, while traces of former cultivation were destroyed or are still lying hidden on the reforested hillslopes.

*Key words:* vine cultivation, landscape change, hill vineyards

STUDYING THE CHANGES OF ABANDONNED VINEYARDS

While in Western Europe, the great expansion of agriculture (and thus, forest clearance) mainly ended up with the late 13th century, 14th-15th centuries were probably the most active periods in Hungary. It is approximately from the 13th century when in the hilly areas of Hungary vine cultivation largely extended on the slopes of favourable exposure. Before this time, vine cultivation more frequently appeared on plains and lowlands or even inundation areas. This 'new' method, however, needed much more and qualified labour as lowland production, though wine became more tasty than it was before (Égető, 1980). Wine production in 'promontoria' (hill vineyards) was predominant in Hungary until the collapse of viticulture occurred in the late 19th century primarily due to the phyloxera disease (Beck, 2003).

The reason of modern decline, however, can be traced back to several reasons. After the late 19th-century collapse and desertion, vine was reinvented in many areas, but vine cultivation started to 'slip' down to the 'skirt', namely to the pediment area of hills (e.g. *Pintér*, 1988-1989; *Laposa*, 1999; etc.). This situation became even more predominant after the collectivization process of the 1950s and the creation of cooperatives, since the less steep areas could be cultivated by machines which made cheap mass wine production possible. This 'progress', nevertheless, resulted a great increase in quantity but decrease in quality, while the formerly better-quality areas of highly-terraced 'promontoria' were mainly abandoned and reforested (see e.g. *Laposa*, 1999). However, abandonment from the 19th century (even before phylloxera appeared in Europe) was already rather general not only in Hungary but also in other parts of Europe with intensive hill-cultivations, such as in the Mediterranean areas (e.g. *Dunjó et al.*, 2003. 24).

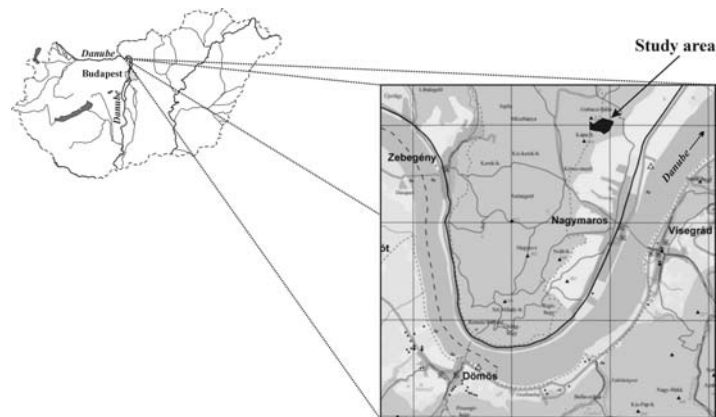
These intensively cultivated areas are also important since today there are only few places where steep slopes with relatively high elevation (over 250 m) are cultivated in the country. Nowadays, most of the vineyards in Hungary are located between 100-200 m above sea level (see e.g. *Kriszten*, 1999. 23, 30-37). Nevertheless, in the historical wine region of Tokaj-Hegyalja, for example, the optimal uppermost level of quality wine production is around 300-350, but sometimes even 400 m on slopes with southern exposure. *Justyák* (1965. 35), studying the microclimatic conditions of the southern slope of the Nagy-Kopasz Hill in Tokaj, has proved that the annual mean temperature starts decreasing more rapidly only from around 350 m above sea level. Cultivation of these higher slopes are also more favourable in general, due to the fact that early and late frosts have less effect here than in lower areas (e.g. *Boros*, 1996. 54). In Hungary, vineyards abandoned at the end of the 19th or during the 20th centuries were studied both by geographers, local historians and ethnographers: these examinations were mainly related to vegetation changes and the historical geography of certain areas, such as the one in the Balaton Uplands (e.g. *Pátkay and Sági*, 1971; *Laposa*, 1988, 1988-1989, 1999; etc.), in the area of Pomáz-Szentendre-Leányfalu north to Budapest (*Baráth*, 1963), as well as in the historical wine regions of Tokaj-Hegyalja (*Balassa*, 1991; *Boros*, 1996. 73; *Nyizsalovszki*, 2001. etc.), Sopron (*Kücsán*, 1999; etc.), the surroundings of Pécs (*Erdősi*, 1987), the Mátra Hills (*Bodnár*, 1987), and Hungary in general (see e.g. *Pintér*, 1989; *Csoma*, 1997; etc.).

