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LANDSCAPE CHANGES IN THE TISZA RIVER VALLEY FROM THE 'TURKISH RULE' TO THE 20th CENTURY

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Introduction

The Tisza River valley has changed a lot for the last one and a half century. When Count Széchenyi launched the regulation works on the Tisza at Tiszadob in 1846, it marked a new era of the river. This process exercised a major influance on the plainland. Vast moorlands, swamps, a lot of ox-bow lakes, immense floodplain had defined the landscape of the Tisza region up to the middle of the 19th century. The bends on end hardened floods passing by. Floods followed floods making it difficult for man to live in the region. The wetland was inhabited by fishermen, hunters and marsh-dwellers. There were water mills, further slowing down the river's and its tributaries' flow. The decreasing floodplain forests and the scattered settlements contributed to the versatile landscape features.

Vast regions were permanently or periodically flooded on the territory belonging to Csongrád County today too. The section of the Tisza between the mouths of the Körös and the Maros could hardly be recognized, had it been seen as it used to.
What were the physical and human impacts effecting the landscape and how did the changes influance man's dwellings and land use?

Maps and surveys

Let us make a list of the available maps and survey-records on the above topic. The first maps having hydrogeographically important details too were issued at the end of the 18th century under the reign of Emperor Joseph II. This 'enlightened' ruler was the first to order the military survey of the country and most of Hungary was thus mapped in 1782-85. This mapping conducted by Colonel Neu opened a new era in Hungarian cartography. The scale of the survey was 1 : 28 800. The maps served military purposes first of all. It is especially reflected in the description (Landesbeschreibung) attached to each map.

This map-collection, called 'Josefinische Aufnahme', was elaborated with pattern of stripes. Elevation values were not indicated on the maps, but the rivers, brooks, lakes, swamps, forests, orchards, vineyards and roads are accurately represented, compared to the mapping devices of the age. When viewing these maps, the high and the low floodplains can be seperated fairly well. Alkali fields can be recognized (like at Badidai, Lalei, Keskeny and Tisza Szik) and the morphology, structure and extention of the settlements are also manifested. The survey collected data on the former river beds and
the destroyed and abandoned settlements too (like 'gewesenes Dorf Sablia'). Isolated farmhouses on the outskirts of settlements are named 'Tanya' and small groups of houses far away from settlements are named 'Szállás' in the maps. Their full names are derived

the destroyed and abandoned settlements too (like 'gewesenes Dorf Sablia'). Isolated farmhouses on the outskirts of settlements are named 'Tanya' and small groups of houses far away from settlements are named 'Szállás' in the maps. Their full names are derived from their owners at that time (Kinyecz Szállás, Jeney Szállás etc). Locations where there were no settlements found at all, were named 'Puszta' in the maps (e.g. Győry Puszta, György Puszta, Karai Puszta, Királyság Puszta, Szénás Puszta, Szőlős Puszta).

The strategical objectives of the survey are also reflected in the accurate locating of the bridges, fords and even the sites of the scaffolds (Hochgericht), e.g. there was a place of execution between Szeged and Dorosma.

The 'Land Description' contains the most important data of the waters, forests, hills, roads and buildings shown in the map. The distance between the settlements is given in hours.

The maps of this *first military land survey* used to be top secret and they were accessible only for the royal court.

Joseph II also ordered a land survey to classify croplands according to land use and yield. It ought to have helped levying tax on agricultural activity. Consequently, first of all the land owning aristocracy objected it, The emperor withdrew this order (with many others) before he died. Though the land survey had been carried out in a part of the country, after its withdrawal the maps and documents were destroyed. It was done so perfectly that not a single document or map did survive from that project. The following cadastral land survey took place 80 years later (it was ordered in 1870 only).

The *second military land survey* is known as 'Franziszishe Aufnahme'. The scale of the map collection was 1 : 28 800 also. The maps of the Hungarian territories were prepared from 1829 on. The plainland counties were mapped in the 1860s. Csongrád County was mapped in 1860-61 and Békés County in 1863-64.

