TISCIA 30, 15-25

VEGETATION HISTORY OF THE KARDOSKÚT AREA (S.E. HUNGARY) I.: REGIONAL VERSUS LOCAL HISTORY, ANCIENT VERSUS RECENT HABITATS

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Molnár, Zs. and Biró, M. (1996): Vegetation history of the Kardoskút area (S.E. Hungary) I.: Regional versus local history, ancient versus recent habitats. — *Tiscia 30, 15-25.*

Abstract. Reconstruction of past events and states provides useful information for the explanation of present vegetation patterns. Based on data from historical documents, old survey maps, the living memories of inhabitants and a detailed survey of present vegetation, the local history of the Kardoskút steppe was drawn and compared with the regional history of the Great Hungarian Plain. Special emphasis was put on distinguishing ancient and recent loess grasslands, alkali steppes and woodlands.

The Kardoskút steppe landscape was shaped mainly by nomadic animal husbandry till 1847. From that time till the 1970's, fine scale capitalist small-farm agriculture was the main landscape forming force. Cultivation was strongly controlled by soil conditions. Since the 1970's, the combination of a socialist planned economy and nature conservation management induced considerable changes in grassland distribution and quality.

Keywords: 18-20th centuries, map series analysis, landscape history.

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Introduction

Landscape historical studies provide opportunities to reveal those past external constraining or enabling conditions, as well as, the order of events and system states which could have played an important role in the creation of present vegetation patterns and dynamics (Pickett 1989, 1991). A main feature of vegetation is its "memory" ("echoes of the past", Pickett 1991), present vegetation pattern reflects more the past environmental and competitive relations than the present ones (cf. Foster 1992).

There is a number of disciplines which study the history of vegetation and landscape and the interaction of land-use and vegetation. Landscape archaeology reconstructs past land-use and landscape using archaeological evidence (Aston 1985, Widgren 1979), cultural palynology reconstructs human impacts on landscape as recorded in pollen diagrams (Behre 1986, Jackson *et al.* 1988, Braun *et al.* 1993) and historical geography investigates the interaction of socio-economic and landscape changes (Woodell 1985, Frisnyák 1990). A multidisciplinary approach was used to draw the very detailed 6000 years history of a Swedish landscape (Berglund 1991).

In order to understand present vegetation, Central European plant sociologists have studied vegetation pattern at the Holocene time and Eurasian spatial scale (e.g. Zólyomi 1958). The map of Hungary's natural vegetation (Zólyomi 1989) and the detailed history of vegetation (Zólyomi 1958, Járai-Komlódi 1987) were reconstructed on the basis of this knowledge. Less attention was paid, however, to the vegetation transformations of the last centuries, when human land-use rather than climate played a significant role in shaping the vegetation (Berglund 1991, Cole and Taylor 1995, Zólyomi 1946, Frisnyák 1990).

Detailed maps and documentary information help historical reconstruction at the century scale. Since more data are available for trees and water bodies, woodland and wetland historical studies are more frequent (e.g. Foster 1992, Majer 1988, Prince 1995, Winsor 1987) than investigations of changing grassland vegetation (e.g. Zólyomi 1946, Mitchell 1991, Jeans 1978, Molnár 1995a,b). Data have also been successfully linked from historical sources with information from present day vegetation (Rackham 1980, Vartainen 1988, Peterken and Game 1984, Zólyomi 1969a, 1989).

Botanists and ecologists usually neglect historical sources and maps when studying present vegetation phenomena. Though the necessary data is scattered in the literature, an adequate and sufficient historical reconstruction can often be made which e.g. explains specialties of local patterns and helps to distinguish ancient and recent habitats (Foster 1992, Peterken and Game 1984, Molnár 1995a).

Historical studies can either substitute or rather propose long-term studies or can help to plan them by generating hypotheses on dynamic aspects of vegetation (Pickett 1989). Landscape models, study site selection, interpretation and regionalization of small scale results also often require historical information of past landscape transformations (Costanza *et al.* 1990, Baker 1989, Mitchell 1991). A better understanding of the past can also improve our predictions about future vegetation changes. Proper nature conservation management requires historical data about the systems to be managed, e.g. what were the main constraints in the past which played an important role in the development of present biodiversity.

The Great Hungarian Plain in the last 300 years

In the Plain, where human induced landscape transformation has been much bigger than in the surrounding mountains and where natural vegetation patterns and dynamics have changed so radically (treeless floodplains, lost loess steppes, drainage — Zólyomi 1946, Frisnyák 1990), it is hardly possible to understand present vegetation without a thorough knowledge of past human interference.

In the Great Plain, the 18th century is the period of resettlement and the re-emergence of the cultural landscape. Between 1596 and the beginning of the 18th century — during the Turkish Occupation, — the human population was wiped out and the former medieval agricultural landscape was ruined. Villages, farms, arable fields, vineyards, orchards and small roads disappeared (Frisnyák 1990, Hanák 1991, Szeremlei 1907). Vast areas turned into secon-dary steppes.