Unlike other wine regions with several hundred years of continuous cultivation, the small wine region of the Danube Bend practically ceased to exist after the phylloxera disease even if at the beginning of the 20th century tremendous efforts were made to restore former vineyards and the significance of wine production. As a result, the landscape of the area changed fundamentally and thus, large part of the formerly-cultivated slopes, up to the top, was reforested. Since this phenomenon, as we could see, was also wide-spread in other wine regions of the country, the landscape changes of former 'promontoria' of Nagymaros as well as the intensity of cultivation together with possible former erosion and the protection against this erosion can be used later as a parallel while reconstructing conditions of other areas of formerly intensive (vine) cultivation.

## LOCATION AND PHYSICAL CONDITIONS

Nagymaros, located in the Danube Bend approximately 50 km north to Budapest (see *Fig. 1*), is part of the temperately warm climatic region with predominant influence of the ocean. This can be also characterised by temperately dry, mild winters (B. V. 9) and an

annual precipitation of 600 mm (Mersich, 2003. 35). The average amount of sunshine is between 1850-1900 hours per year. This is somewhat more than that of Tokaj-Hegyalja (1800-1850 hours per year), but less than, for example, in such other traditional wine regions as the Balaton Uplands and the Villányi Hills.



*Fig. 1* The Danube Bend and Nagymaros

The 'promontoria' of Nagymaros were located on the southern slopes of hills characterised by Miocen andesite partly covered by a soft, thin layer of limestone. The predominant soil type is brown forest soil with clay illuviation, but arubase and stony soils can also be found in the area, all well suitable for wine production. Terraces of natural origin (fluvial Danube terraces) also appear on these southern slopes (Pécsi, 1991. 36-47). It was mainly the hills along the Danube with southern exposure which were all, up to the end of the 19th century, utilized as vineyards. As the southern edge of the Börzsöny Hills, the former 'promontoria' are today situated in the close vicinity of the Danube-Ipoly National Park.

#### VITICULTURE AND LANDSCAPE BEFORE THE 18TH CENTURY

The history of vine cultivation in the area of Nagymaros cannot be separated from that of the Danube Bend in general. While in the heydays of wine production in the second half of the 18th to the late 19th century the town of Vác was a main wine producer along the eastern side of the Danube north to Buda and Pest, grapes and wine had primary importance in the more northerly villages (e.g. Kismaros, Veróce, Zebegény) and towns (e.g. Nagymaros, Visegrád), located in the Danube Bend. Nevertheless, among the wine producing settlements of the Danube Bend, the town of Nagymaros was probably the most important. Thus, any of the landscape transformations taken place due to changes in vine cultivation in Nagymaros are quite representative for the changes occurred in the entire Danube Bend in general. Although many of the early aspects of wine and fruit production in Nagymaros have been discussed by some authors (see e.g. Jakus, 1991. 17; Mándli, 1994. 175-178; etc.), here an overview and some new information had to be included due to the fact that these early sources provide at the moment the only (though indirect) evidence

to the question in what extent certain intensive land-use types affected the landscape and soils of the area for a longer period of time (several hundreds of years).