Unlike the first military survey, the land description pages were missing with the second one, but the maps themselves were much more exact and their layout more perfect than in the first one. The contour lines were still missing in these maps, but the morphological details are more developed than in the maps of the first survey. When comparing the maps of the two surveys, the development of the road and the settlement networks can well be seen, along with the landuse changes ensued since the 18th century. The names of the regions, sites, fields were also written on these maps, making them especially valuable.

The 1: 25 000 scale maps of the *third military land survey* were contructed mainly in 1883-84. The well detailed maps outline the landscape changes compared to the previous ones (Figure 1).

There were hydrogeographical maps prepared in the 18th century as well and they were examined too in our research. The surveys concentrated on the strategical interests too. The court found the floodplains too vast, yielding no income at all. (It was the main reason for which Joseph II had ordered the cadastral land survey that failed.)

There were maps of the Tisza drawn in the first half of the 18th century showing certain sections of the river only. The 1 : 38 400 scale map of the Tisza section between Tápé and Szalándkéménd compiled by Ernst Helchis in 1739 was one of them.

The map series entitled *'Praeliminaire Flusskarte'* made under the reign of Joseph II is of special interest for today's research. These maps represent the Tisza sections in a shire or county. Hydraulicians used Müller's map from 1709, because the military maps were secret, and this Tisza map was fairly reliable. During this survey the

country was divided into 10 water regions. This survey was brought about by the ever increasing economic role of inexpensive river transport. The Tisza and the Maros rivers were mapped by order of the court (Joseph II), because these two rivers played a leading role in transporting salt from the Transylvanian mines.

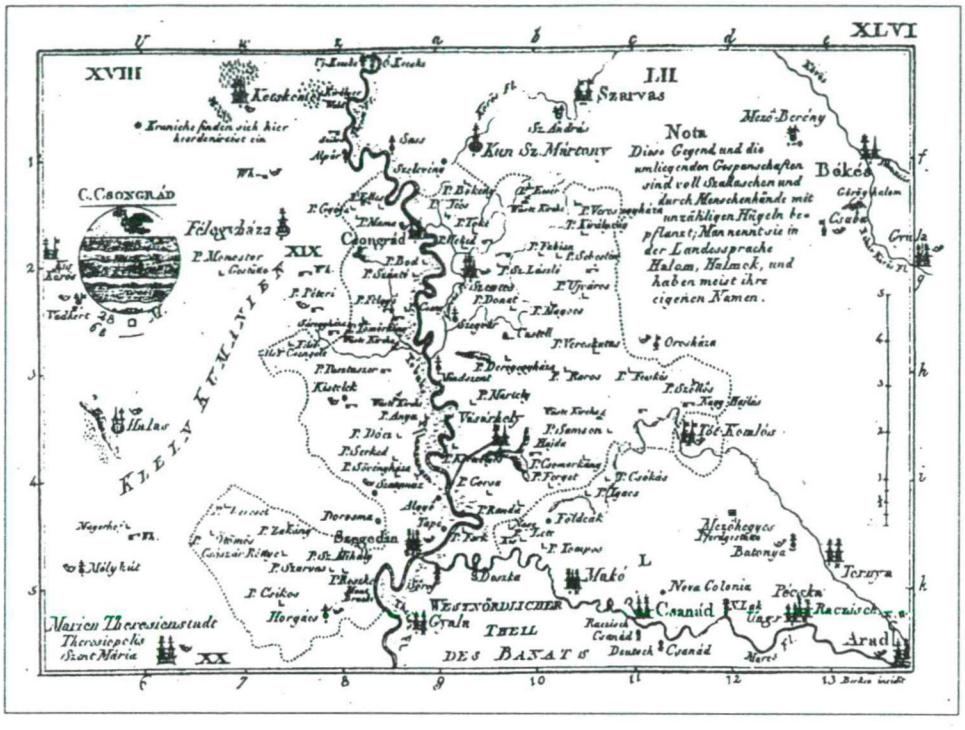

Figure 1. *The Tisza in Csongrád County (source: the Korabinszky map collection, 1805)*

Antal Balla's Tisza map from the mouth of the Sajó River down to Csongrád, János Budinszky's map of the Tisza in Ung County and Spatzek's Tisza Map from the mouth of the maros River down to Titel were made by such a court order in the scale 1 : 86 400.