In the 17th and the first half of the 18th century, nomadic grey cattle grazing was characteristic making the landscape probably even more homogenous. During the 18th century, the dominant nomadic animal husbandry was replaced by wheat cultivation, which by the end of the century, became the dominant feature of the Plain (Frisnyák 1990, Szeremlei 1907).

In the Great Plain, the anthropogenic features of the present-day landscape structure and its dynamics developed almost entirely in the last 200-250 years (e.g. pattern of cultivated areas and settlements, drained wetlands and secondary forests). Only the larger settlements and the main roads survived from the medieval cultural landscape (Frisnyák 1990).

Kardoskút steppes

The Kardoskút area is particularly suitable for landscape historical studies. As a consequence of the two neighbouring towns and the famous lake, historical sources are more abundant than usual.

The aims of our study are to find out the differences between the regional landscape history of the Great Plain and the local history at Kardoskút, and to point out local specificities which contributed to the development of the local landscape.

Opinions are divided about the ancient or recent character of certain vegetation types of the Plain (woodlands, loess grasslands, alkali steppes - Zólyomi 1969a, Somogyi 1994, Bodrogközy 1965a, Szabolcs 1961). Based on historical data, the ancient or recent character of these habitats was reconstructed in the region.

The general vegetation and land-use history of the last 250 years was also reconstructed. Historical data was sorted and interpreted to make this readily accessible to other botanists and ecologists.

Study area

Kardoskút lies in SE. Hungary on the Békés-Csanád alluvial fan, where extensive arable fields on chernozem soils (with corn, wheat, barley and onion), alkali steppes and wetlands are the dominant features of the landscape (Fig. 1). The average annual temperature is 10.5 Celsius, and rainfall is 550 mm (maximum in June, drought in July and August; Pécsi 1989).

The Great Hungarian Plain belongs to the Eurasian wooded-steppe zone, its vegetation boundary coincides with the orographic boundary of the basin (Zólyomi and Fekete 1994). Edaphic (mainly hydrological) patterns are responsible for the formation of woodland-grassland mosaics on sand, alkali and loess soils, respectively (Soó 1929, Zólyomi 1958). Vegetation and landscape development of the southeastern part of the Plain was reconstructed by Zólyomi (1946, 1958, 1969a, b). In the Post-glacial and Boreal periods climatic steppes were widespread. In the Atlantic, woodland might have developed in some steppe areas but the land-use of the late Neolithic and Bronze Age probably prevented or hindered this process.

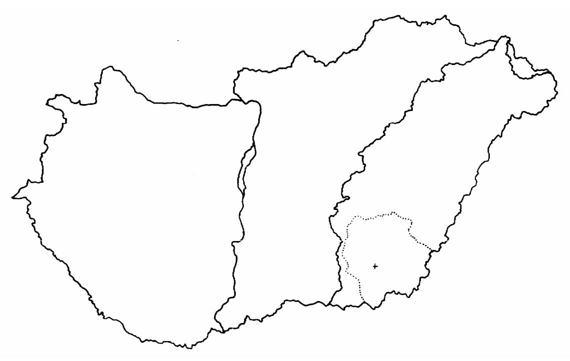


Fig. 1. Location of the study area. The Kardoskút-steppe (marked with '+') is located in the Tiszántúl part of the Great Hungarian Plain, in the basin of the Békés-Csanád alluvial fan which was built by the river Maros in the Pleistocene. (Pécsi 1989).

The area has been inhabited since the late Neolithic, mostly by nomadic tribes such as Körös culture, Baden culture, early and late Iron Age, Scythians, Jazyg-Sarmatians, Avars and Gepids (Szeremlei 1907, Banner 1943, Nagy and Szigeti 1984).

The Kardoskút steppe is a characteristic, fine scale mosaic of loess, alkali and wet areas (Fig. 2). A temporal lake lies in the center of the basin. North and south of the lake, dry and wet alkali grasslands can be found. On higher elevations (the differences are only 0.5-2 meters) arable fields with chernozem and slightly alkali soils are typical. The Hungarian alkali steppes are partly ancient (similar to the Ukrainian steppes; Soó 1929) and partly recent i.e. developed as a consequence of river control and drainage in the 19th century (Szabolcs 1961). Their fine scale mosaic pattern is determined by surface water erosion, the depths of soil water, and salt content of the B horizon (Bodrogközy 1965a,b, 1977).

Methods

The period before the 18th century was reconstructed because of a total lack of palaeopalynological data based on the scattered written documents and archaeological evidence (cf. Zólyomi 1946), and toponyms (cf. Zólyomi 1969b, Garcia Latorre and Garcia Latorre 1995).

From the 18th century onwards historical data are more abundant (e.g. military survey maps, Szeremlei 1907, Nagy and Szigeti 1984, Szenti 1983, Nagy 1975). In the 1960's, a multidisciplinary research project was set up by the Hungarian Academy of Sciences to study the area e.g. Bodrogközy 1965a, 1965b, 1966, Kiss 1963, Sterbetz 1974, 1977, 1992, Molnár and Mucsi 1966.