The name of the rapidly growing settlement appeared in a charted dated to 1255, when the king annexed a land in Maros to his own properties (*Knauz and Dedek*, Vol. 1, 1874. 430; *Györffy*, 1998. 272-273). By the end of the 13th century, the settlement was bought up by the king, and was entitled as a royal 'villa' in 1297 together with its wine and grain tithes, amongst others (*Knauz and Dedek*, Vol. 2, 1882. 399). Its importance in trade can be detected in the great number of Viennese pottery found at excavation sites in the historical centre of the settlement (*Torma*, 1993. 218-219). Another significant information on the former landscape conditions of the town can be found in the donation charter of king Charles I dated to 1324 (*Knauz and Dedek*, Vol. 3, 1924. 47). In this document, among the most important (re)sources of the town, vine cultivation is highlighted. In 1326, one fourth of the town's wine- and one third of grain tithes were awarded to the parish priest (*Knauz and Dedek*, Vol. 3, 1924. 75-76). At latest from the 14th century, Nagymaros comprised a single economy with the royal centre and summer residence of Visegrád, opposite side of the Danube, supplying the town as well as the royal palace complex with agricultural products (*Magyar*, 1998. 23). According to the early 18th-century description of Matthias Bél, chestnut was also planted at that time, in the early 14th century (*Szabó*, 1977. 160).

In his book, issued in 1536, Nicolaus Oláh found vineyards as the most important, characteristic features of the landscape in Nagymaros. Here the archbishop describes the view of the early 16th-century Nagymaros as was seen more than a decade before, from a window in the upper-castle of Visegrád: „... in the area lying on the other side of the Danube, the oppidum of Nagymaros, inhabited by German settlers, is located; above (the settlement) an extensive not too high hill arises, planted with vinestocks all over.” (translated after the crit. ed. *Eperjessy and Juhász*, 1938. 16). His remark is especially important because it gives a clear proof that in the early 16th century at least the hill nearby the settlement (Fehér hill) was heavily involved in vine cultivation, and this was the most characteristic cultivated landscape feature worth mentioning about Nagymaros. At this time wine production, according to *Szakály* (1995. 227-228), acted as the most important economic branch of the settlement, since the yearly production of Nagymaros was around 30-40,000 hectoliter in the early 16th century. The former great importance of wine production can also be detected by the great number of wine celars located all around the town centre and beyond, in many cases with early-modern or perhaps late-medieval origin (*Torma*, 1993; *Zsoldos*, 2001. 121). Since Nagymaros has only a narrow plain along the Danube, sometimes anyway inundated by the river, this large amount of wine could be mainly produced on the slopes. Thus, even if except for the short description of the archbishop we have no direct medieval evidence concerning the landscape characteristics of the hills, it seems quite obvious that some of the hills or at least the Fehér hill described by Oláh above, were covered by vineyards already in the late Middle Ages. Naturally, the extent of this intensively cultivated hilly area and other questions such as the possible impact of intensive cultivation, level of erosion and protection techniques applied are all yet unknown, although with the help of late medieval as well as early modern parallels some rough estimations can presumably be drawn in the future.

In the first decades of Turkish occupation, according to the conscriptions of the sandsak (Turkish district) of Buda, between 1546 and 1562 must and wine production became more than double in Nagymaros (*Káldy-Nagy*, 1985. 424; *Jakus*, 1991. 17). Beyond their own territories, the inhabitants of Nagymaros had vineyards, even in the politically difficult decade of the 1540s, for example, in Kisoroszi, while the inhabitants of

Kisoroszi also possessed vineyards in the territory of Nagymaros (Káldy-Nagy, 1971. 73; Káldy-Nagy, 1977. 253; Szakály, 1995. 240). Although the ownership of the area changed several times which caused a great devastation of the area, the settlement still stayed inhabited and continued vine cultivation as an important branch of their economy up to the end of the Turkish occupation in 1686. Paying taxes both to the Habsburgs and the Turks, wines of Nagymaros and related problems are mentioned in conscriptions, petitions and other sources in several cases (see e.g. Mándli, 1994. 179-180). Even if the number of inhabitants sharply decreased by the 1580s (Káldy-Nagy, 1985. 423; Szakály, 1995. 234-236), the greatest abandonment of vineyards and 'promontoria' presumably occurred during the fifteen-year war (1591-1606): by 1612, according to the petitions of the inhabitants, only one third and by 1630 less than one fourth of the formerly cultivated vineyards remained (Jakus, 1991. 17; after MOL, E 41, 5/2. No. 31, 149). In 1631, inhabitants could pay only smaller tax due to their poorness and the fact the vine hills did not 'give' enough already for a long time (Jakus, 1991. 67; MOL, E 213, Hont: Fol. 76/6).