József vertics mapped the Tisza section between Csongrád and the Maros Mouth. His work became known as *'Theis Fluss in Csongrader Comitat'*. I does not belong to the above mentioned 'Praeliminaire' fluvial maps, though its scale is the same and it was probably made on court order too.

The 'Korabinsky map collection' issued in 1805 should also be mentioned here. It represents the hydrogeographical conditions at the turn of the century (Figure 2).

The above mentioned maps from the end of the 18th and from the beginning of the 19th centuries are especially important data, because they reflet the hydrogeographical conditions of the Hungarian Plainland prior to the water regulation works on the Tisza River.

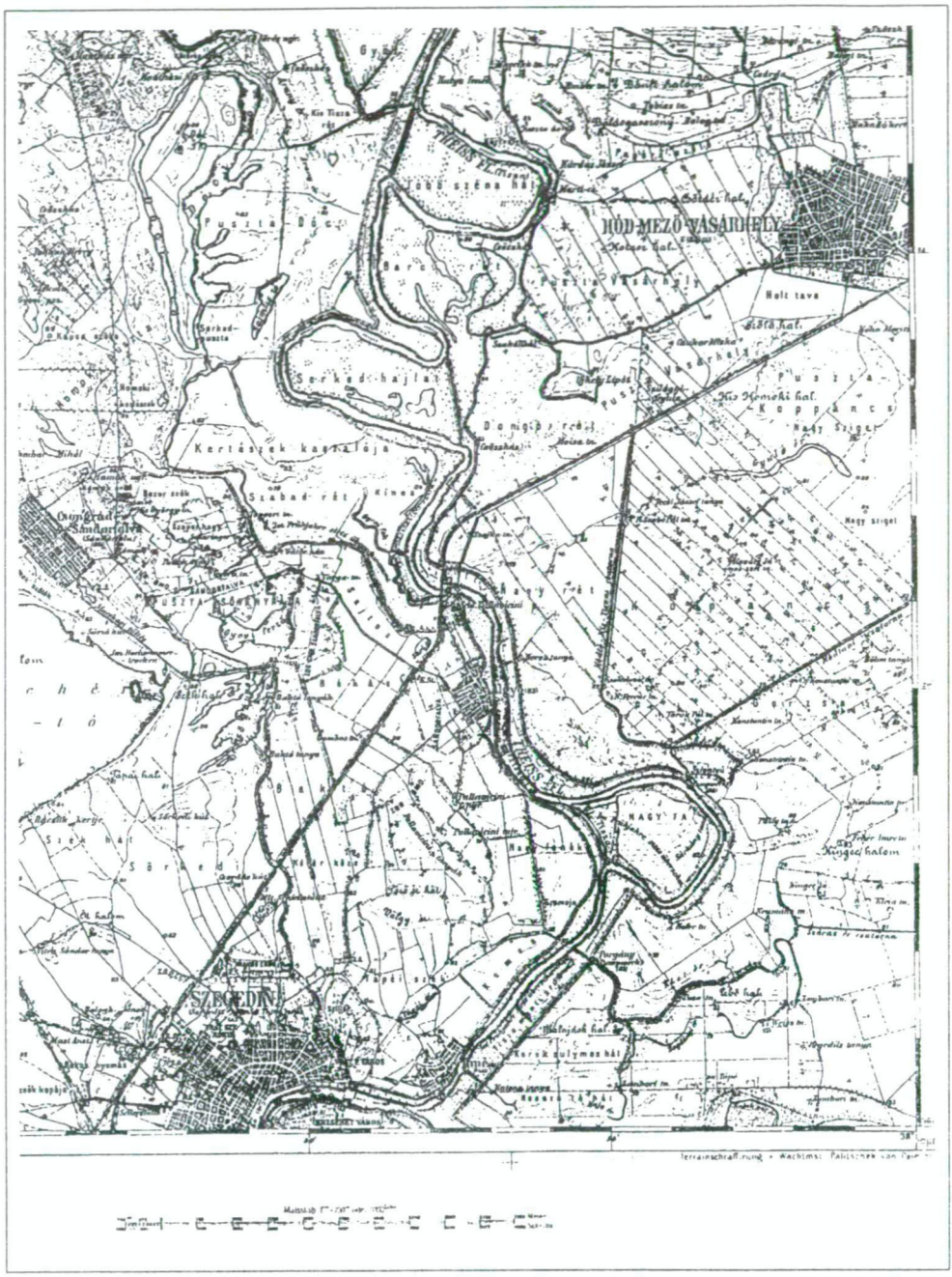

Figure 2. *The Csongrád County section of the Tisza River at the end of the 19th century (source: the third military survey)*

Summary of landscape evolution from the 'Turkish Rule' to the 20th century

Let us examine the changes of the value of the surface from the 17th to the 20th century. These changes can be listed in two categories: the dominant physical changes and the landscape changes ensuing on human impacts either direct or indirect.

Cultural-geographical periods of landscape can be defined on the basis of *man-environment interdependence and relation.* In this relationship human culture ha a double role: partly it is *accomodating* to its environment and partly is *changing* it.

Water has always been prominent among the geofactors of the plainland, especially in the Tisza River Valley. Therefore a special attention should be paid to the relation of the old water pattern and human culture in this region. Flowing and stagnant waters both exercised significant impacts on economic activity, land use, restructurizing of settlement networks, the methods and materials of building.

The Hungarian Plain can be divided into two large mosaic-patterned regions from hydrogeographical viewpoint: the areas of the so called 'rétség' (floodplain meadows) and the 'mezőség' (floodfree fields), the latter having been the scene of crop cultivation. The 'mezőség' areas represent the 'bread baskets' of the Hungarian Plain.