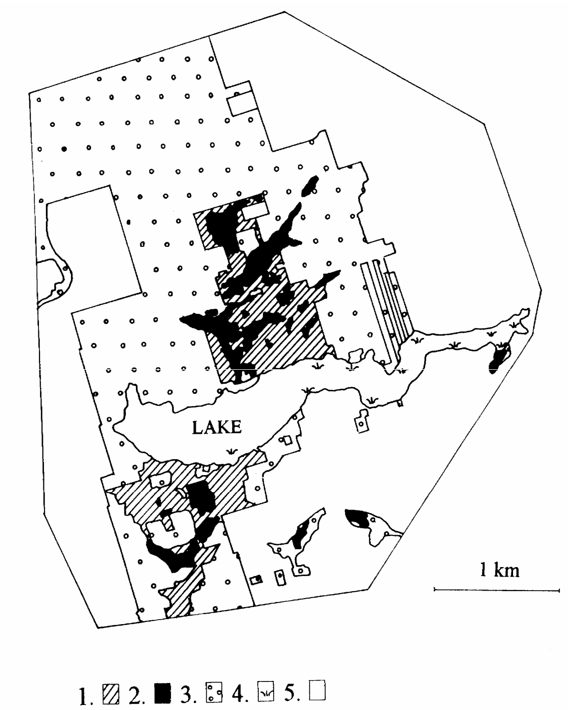


Fig. 2. Map of the Kardoskút steppe and the lake Fehér-tó. The area is a mosaic of loess, alkali and wetland areas. 1. ancient steppes on alkali soils, 2. wetlands and bare alkali patches,
3. secondary steppes, 4. lake bed and alkali marsh vegetation,
5. arable fields on loess.

All the available survey maps (1784, 1861-66, 1884, 1970 and 1983) and aerial photos (1950, 2 from 1953, 1964, 1976, 1981, 1987 and 1991) were studied in detail. In June 1995, colour aerial photos were made from a hang-glider.

Dependence of land-use on soil conditions was analyzed by comparing the soil map of Hahn and Witkowsky (1938) and the grassland-arable field mosaic for 1784, 1861-66, 1884, 1950-53 and 1970 redrawn on a transillumination table from maps and aerial photos. Areas which had been grasslands on all the 4 maps and photos were treated as ancient, and areas which were continuously ploughed between 1861-66 and 1970 were regarded as permanent fields. It has to be mentioned that the inaccuracy of 18th and 19th century maps (originated partly from the process of copying) could have caused an error of a magnitude of several %.

A more detailed reconstruction of the land-use could only be made from the 1930's, based on the living memories of the inhabitants. Data from personal communications often involve the risk of subjectivity (cf. Winsor 1987, Mitchell 1991, Clarke and Finnegan 1984), therefore the most important data were verified.

Nomenclature of species follows Soó (1964-80).

Results

Vegetation

The first vegetation description of the area was prepared by Bodrogközy (1965a,b), but this data were collected from a much bigger area. During 1995 the vegetation of the area under investigation was resurveyed.

The most common vegetation type of the steppes is the *Festuca pseudovina* dominated, dry continental alkali grassland. In its more alkali subtype, *Artemisia santonicum, Matricaria chamomilla, Podospermum canum, Atriplex litoralis, Trifolium angulatum* are common. Its less alkali subtype, the *Achillea* steppe, can be characterized by disturbance tolerant, generalist species like *Bromus mollis, Poa bulbosa, Cruciata pedemontana* and *Veronica arvensis*. The *Achillea* steppe is more common, since it can also develop from *Artemisia* steppes by degradation (caused e.g. by fertilization or liming; cf. Sterbetz 1995).

To the north and south of the lake alkali meadows and temporary marshes (which dry out by May or June) with *Agrostis stolonifera, Alopecurus pratensis, Beckmannia eruciformis* and *Bolboschoenus maritimus* fill the depressions. On the most alkali patches, where the salt content reaches 0.3-1.2 % (Bodrogközy 1965a), partially vegetation free white patches with *Camphorosma annua* are typical.

Embedded in the alkali steppe, small stands of loess grasslands represent the last remnants of the former vast loess steppes. The only tiny ancient stand (ca. 0.2 hectare) is overgrazed, dominated by weeds and poor in specialist species (only *Sternbergia colchiciflora, Thalictrum minus* and *Astragalus austriacus*). The other loess grassland patches are secondary and dominated by *Festuca pseudovina, Salvia austriaca, Poa angustifolia, Cynodon dactylon* and *Euphorbia cyparissias*.

