

# INUNDATION AREA OF THE RIVER MAROS NEAR BÖKÉNY: LAND-USE HISTORY AND HABITAT MAPPING

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## Introduction

During human history, activities such as forest plantations and agriculture have considerably influenced the landscape. In conservation management, it is important to know the history of the area to be protected (e. g. Milchunas *et al.* 1988). The subunit of the Körös-Maros National Park near Maros is quite well-known (Paulovics 2002). However, its land-use history has never been analysed yet. In addition, its state has undergone rapid changes recently. Therefore, it may be useful to reveal its present state from a botanical perspective.

In this study, we revealed the land-use history of the subunit of the Körös-Maros National Park and we scrutinized its present state.

## Material and methods

The river Maros has a marked bend near Bökény, a small settlement belonging to Magyarcsanád. Makó is about 12 km away. Mean annual temperature is 10.5-10.6 °C, mean annual precipitation is 580 mm (Ambrózy and Kozma 1990). Water quality of the Maros near Makó belongs to the category III (Somogyi 1990). Floods are most frequent in spring, whereas water level is mostly low in autumn (Somogyi 1990). The area belongs to the phytogeographic province Pannonicum, region Eupannonicum, district Crisicum (Borhidi and Sánta 1999).

In land-use historical analyses, historical maps and other historical documents, interviews with local inhabitants, and recent botanical data can be used and compared with actual field data (Molnár and Biró 2010).

In revealing the land-use history of the area, we used the following historical maps: Map of the first military survey (1784); Map of Csanád county (1802); Map of the second military survey (1864); Map of the state-owned forests of the river Maros and Bógamellék (1869); Map of the third military survey (1872-1884); Map of all forests of the Hungarian state, with the main tree species (1885); Map of the river Tisza valley: River Maros valley and the southern part of the Danube-Tisza interfluvium (1892); Map of all forests of the Hungarian state, with the main tree species (1896); Administrative and agricultural map of Csanád

county (1902); Makó and Nagyszentmiklós (1914); Topographical map of Sannicolau Mare (1972).

Besides, other historical data (Kitaibel 1810 in Lőkös 2001), documents on local history and natural conditions (Andó 1993, Marjanucz 2000, Tóth 2000) and recent reports (Paulovics 2002, Oroszi 2009), as well as interviews were used.

We also prepared a habitat map using ArcView GIS 3.2 (ESRI). Habitats were identified using the habitat guide (Bölöni *et al.* 2007a, 2007b).

## Results

### *Land-use history*

In the Middle Ages, several villages were located along river Maros. In the inundation area of the Maros, there were plenty of lakes, backwaters, brooks and islands, providing excellent opportunities for fishing, bird-catching and hunting. Higher loess plateaus were used for agriculture (Marjanucz 2000, Tóth 2000).

During the Turkish occupation of Hungary, plough-lands were uncultivated, roads were covered with plants, floods were greater and more frequent (Tóth 2000).

The area revived from the 1730s. The population lived on animal keeping, fishing and hunting, as well as from salt and wood transportation from Transylvania (Andó 1993). Neighbouring farmsteads were put into use (Tóth 2000).

By 1770, water-mills used the energy of the Maros. The ferry also played a significant role from the Middle Ages. Intimate connections between humans and the Maros are emphasized by the sigil of Apátfalva, dating from 1764, depicting a lapwing, some sedges and the river Maros (Tóth 2000).

Soldiers settled in at the end of the 18<sup>th</sup> century. They were allowed to use land and forests unrestrictedly. Viniculture started in Apátfalva in 1770. In 1779, local inhabitants had good plough-lands. On the island, they had remarkable plum orchards (their importance is echoed by the geographical names Kerekszilvás and Hosszúszilvás). In Apátfalva, stabling and semi-extensive animal keeping were typical. Hay-meadows along the river were flooded frequently at this time (Tóth 2000).

River canalizations began in 1754, but in a short time, the Maros returned into its original bed (Paulovics 2002). Therefore, the river flows in its original bed on the map of the first military survey (Fig. 1).