53 % of the flooded areas in Hungary used to be situated along the Tisza and its tributaries. Frequent or permanent flooding used to be characteristic of the low floodplains, while periodical floods occurred on the high floodplains. These areas determined the 'levels' of traditional live-stock farming.

The first settlements were formed on the boundaries of the floodplains and the floodfree lands. They were the ancient centres from which crop cultivation radiated out. This border region is called *'ancient settlement line'* by Frisnyák, S.

Let us have a brief summary of the changes in man-landscape connection from the 'Turkish Rule' to the 20th century.

Human activity during feudalism, following the local human environmental impacts of the Árpádian Age (such as digging canals and building earthworks) showed something that might well be called a dynamic harmony between man's adjustment to nature and his environmental impact. Though its reasons were rather objective than subjective (think of the stages and main trends of technical development in human history).

In the end of the 15th century the Southern Hungarian Plain belonged to the most developed regions of the country. The largest break in the development of this region was marked by the Turkish invasion and the ensuing *Turkish rule* over this territory that lasted for one and a half century. During the Turkish age the so far existing *cultural landscape* went through a complete *degradation.* The general decline of economy had its impact on the landscape of the Plain too.

What were the major tendencies describing the physical state of this region during the 16th and 17th centuries?

First the ever increasing *forest clearing* has to be mentioned. Wood was needed a lot for building forts, and mainly for making potash and charcoal as these products belonged to the most important taxable items. Wood in the hilly regions was used for mine-timbers and for fuel in metallurgy.

The extended deforestation of course had its impact on the landscape. As a consequence the sand movement were reoccurring and both the levels and the passing time

of the floods changed. Flood waves were speeding up and they reached the plainland erosion-base in a short time with a steep profile. According to the findings of Jakucs, L. (1982) a 10 % deforestation increase in the hilly region cause a 5 % increase in the rivers' runoff coefficient.