History of the steppes

Before and during the Turkish Occupation (10-17th centuries)

Though the area belongs to the wooded-steppe zone (Zólyomi 1946, 1969a), there are no data available which point to the presence of ancient woodlands on the alluvial fan. In documents from the Árpád period (10-13th century), the following toponyms with woody species names were found (Blazovich 1985): *Cornus* sp. (species of mesophilous broad-leaved woodlands), *Corylus avellana* (common in xero-mesophilous oak woodlands with continental character), *Prunus spinosa* (species of fringes of xero- and mesophilous woodlands), *Sambucus nigra* (Nitrogen frequent species of degraded woodlands and clear cuts), Thorny thicket (thickets presumably with *Prunus, Crataegus* and *Rosa* species) and none for oak, elm or ash, the common woodland trees of the Plain.

From this period, there are no data available about the grasslands. The typical methods of agriculture were rotation of pastures and fields, or fields and fallows (Frisnyák 1990). The size and density of archaeological sites points to many, small, short-lived settlements (Blazovich 1985).

From the second half of the 13th century onwards, people began to move into nucleated settlements and small villages became abandoned. The height of this process was at the turn of the 16th and 17th centuries. The vast deserted steppes were used for nomadic grey cattle grazing (Blazovich 1985).

In the Middle Ages, the Kardoskút steppe was inhabited for centuries by farmers and stock breeders. Between 1693 and 1700, the area became deserted and later it was used for nomadic grazing (Szeremlei 1907, Szenti 1983). Settlements and fields disappeared, grasslands expanded and the landscape became more homogenous.

The period of extensive pastures (1743-1847)

In the 18th century, the steppe was till used for nomadic-style animal husbandry. This type of pasturing has been replaced by stabling, only since the end of the 1st World War. Overgrazing was common (Szenti 1983). In the beginning of the 18th century, the area was described as a steppe with extensive temporal wetlands, where, with the exception of one pear tree, no trees could be found (Nagy 1975). Lack of trees can also be seen on the 1784 map. In 1743, the area was separated as a town pasture and land-use was restricted to grazing (previously mowing was also allowed; Szenti 1983).

Since in the spring, inland floodings threatened arable fields, drainage works began early. Already by 1805 dams were built to keep water in the steppe area away from the neighbouring arable fields (Szenti 1983). This method of drainage survived till the 1930's (A. Gyömrei personal communication), later water was drained away into the Maros river.

The first botanist who visited this region was Kitaibel, who travelled through the alluvial fan in 1798 and 1810 (Gombocz 1945, Radics after 1970).

He listed the following habitat types from the vicinity of Csanád, Mezõhegyes and Kondoros: arable fields, fallows, pastures and meadows, alkali steppes, road verges, dams and settlements. The flora of the arable fields was more diverse than today. On the fallows specialist species of the loess grasslands appeared already in the first years of succession (e.g. *Carduus hamulosus, Anthemis tinctoria, Astragalus austriacus* and *Euphorbia pannonica*). The dominant grass of pastures was *Festuca* (sp.?), common weeds were : *Carduus nutans, Carthamus lanatus, Marrubium peregrinum* and *Artemisia absynthium.* Some of the loess specialists which are now very rare or extinct (Molnár 1992) are mentioned too (*Silene longiflora, Inula oculus-christi* and *Astragalus onobrychis*). Loess specialists, however, were mostly found on road verges (*Crambe tataria, Ajuga laxmannii, Dictamnus albus, Brassica elongata, Chamaecytisus hirsutus, Amygdalus nana, Campanula sibirica* and *Rosa gallica*). From alkali habitats *Limonium gmelini, Lepidium ruderale, Matricaria chamomilla, Hordeum hystrix* and *Lepidium crassifolium* were listed. The landscape was still nearly treeless. Kitaibel has not seen any woodland, only a young oak plantation, and single trees of *Ulmus minor* and *Pyrus* sp.

The small-farm system (1847-1950)

In the first half of the 19th century, the area of the steppe decreased continuously from the edges. Demand for arable fields increased so much, that between 1847 and 1860 the steppe had to be parcelled out by the town (Szenti 1983). In a little more than 10 years nearly all of the suitable land was ploughed (64% of the study area; Fig. 3, Table 1). Between 1861-1866 and 1884, more ancient grasslands were broken up, but at the same time abandonment of land also began. By 1884, all land that was suitable for farming had been ploughed. The remaining grasslands were used for extensive animal husbandry (Nagy 1975). Ploughing of grass-lands did not seize, but was confined to secondary grasslands originating from arable fields. Between 1884 and 1950, there were only slight changes in the area of ancient grasslands.

Between 1847 and 1970, ploughing and abandonment was strongly controlled by site conditions. Land-use was fine-grained. Since peasants owned very small bits of land, they had no alternative but to plough even the smallest suitable piece of land (A. Gyömrei personal communication). As a consequence, till the late 1940's, the small loess grassland patches were also used e.g. as a vegetable garden or a quince orchard (Antal Gyömrei personal communication, aerial photos from 1950 and 1953). Today, these loess grasslands are poor in specialists, the characteristic dominant species are all disturbance tolerant generalists (*Salvia austriaca, Ornithogalum orthophyllum, Cynodon dactylon, Festuca pseudovina, Achillea collina, Poa angustifolia, Cruciata pedemontana* and *Euphorbia cyparissias*).