Figure 1. Map of the first military survey, coll. XX., sect. XXX. et XXXI. (1784)

According to the description of the first military survey, after long-lasting rains in spring, the whole area was flooded, including the village of Magyarcsanád, the roads leading to Nagylak, the nearby Bekay grassland and Bekay halom.

The area surrounded by the Maros bend was covered by forests which were flooded (Fig. 1). North of this region, a wet grassland can be seen. Further away, sweep-pole wells were situated on a grassland. Islands are also clearly visible on the map. According to the description of the first military survey, islands (e. g. Vrangyak sziget, Vatta Mada sziget, as well as Szilvás, Szecső, Tárnok further downstream) were covered by forests of full-grown trees, white willow-forests of medium height or thickets. Near the Bekai halom, there were small swamps, which dried up often.

In 1793, because of the repeated floods, the village Magyarcsanád moved to the north, where it can be found at present.

In 1801, tobacco-growing started in Beka, at the place of the deserted medieval village Bökényfalva (Marjanucz 2000). The study area was called Béka on the map of József Vertics made in 1802 (Fig. 2.).



Figure 2. Map of Csanád county (1802)

Kitaibel (in Lőkös 2001) recorded in 1810 that the whole area around the former, abandoned Csanád was flooded. He found on the pasture near the new Magyarcsanád some species typical of steppes (e. g. *Astragalus austriacus*, *Isatis tinctoria*, *Salvia austriaca*, *S. verticillata*).

After severe floods had occurred (e. g. in 1821 and in 1852), bends of the Maros were cut through. First cuttings were made in 1852 near Apátfalva. However, in 1879 the river was flowing in its original bed (Tóth 2000).

Considerable changes occurred between the first and second military surveys. Both forests and reed beds decreased. The area surrounded by the bend of the Maros is called Buzsáki-erdő on the map of the second military survey (Fig. 3). This forest was interrupted by pastures. Also, pastures can be found north of this region. A forester's lodge was located in the northeast corner of the Buzsáki forest, near the river.

The river was flowing in several branches, which made sudden bends. The islands were covered by forests. After 1863, a 19 m wide road had to be separated from the collective pasture for the barge hauler horses along the river (Oroszi 2009).