The first known pictorial representations of Nagymaros are strongly related to the siege of Visegrád in 1595. On some of the contemporary copperplates (thought to be reliable) the lower sections and the pediments of hills, but sometimes also the higher parts of southern slopes are covered by lonely trees which can symbolize woodland as well as underwood vegetation with only some few trees around (Szalai, 2001. 40, 143, Table 231: 1597 – OSZK-TK, App. H. 612, and Table 232: 1597 – OSZK-TK, Ant. 217). Referring to the other important war-period of the 1680s the northeastern hills of Nagymaros with southern exposure, in this case again – either with real or symbolised meaning – only some trees scattered on the bare landscape, were depicted (Szalai, 2001. Table 235: 1686 – OSZK-TK, 123473).

In conclusion, a primary significance of wine production presumably with some earlier roots can be detected from the 14-15th centuries extending up to the second half of the 16th century. Although we have only one direct contemporary source, indirect evidence suggests a great spatial expansion of vineyards in the landscape. From the second half of the 16th century a gradual decline started and continued throughout the 17th century, although vine cultivation even in this problematic period played a significant role in the economy of the settlement. This shows clear parallels to many other areas where vine cultivation had large importance. Unlike in many parts of Western Europe where climate change had major impact on wine production, the instable political conditions and (Turkish) wars of the 16th and 17th centuries can be more blamed for the temporal decline (Égető, 1999). Nevertheless, after Turkish wars ended up in the majority of the country in the late 17th century, a new, probably even greater second expansion started in the first half of the 18th century.

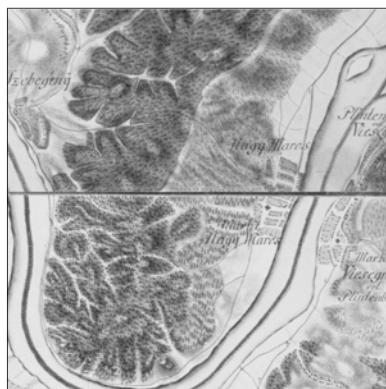
#### A NEW EXPANSION OF VINE: THE 18TH CENTURY AND BEYOND

Much more is known from the late 17th, but especially from the early 18th century when Nagymaros, as part of the Visegrád-estate, became a royal property again. More than a decade after expelling Turks from the area, still half of the formerly cultivated vineyards lay fallow in 1699 (MOL, UC 87: 69). Throughout the first half of the 18th century, predominantly German-speaking settlers of different locations (e.g. Germany and Austria) arrived in small groups and in several 'waves', rather than once in a large community (Magyar, 1998. 62, 82) – probably also inventing some of their own cultivation practices in

their new home area. In Nagymaros, the ownership period of the Austrian Stahremberg family (1700-1756) resulted prosperity and a probably greater expansion of cultivated lands on southern slopes than ever before. From the beginning of the 18th century the most significant parts of the estate, namely large portion of forests and woodlands, most of the vineyards, arable lands and industrial buildings e.g. the new brewery and the brick-works, were located in Nagymaros (*Magyar*, 1998. 102, 108, 111, 114).