Land-use mainly depended on soil conditions (Fig. 4, Table 2). 84 % of the permanent fields were on chernozem soil. Only 0.5 % of the chernozem was never ploughed, but this area seems to be even smaller (0.1%) on the basis of field survey. 49 % of the alkali soils were ploughed, but only 29 % of them became a permanent field. 42 % of the alkali arable fields were abandoned later, but only 12 % of the fields on chernozem.

Socialist agriculture and nature conservation (1950-1995)

Land-use changed remarkably between 1950 and 1995 (cf. Sterbetz 1977, 1992). In 1950-53 (based on aerial photos) the traditional small-farm system was still the dominant landscape forming force. Later, the number of occupied farm-houses decreased (e.g. on the steppes around the lake: in 1950-53: 31, in 1964: 21, in 1981: 9, in 1991: 3, and in 1995: 1), while socialist agriculture became more and more dominant. Abandoned houses were demolished, small fields and fragments of pastures were aggregated into huge fields.

In the early 1970's, north of the lake, ca. 70 ha of arable field was turned into grassland for nature conservational reasons. From the 1960's onwards, the improvement of ancient grasslands accelerated, first by fertilization, but between 1976 and 1982, also by harrowing and overseeding, or even by breaking up the grasslands and creating a new one (I. Gojdár and I. Sterbetz personal communication). In this period, 40 % of the ancient grasslands were degraded (see Fig. 2). Specialist species like *Artemisia santonicum, Limonium gmelini, Campho-rosma annua* and *Matricaria chamomilla* disappea-red (Sterbetz 1995), together with specialist bird species like *Otis tarda, Glareola pratincola, Burhinus oedicnemus* and *Charadrius alexandrinus* (Sterbetz 1992, Nagy 1993). In addition to these factors, the 15 years long drought period has also caused transformations, mainly in wetlands. Though monocotyledons of steppe wetlands have a good resistance to dryness, the opening of the canopy and spread of weeds shows the degradation process. The area of bare alkali patches with *Camphorosma* has also decreased, which was caused by the less intensive grazing and the shorter inundation in the spring (Sterbetz 1992, Z. Varga personal commu-nication).