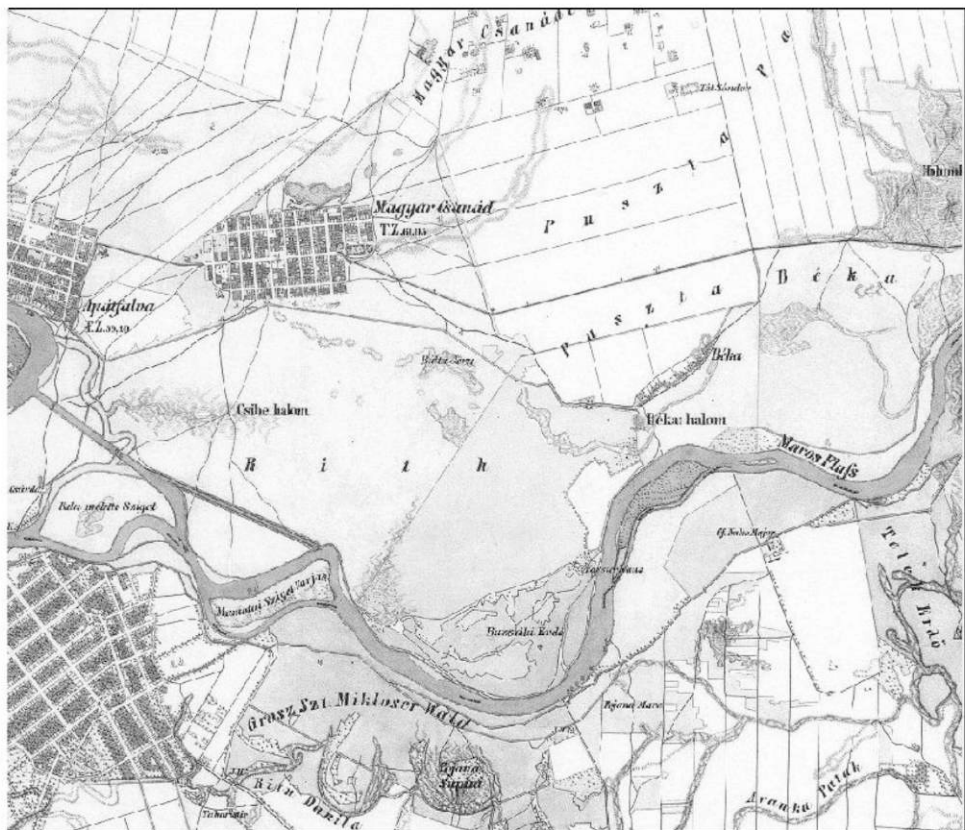


Figure 3. Map of the second military survey, col. XXXIX, sect. 62 (1864)

The map of the state-owned forests of the river Maros and Bégamellék (1869) shows that considerable parts of the study area were occupied by forests (Fig. 4).

The area called Béka must have been wooded a few years later, as shown by the map of the third military survey (1872-1884).

Also, the Map of all forests of the Hungarian state, with the main tree species, made in 1885 shows a forest on the study area.

On a map from 1892 (Map of the river Tisza valley: River Maros valley and the southern part of the Danube-Tisza interfluve), a forest can be seen, which is somewhat fragmented. North of the forest, there was a grassland, called "Lápos". Further away, there were some sweep-pole wells, indicating that grasslands were used as pastures. In this section, some small islands were situated in the river (Fig. 5).



Figure 4. Map of the state-owned forests of the river Maros and Bégamellék (1869)



Figure 5. Map of the river Tisza valley: River Maros valley and the southern part of the Danube-Tisza interfluvium (1892)

Similarly, it seems that the area was wooded in 1896, according to a forestry map (Map of all forests of the Hungarian state, with the main tree species; Fig. 6).



Figure 6. Map of all forests of the Hungarian state, with the main tree species (1896)

In 1902, a considerable part of the area under study was covered by forests according to the Administrative and agricultural map of Csanád county (Fig. 7). However, in a short time, forests along the Maros were cleared, and the area was used as arable land (Marjanucz 2000). By 1914, the area had been parcelled out into allotments, as it can be seen on the map of Makó and Nagyszentmiklós (Fig. 8).

The dominance of alien plants rose in the 20<sup>th</sup> century: for example, in 1949, one hectare of black locusts was planted on the pasture of Bökény.

Formerly, extensive orchards were pretty wide-spread in the area, and the farmers often lived in small huts from spring to autumn (J. Veréb, personal communication).

Till the regime change, grasslands were used intensively: they were fertilized and irrigated. After being mown in spring, grasslands were grazed first by horses, then by cattles, later by sheep and finally, at the end of the season by pigs (I. Csáki, personal communication). Although there were great forests in the area (Fig. 9), before 1990, nonindigenous poplar forests were planted exclusively (I. Csáki, personal communication).



Figure 7. Administrative and agricultural map of Csanád county (1902)