As a reference to the ongoing vine-stock planting campaign, the incomes of the young manorial vinestocks are mentioned in 1749 (MOL, UC 74: 8). In 1766, another source already points to the division between the 'old' vines and the 'new' vines in Nagymaros (MOL, UC 142: 12). In the same time a great increase of vine cultivation can be detected which was subsidized by the estate (see e.g. 1754 – MOL, O 18. Fol. 21-22/1430). Vineyards of the settlement extended to 1558 1/2 hoes at that time (e.g. 1766 – MOL, UC 142: 18; 1776 – 142: 13). The inhabitants of the town also made spirit out of the vine which was not imposed to any taxation (1766 – MOL, UC 142: 14, 142: 18); moreover, beyond some further taxation, they could sell their own wine and vineyards without any control. One of the most significant incomes of inhabitants came at that time from pubs and inns (1776 – MOL, UC 142: 13). The wines of Nagymaros had better price than that of Visegrád: while Nagymaros wines cost 1 Ft 75 denar, Visegrád wines were worth for 1 Ft 25 denar per urn (*Magyar*, 1998. 108, 112; see also 1749-1753 – MOL, UC 74/8).

All the above-mentioned information on the great greatest extent of vineyards on slopes of southern-southeastern exposure is supported by the map of the First Military Survey (*Fig. 2*) and the detailed late 18th-century estate map of Nagymaros (1787-1805 – MOL, S11. 207/b) describing the land use of the area: vineyards extended almost up to the top of the hills with southern exposure.



*Fig. 2* Map of the First Military Survey (1784) – HMT, Coll. XII. Sec. 17-18 (original: M 1:28,800)

Concerning wine production, another important issue is that in the second half of the 18th century Nagymaros was an important junction of roads leading from the north to the south, as the trading route from Moravia reached and crossed the Danube at Nagymaros, through the Börzsöny Hills. In the second half of the 18th century, wines of Nagymaros were mainly exported to the north, for example, to the mining town of Selmecebánya (today Banská Štiavnica in Slovakia) which caused a great prosperity for the town and real peak of wine production (*Magyar*, 1989. 143-145). In the second half of the 18th century vineyards were probably more important elements of the Nagymaros landscape than ever before. This last information becomes especially interesting if we consider the fact that the second half of the 18th century was already the

beginning of a long-term decline (due to lost markets) in the two traditionally most export-oriented historical wine regions of the late 16th-17th centuries: Tokaj-Hegyalja and Sopron (see e.g. *Kücsán*, 1999; *Nyírsalovszki*, 2001. 86).

At the end of the 18th century, the 'kind taste of wines' of Nagymaros is especially emphasised in the description of *Vályi* (1796. 581). Still a primary significance of wine, but growing importance of fruit (including chestnut) can be detected in the early and mid-19th-

century sources (1845, 1857-1859 – MOL, UC 249/40, 43). In the 1820s, for example, chestnut trees were (partly) located among the vineyards, in the 'promontoria' area (1826-1827 – MOL, UC 249/41). According to the description of *Pesty* (1986. 226-227) and *Fényes* (1985. 70), good-quality (white) wines, fruits and chestnut were produced here around the mid-19th century. In 1870, the hills of the settlement were characterised by chestnut forests while extensive vineyards could be found on the slopes which, according to *Nagy* (1870. 154), provided medium-quality wines. In 1873, approximately 90% of the wines produced were white (KSH, 1986. 13).



*Fig. 3 Markó, K., the elder: Visegrád. Oil painting on canvas, 1826-1830. Note the bare hillslope over the Danube, at the other side*

Referring to the 19th century, on the spatial extent of utilization probably the best sources are maps and landscape paintings. While the late 18th-century maps, mentioned above, gave us a detailed picture on the extent of vineyards in the landscape, concerning map evidence little is known up to 1850s: the cadaster map of 1856 approximately the same extent of "promontoria" can be detected then at the beginning of the century (OSZK-TK, Bv 1455/1/1-2). The relevant map of the Third Military Survey (1872-1873 – HMT 4862/3), although considerably more trees appeared among the vineyards, still shows no significant difference in land use to the situation described in the late 18th century. An excellent extra source provides more information on the 'dark' decades: on the detailed, topographically realistic paintings of *K. Markó* the elder, entitled 'Visegrád' (1826-1830; see *Fig. 3*), the bare hills above Nagymaros, cultivated up to the very top regions, can be seen clearly. Same is the case with those other 19th-century realistic-romantic pictures where the landscape of Nagymaros or parts of it is clearly visible: although in a bit of a romantic context and contours, according to the mid-19th-century drawing of *L. Rohbock* (published in *Hunfalvy*, 1859. 220) cultivation on the southern slopes extended up to the top region. The information found in contemporary pictorial evidence, thus, supports the data derived from other contemporary sources.