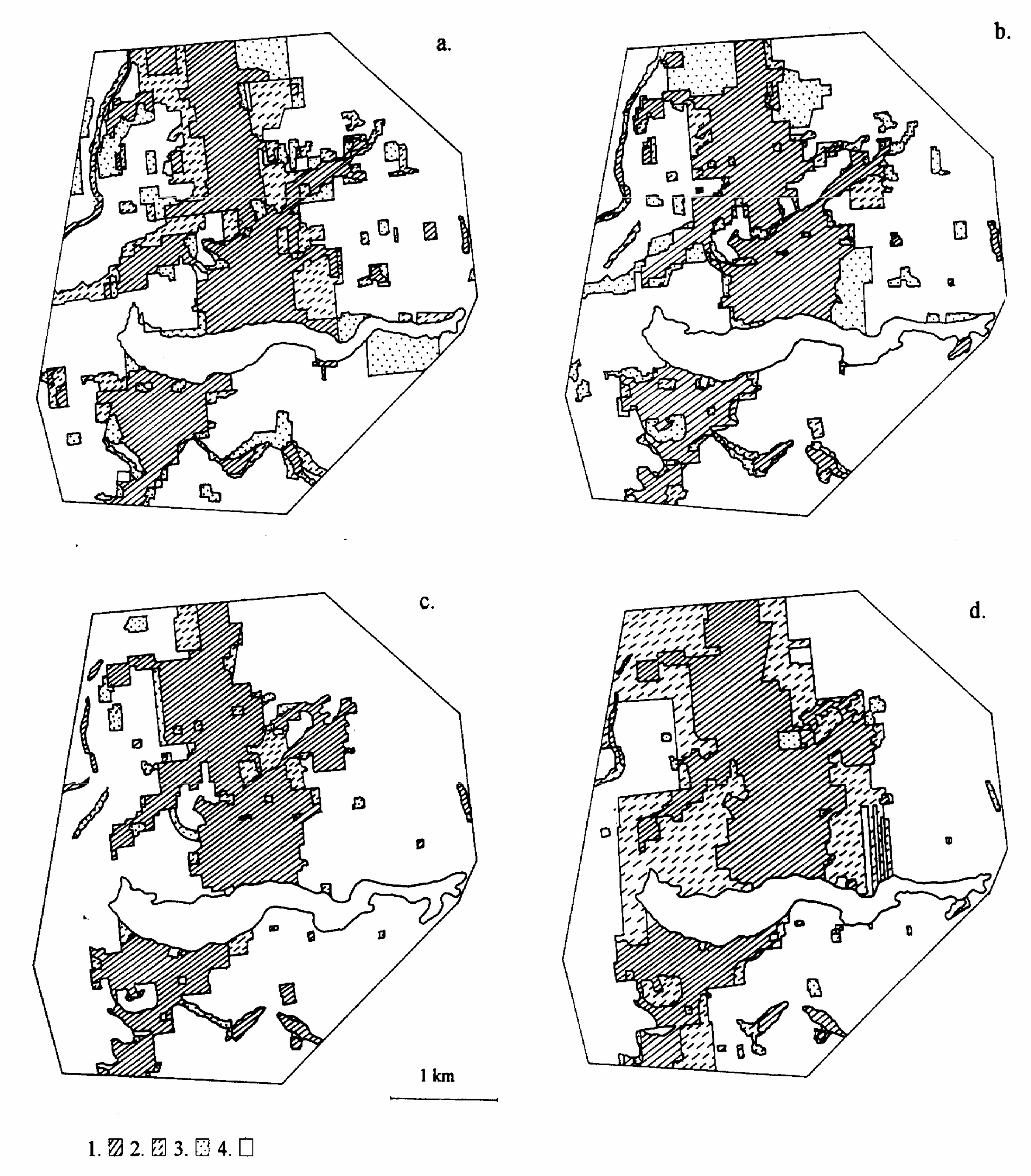


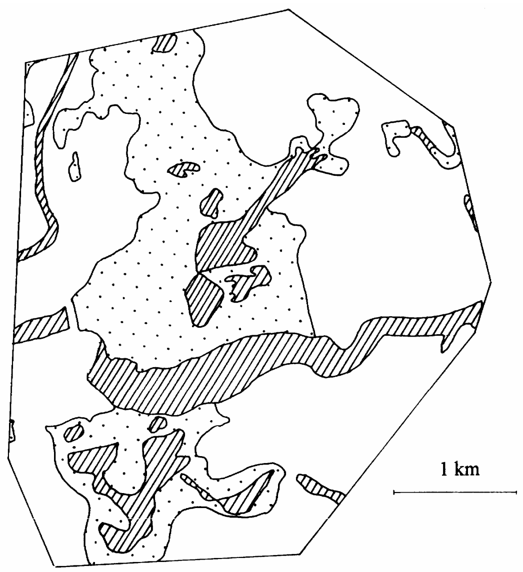
Fig. 3. Changes of the grassland - arable field mosaic at Kardoskút from 1861-66 till the present, based on the comparison of subsequent maps and aerial photos. Both ploughing and abandonment can be observed during the whole period. 1. Remained a grassland in the period, 2. Became a grassland in the period, 3. Ploughed in the period, 4. Remained an arable field in the period. Periods: a: 1861-66 - 1884, b: 1884 - 1950-53, c: 1950-53 - 1970, and d: 1970 - 1995.

Table 1. Changes in the area of grasslands and fields at Kardoskút from 1784 till present, between subsequent maps and photos. Numbers indicate the area of certain types as a % of the total area.

Time preiod	Remained a grassland	Became a grassland	Ancient grassland	Total grassland	Ploughed grassland	Remained a field	Total field
1784 - 1861-66	36	0	36	36	64	0	64
1861-66 - 1884	31	9	27	40	5	55	60
1884 - 1950-53	28	4	26	32	12	56	68
1950-53 - 1970	30	4	25	34	2	64	66
1970 - 1995	33	31	14	64	1	35	36

Table 2. Control of land-use by site conditions in the period of 1861-66 and 1970 at Kardoskút. Soil moisture and salt content controlled land-use, with the wet sites being used as hay meadows or pastures and thus remaining ancient grasslands, dry alkaline sites being utilized for grazing and cultivation and dry sites with chernozem soils being used for cultivation. Numbers indicate the area of certain types as a % of the total area.

Land-use / soil type	Flooded alkali	Alkali	Chernozem
Permanent arable field	0.8	9	51
Ploughed but abandoned later	1.2	6.5	7
Ancient grassland	8	16	0.5



1. □ 2. ⊡ 3. ▨

Fig. 4. Soil map of the area after Hahn and Witkowsky (1938).
1. Chernozem soils, 2. alkali soils, 3. highly alkali and flooded soils.

Discussion

Regional versus local history

Cultural landscape transformations are often abrupt, strongly bound to cultural changes or technical innovations. These changes are, however, scale dependent and local and regional timing of events do not necessarily coincide (Berglund 1991). Variances between individual landscapes may often be ascribed — beside the abiotic differences — to different local land-use histories.

1. Regional scale processes in the Great Plain

The broad outlines of the last 300 years of landscape history in the Plain are relatively simple: Desertification and nomadic animal husbandry in the 16-17th centuries, re-emergence of the cultural landscape in the 18th and partly in the 19th century, development of the small-farm system, river control and drainage in the 19th century till the 1950's and since then disintegration of the small-farm system and the development of the socialist agriculture (Frisnyák 1990).