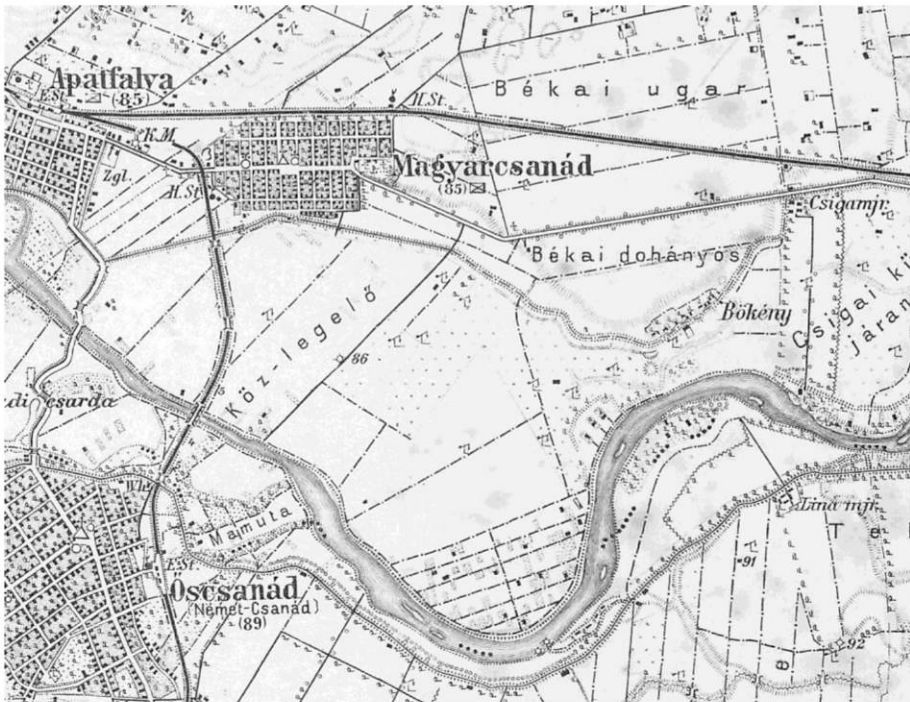


Figure 8. Makó and Nagyszentmiklós (1914). Study area is parcelled out.



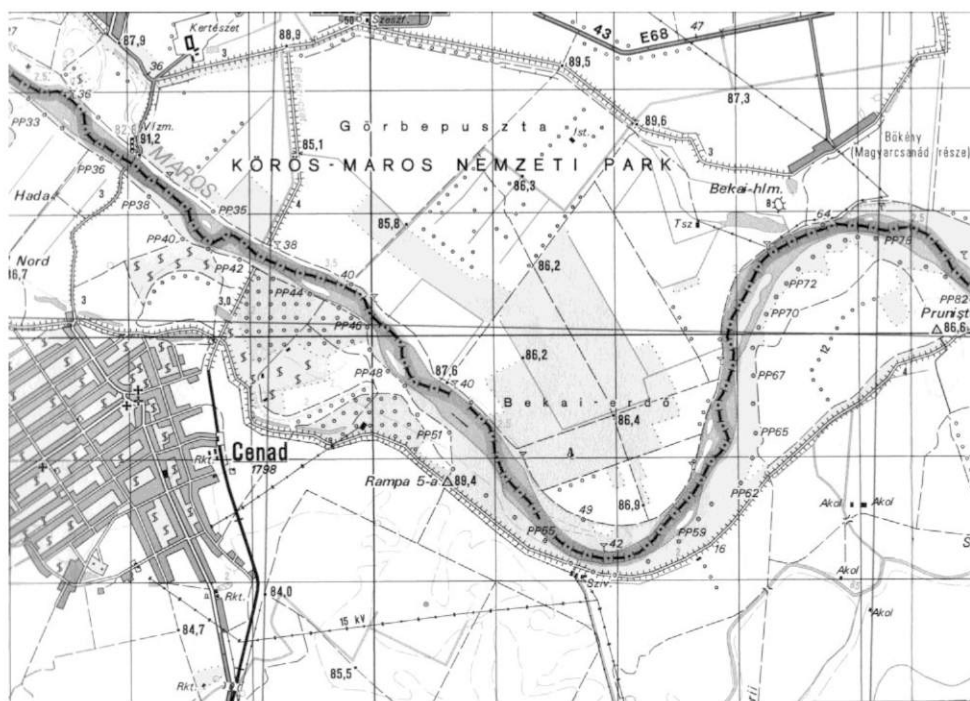


Figure 9. Topographical map of Sannicolau Mare (1972)

### Present state

Habitat map of the area is presented in Figure 10. At present, grasslands are partly mown, partly grazed by sheep and cattles (I. Csáki, personal communication). Most of the forest patches are in a very bad condition, with poor field and shrub layers. They are planned for restoration with indigenous tree species (I. Csáki, personal communication). The poplar-willow riverine forest on the riverside, although invaded by alien species, supports relatively diverse herb and shrub layers. Proportion of orchards is low. The directorate of the Körös-Maros National Park intends to restore the extensive orchards with traditional fruit-trees (I. Csáki, personal communication).