## COLLAPSE AND NEW PROSPERITY: LANDSCAPE CHANGES FROM THE LATE 19TH CENTURY

Up to the end of the 19th century, the settlement mainly produced grapes (and wine), chestnut and walnut (Döbrössy, 2004. 67). Especially phyloxera (1875-1895), but in some extent also peronospora (1893-1895) diseases at the end of the 19th century, similar to other historic wine regions of Hungary (see Beck, 2003), devastated most of the vinestocks in and around Nagymaros from 1886 (Mándli, 1994. 196; see also Döbrössy, 2004. 69): a fact which clearly appears in the dramatic fall of areas under vine cultivation (Fig. 4). Whatever great the devastation of vineyards was, a rapid replantation campaign started; around the turn of the 19th and the 20th centuries not only fruits and chestnut, but also dessert grapes were exported to the markets of Vienna and Budapest, while good-quality wine was produced and sold (Borovszky, 1911. 59; Döbrössy, 2004. 68).

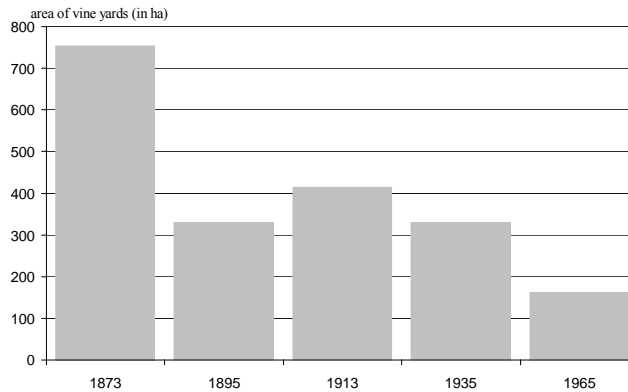


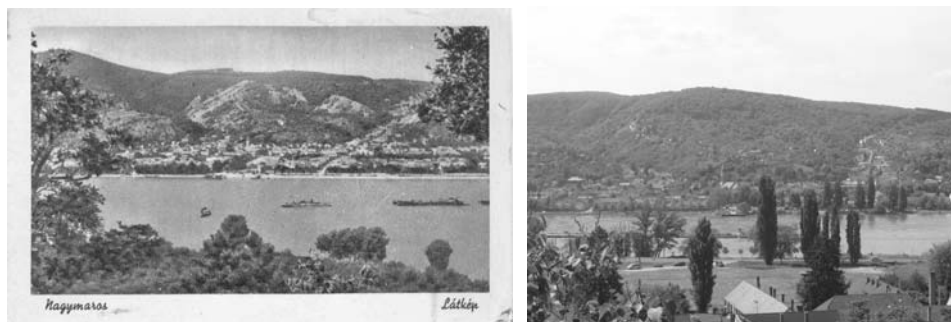
Fig. 4 Changes in the extent of Nagymaros vineyards from the late 19th century (KSH, 1986. 64)

Although in the first decades of the 20th century the settlement was one of the centres of new vine (re-)plantations in the country, in 1932 vineyards occupied less than 10 % of Nagymaros lands (PMU: V. 1079 c, d). What is more, even if one of the main regional centres of the countrywide replantation campaign was Nagymaros (Beck, 2003. 343), these plantations usually had much less effect on the high slopes of former terraces any more. The great amount of fruit trees at the turn of the 19th and 20th centuries, and later the significance of raspberry (especially from the 1920s and 1930s) are emphasised in many sources, which fruits – together with vine grapes – were exported mainly to Vienna and Pest, but also to such more remote destinations as, for example, the Czech Lands, Germany and Russia (for more details, see Mándli, 1994. 185-187, 190-192). Thus, fruit production (e.g. redcurrant, raspberry, apricot, peach, plum but also chestnut and walnut), gained much more importance up to the end of the 1930s (see Döbrössy, 2004).