The re-emergence of the cultural landscape in the 18th century was in many respects similar to the encroachment of civilization onto the North American or Argentinean steppes (Hollander 1947) or to the large-scale deforestations in east North-America between 1810 and 1860 (Williams 1982), though in Hungary encroachment was not frontier-like, but more patchy as a consequence of the more heterogeneous landscape. Agricultural activity in the Plain was generally strongly controlled by site conditions, chernozem soils used as arable fields, alkali areas for grazing and meadow soils for mowing (Frisnyák 1990).

2. Local features of the Kardoskút steppes

At Kardoskút, the turning of grasslands into arable fields could also be observed, though it happened later than in the region (I. military map, Szeremlei 1907, Molnár 1995a), since the town was able to conserve extensive pastures till the late 1840's (Szenti 1983). In the study area, site conditions like soil moisture and salt content controlled land-use (with wet sites used as hay meadows or pastures, dry alkaline sites for grazing and cultivation and dry sites on chernozem soils for cultivation) but ploughing pressure (Elek 1937) was higher than general in the Plain. Consequently, a large proportion (49 %) of alkali areas were also ploughed for cultivation, although 42 % of it was later abandoned. Even the smallest loess grasslands were used as a field. This small scale land-use can best be seen during the small-farm system period (1847-1950's). Present landscape pattern was basically developed between 1847 and 1884, though by the time of the disintegration of the small-farm system (1950's - 1970's), land-use changed fundamentally and became coarser-scale.

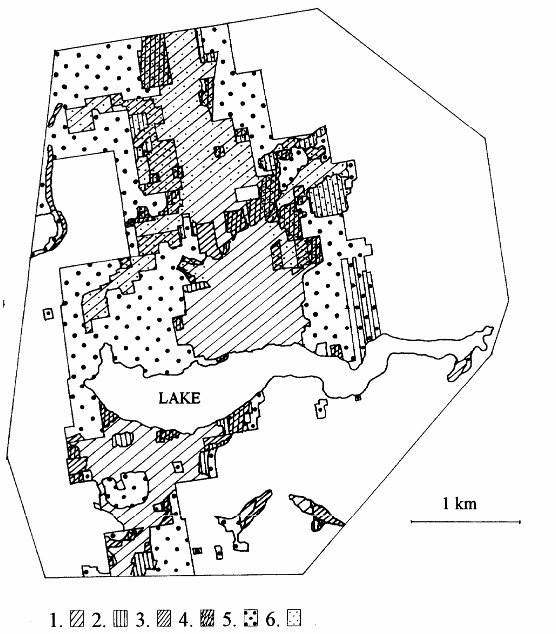


Fig. 5. As a consequence of the continuous ploughing and abandonment since the 19th century, the grasslands of the present steppe are of a different age. The map was constructed on the basis of the map series shown on Fig. 4 1. Ancient grasslands 2. Abandoned between 1861-66 and 1884, 3. Abandoned between 1884 and 1950-53, 4. Abandoned between 1950-53 and 1970, 5. Abandoned after 1970, 6. Improved since 1970.

Contrary to the other areas in the region (Molnár 1995a) already in the second half of the 19th century the abandonment of fields could be observed, since many non-productive alkali areas were broken up in the 1850's. One fifth (19 %) of the cultivated area was abandoned between 1861-66 and 1970, nearly half of it (44 %) was on alkali soils. As a consequence of the abandonments of the last 130 years, the age of present-day grasslands are different (Fig. 5). Ancient and mixed aged recent secondary grasslands form a fine mosaic patterns, where patches are often hardly distinguishable in the field, because dominant weeds conceal differences in species composition. Lack of specialists and/or unnaturally shaped boundaries help point out secondary patches.

In the Great Plain, during the last 150 years, the sharp decrease of wetlands is striking (Szabolcs 1961). At Kardoskút, from the 19th century up to the 1930's, regional drainage resulted in more water locally, since the area of alkali pastures was used as a water reservoir to keep flooding water away from the arable fields nearby (Szenti 1983, A. Gyömrei personal communication.).

Ancient versus recent habitats

Since it is often difficult to prove that a certain vegetation patch is primary, with historical continuity from the pre-Neolithic Period, we usually distinguish ancient and recent patches (Rackham 1980, Peterken and Game 1984). Ancient patches in the Hungarian Great Plain are those which developed before 1783 (the publication of the first military survey map), whilst recent patches are those that are less than about 200 years old. Ancient patches retain undisturbed, unploughed soils and have kept more valuable species than our recent and thus secondary vegetation patches. Reliable identification of anci-ent grasslands and woods is, therefore, important for nature conservation.

1. Woodlands in the region

Opinions are divided as to what extent the Békés-Csanád alluvial fan was wooded a 1000 years ago. According to Zólyomi (1969a), Blazovich (1985) and Rapaics (1918), the area was probably nearly completely deforested, Somogyi (1994), however, assumes that extensive loess oak woodlands were still present. Based on toponyms from the 10-13th centuries (Blazovich 1985), only shrub vegetation could have presumed to have been in the region ca. 1000 years ago, which could look similar to the steppe-thickets described by Rapaics (1918) from the Serbian Titel-plateau. Since later historical data (Kitaibel in Gombocz 1945, Radics after 1970, Thaisz 1905, Szenti 1983, Nagy 1975, I., II. and III. military survey maps) also do not indicate ancient woodlands, it can be concluded that in the last 1000 years ancient woodlands were absent from the alluvial fan.