We found the following valuable plant species in the target area:

*Clematis integrifolia*: a protected plant species; it is quite common on mesotrophic meadows on the study area.

*Lamium album*: although not protected, it is valuable (Paulovics 2002); we found this species in the edges of the riverine poplar-willow woodland.

*Ornithogalum boucheanum*: common on the Great Hungarian Plain, sometimes occurring in large numbers; we found this species in an edge of the riverine poplar-willow woodland.

*Scilla vindobonensis*: a protected plant species; this plant was found in the riverine poplar-willow woodland.

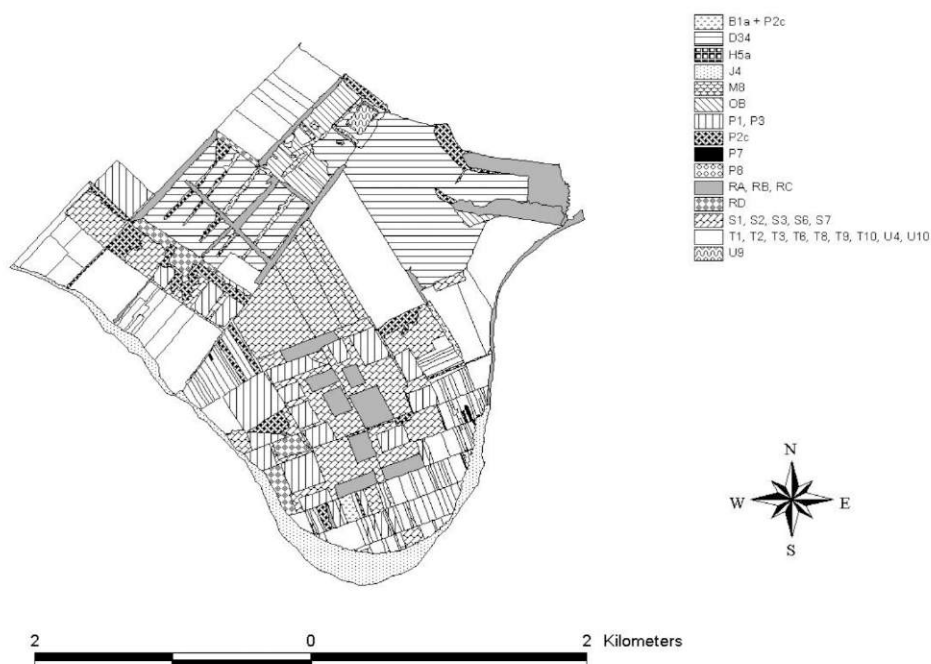


Figure 10. Present land-use map of the study area

## Discussion

Our land-use historical study revealed that the area surrounded by the Maros bend was mostly covered by forests. These forests were somewhat fragmented: several maps indicate a mosaic of grasslands and forests in the area. North of this region, pastures were typical. Often the whole area was flooded by the river. Major changes occurred from the beginning of the 20<sup>th</sup> century, when forests were cleared and land was parcelled out into allotments, alien species spread, grasslands were fertilized and extensive orchards decreased.

Although the potential vegetation is riverine willow-poplar woodland (Deák 2008), this habitat can be found in a narrow stripe along the Maros exclusively. The study area is dominated by plantations of invasive species and arable fields, which is usual in the region (Deák 2008). Mesotrophic meadows, used either as pastures or as hay-meadows, also cover a considerable area. Extensive orchards may also be valuable, with traditional Hungarian fruit-trees (Deák 2008). In the study area, we found some potentially valuable small orchards.

At present, there are intensive efforts to eradicate the invasive species *Amorpha fruticosa* and to replace alien trees with indigenous tree species.

We found two protected plant species. Although localities of *Scilla vindobonensis* are known along the Maros, it has not been reported from this locality (cf. Penksza and Kapocsi 1998, Farkas 1999).

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