Located relatively close to Budapest, in the second half of the 19th century, after direct train connection was established between Pest and Nagymaros in 1851 (see e.g. Mándli, 1994. 184), the Danube Bend became a favoured holiday destination (Borovszky, 1911. 59) – a role continuously increasing today. From this time, Nagymaros was a popular holiday destination mainly due to the picturesque view of the Visegrád Hills and the Danube Bend in general, together with the magnificent ruins of the former royal castle-complex. After the Second World War, but especially from the 1960s onwards – similar to



what happened in other former hill vineyards, for example, at Lake Balaton (e.g. *Laposa*, 1988. 35-40) – a growing amount of cottages and family houses occupied the formerly cultivated lands on the southern hillslopes, in many cases already reaching the reforested lands of former vineyards. Due to its importance in tourism, the changing landscape of the slopes can be also detected on contemporary postcards, from the late 19th century (e.g. OSZK-PKNyT, Postcards/Nagymaros: from 1891).



*Fig. 5* The Nagymaros landscape (with the Fehér Hill in centre) on postcard in the late 1940s and on a photo taken in June, 2005 (private properties of the first author). Note the changes especially visible on the Fehér Hill (in the middle of both photos)

From the late 1940s and in the 1950s great changes occurred in the agriculture due to the new policy in economy, then the collectivisation and mechanization which, similarly to many other parts of the country, resulted the final abandonment of southern hillslopes being too expensive and labour-demanding for large-scale farming. The process of abandonment in the former 'promontoria' clearly appears, both on maps (*Fig. 6*) and other pictorial sources such as aerial photos or postcards (see e.g. *Fig. 5*), even if vineyards in many cases were replaced with other cultivation types (orchards, chestnut forests, meadows, etc.). Thus, probably the greatest changes and the final abandonment of the higher and steep southern slopes occurred from the 1950s on, although this was already preceded by a process of gradual decline.

## OUTLOOK

As far as the spatial extension of viticulture is concerned, the most active periods of vine cultivation in Nagymaros were the 14th-early 16th and, after a period of a relative decline, the 18-19th centuries; quite in the same time when, for example, in the South-German hilly areas probably the greatest soil erosion of the last Millenium were detected, namely to the 14th, 18th and 19th centuries (see e.g. *Bork et al.*, 1998; *Dotterweich et al.*, 2003).

It seems clear that in the early 16th century the latest, some of the hills (or at least one) in the close neighbourhood of the town were permanently and entirely used for vine cultivation, and afterwards, even in the worst periods of the 17th century, wine kept its primary importance among the other incomes of the settlement. Probably the ever largest spatial expansion of viticulture occurred in the 18th century due to systematic and subsidised clearance and vinestock plantations; by the end of the century practically all of the slopes with favourable exposure, almost up to the top level of hills were covered by

vinestocks. Compared to other important wine regions, modern declines did not occur in the same time: while in case of Tokaj-Hegyalja and Sopron a gradual decrease started already in the second half of the 18th century, wine production of Nagymaros reached its probably ever greatest extent in the same period. Although the increase of fruit production (similar to vine, with intensive and erosive cultivation) can be also detected, vine presumably kept its primary importance up to the end of the 19th century.