2. Degradation of the loess grasslands

Loess grasslands of the area are species poor, which was explained by Bodrogközy (1965a) by the high salt content of the B horizon of the soil, since patches adjacent to alkali grasslands could only survive. It was shown, however, that species rich loess grasslands can survive even if salt accumulates to depths of 1 meter, if grazing pressure is low (Biró 1990). At Kardoskút, species richness is probably controlled more by the ancient or recent character of the loess grassland stands, than by conditions of deeper soil layers.

Based on the known methods of agriculture (Szeremlei 1907) and the two medieval villages at the lake (Blazovich 1985, Banner 1943, Olasz 1959), intensive use of loess areas can be assumed in the Middle Ages. Later during desertification (Balzovich 1985), secondary grasslands could develop on the place of former cultivated fields. In the 18th century, overgrazing (Szenti 1983) might result in degraded loess pastures. These secondary loess steppes were described by Kitaibel (in Gombocz 1945, Radics after 1970) and later by Jankó (1886). In their species lists, specialist species show the ancient character of the grasslands (cf. Peterken and Game 1984), while the long list of weed species point to their degraded character (Molnár 1995a). Concentration of specialists on the road verges (see Kitaibel) shows the secondary character of these pastures. It has also been shown that nomadic-like cattle or sheep grazing does not prevent the survival of steppe specialists (Molnár 1992). At Pitvaros, nearly half (47 %) of the specialists of the area could survive in grazed loess grasslands. This part of the Pitvaros steppes belonged to a large estate where land-use was coarser-scale (compared to Kardoskút), thus the small loess grasslands, embedded in alkali steppes, remained pastures. Today, even rare loess specialists can be found in them (*Sternbergia colchiciflora, Phlomis tuberosa, Ranunculus illyri-cus, Thalictrum minus, Adonis vernalis Trifolium ochroleucum*, etc.; Molnár 1992).

At Kardoskút, loess grasslands were nearly completely ploughed (99.9%) between 1847 and 1970. The species richness of recent stands is very low, since till the 1940’s, they had been used for cultivation. In the early 1970’s, extensive secondary grasslands were created on the chernozem soils (I. Sterbetz, I. Gojdár personal communication). The potential vegetation of these areas is the loess grassland, but the long history of land-use resulted in a locally very poor propagulum source, which prevents their regeneration. Based on the observations of 40-50 years old abandoned fields, a decrease of weed cover and an increase of the dominant generalist grasses, can only be expected (*Festuca pseudovina, Poa angustifolia* and *Cynodon dactylon*; Molnár unpublished data).

3. Alkali steppes

Most of the alkali steppes of the Hungarian Great Plain developed as a consequence of the river controls and drainage works of the last 150 years (Somogyi 1965, Szabolcs 1961). These secondary steppes are usually poor in specialist species. Identification of ancient areas is sometimes difficult, especially when they are impoverished by overgrazing. Historical data can help distinguish ancient and secondary steppes by reconstructing past hydrological, soil and land-use conditions (Molnár 1995a, b). Based on the data of Kiss (1963), Bodrogközy (1965a, b, 1966) and Szenti (1983), the Kardoskút steppes and the lake can be regarded as ancient, though some parts are being turned into secondary steppes by pasture improvements (cf. Sterbetz 1992).

Conclusion

The vegetation of the Kardoskút steppe has undergone considerable changes in the last 250 years. Based on historical documents, survey maps, the present vegetation and the living memories of inhabitants, this history could be reconstructed in detail. Past events and states have had fundamental effects on the present state and dynamic of vegetation. Many of these effects were not deducible from present vegetation pattern.

Historical reconstruction at the century scale can provide essential information for explanations of present and predictions for the future vegetation.

Acknowledgements

István Sterbetz, István Farkas, Ernõ Olasz, István Farkas Jr., István Gojdár and Antal Gyömrei provided valuable insights into the 20th century history of the area. Bertalan Andrásfalvy, László Blazovich, Pál Halmágyi, Sándor Hévízi, Ferenc Kõszegfalvi, Gyula Nagy, András Pleskonics, Tibor Szenti and Ferenc Tóth helped in collecting the literature. László Bagi made the aerial photos from the area. Sándor Bartha, Gábor Fekete and István Sterbetz offered constructive comments on a former version of the manuscript. I would like to thank Liam Holloway for checking the English content. This study was supported by the Nature Conservation Directorate of Körös-Maros, Szarvas and by the National Scientific Research Foundation (OTKA grant No. T-16390).

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Maps and aerial photographs

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Black and white aerial photograph from 1976, Institute of Geodesy and Remote Sensing, Budapest
Colour aerial photograph from 1995, at the author.