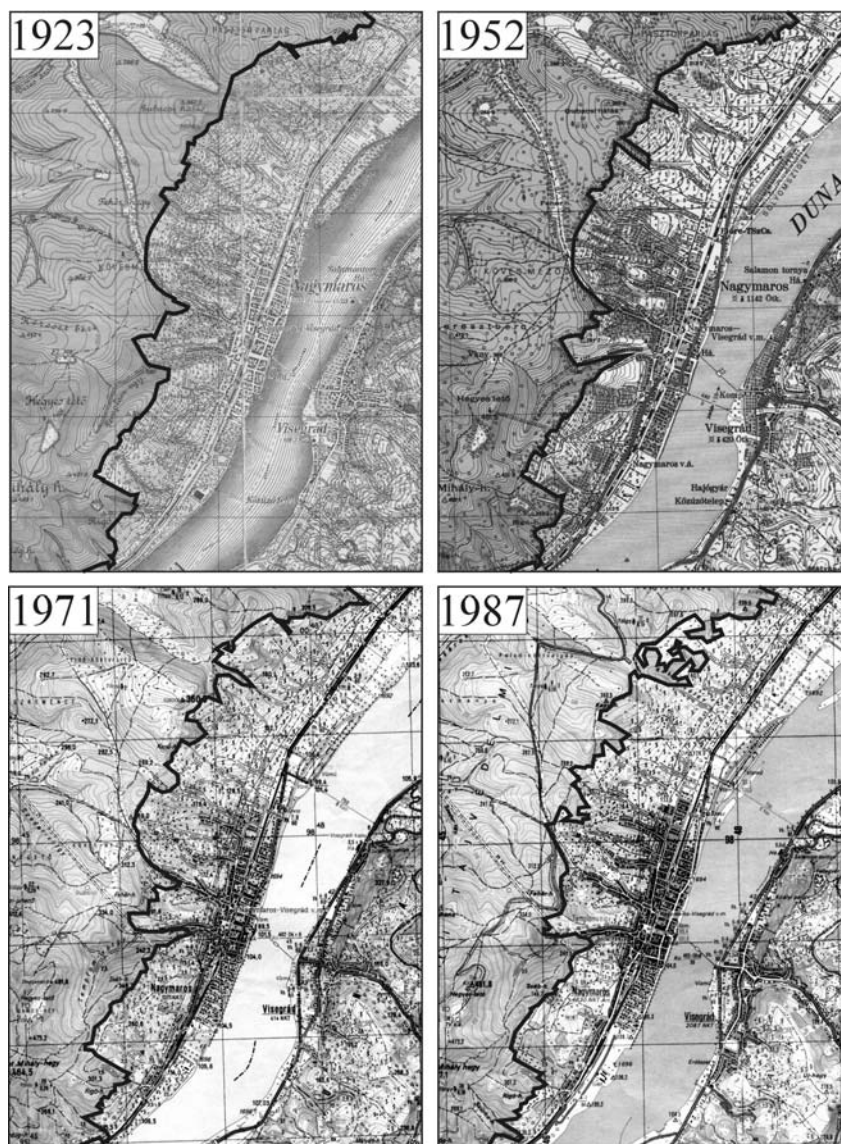


Fig. 6 The 'promontoria' area of Nagymaros in 1923, 1952, 1971 and 1987 – HMT, Third Military Survey, revised in 1923; new military surveys of 1952, 1971, 1987: L-34-002-D-b (originals: M 1:25,000). The boundaries between the forest-area and zone of the former 'promontoria' in different periods are indicated with bold lines. Note the decrease of 'promontoria-zone' and the cultivation change taken place inside of the territories of 'promontoria-zone'.

Thus, being intensively cultivated, some of the steep southern slopes of Nagymaros, turning towards the Danube, were subject to severe erosion for hundreds of years. Due to the application of various traditional techniques – whose traces (e.g. terraces, ditches) are still visible in the today highly-reforested landscape – however, in the time of intensive cultivation, soil erosion was certainly decreased in quite a large extent. In order to have a closer look on the former extent of human impact, more intensive and detailed investigations on present physical conditions were needed, for which a smaller study area with well-preserved man-made features was chosen, clearly referring to a longer period of former vine cultivation (see Kiss *et al.*, 2005).

**Acknowledgement** - This study was supported by the OTKA Fund of Hungarian Ministry of Culture and Education (T 046373).

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