The destruction of the plainland woodstock resulted in an increasing 'pusta' (barren grassy plain) character of the Hungarian Plain during the 16th-17th centuries.

Another emerging feature was the *increase of the swamps and wetland.* It had several reasons: The risen flood level caused by deforestation overflew territories that had been floodfree earlier. The Tisza and its surroundings changed into a vast wetland. This moorland became a paradise for fishermen, hunters and marsh-dwellers. Persecuted inhabitants of attacked settlements often found shelter on the islands of the moorland. The floodplain was enlarged artificially too, due to self-defence of the local population. Fortresses and fortified settlements were encircled by canals to bring water and form a swampy area around. It happened to Szeged too.

Turkish rule and the constant wars contributed to uncertainty of existence which led to *depopulation* and desolation of the cultivated land. The pusta and the 'bozót' (shrubby areas) gained place. Rural settlements partly moved to areas of higher elevation, partly 'hid' in the marshland.

Summing it up: the prosperous economy and society of the Southern Plainland of the end of the 15th century declined in the 16th and 17th centuries into a peripherical condition.

During the 17th and 18th centuries man's activity effecting his environment exceeded his capability of adapting to it. Besides the above mentioned human impacts the emergence and change of the economic factor gained importance. It was manifested in transportation.

After driving out the Turks, there was much land and little labour power available in the Plainland. The lack of implements and labour led to a spontaneous immigration first, then to an organized one under the reign of Empress Maria Theresia. Thus the population of the Hungarian Plain increased from 125.000 (meaning 0-10 population density per sq km) in 1720 to 950.000 in 1787.

After the dislodgement of the conquerors, the relative abundance of land resulted in the primitive first-broken form cultivation instead of the more developed three-course rotation. It was a step back in land use. In spite of this, the ratio of croplands was rising along with the population number throughout the 18th century. Crop cultivation was slowly growing in the loess-pustas, in the areas covered with chernozem soil, in the snady regions with brown forest soil and in general, in the floodfree areas. It was completed by a sort of nomadic stock-raising, mainly on the amphibic levels of floodplains.

A new wave of deforestation began in the 18th century. It led to the almost complete loss of the plainland forests. Only a few gallery forests and groves remained along the Tisza. The greatest extent of treelessness and pusta character described the Plainland during the 18th century (Somogyi, S. 1994). An unavoidable result of the further deforestation was the further increase of flood risk. The frequent danger of flooding urged the regulation of the plainland streams and the Tisza first all. A few land owning, local aristocrats were backing the idea too. Because of the insufficient means and possibilities of transportation, the locally produced grain had to be processed on spot.

A long sequence of water-mills were built on the Tisza and on its affluants. The mill-dams impounded water, flooding and swamping new areas. It was often the subject matter of law cases.

From the second half of the 18th century a certain reconstruction of the cultivated landscape could be observed. On the floodfree levels the three-course rotational cultivation became dominant again.

The cropland-communites' land use began to disappear and the authorized land-ownership brought about the spreading of the isolated farmsteads. (At first these isolated farmhouses functioned as winter shelters and the complex farmsteads appeared only in the 19th century.)

Traditional land use in the floodplains remained characteristic and orcharding, horticulture and viticulture developed around the major settlements.

Wind-blown sand was started to be stabilized by afforestation, land reclaimation works were also started in swampy marshland areas and rivr regularization was begun.

This change in land use had its feedback on settlement structure. With the occurrance of private land property, the settlement form characterized with central lying double-grounds began to disappear. Residential buildings were erected in the sty-gardens formerly encircling the settlement core. Croplands gained place in the pustas used for grazing stock so far. Only the zigzagged street network related to the former double-ground structure. Such rural settlement do differ from the chess-board patterned newcomers' settlements in the Southern Plainland.

By the beginning of the 19th century, there was a prosperity on the cereal market due to the Napoleonic wars. It resulted in the further spreading of the croplands at the cost of grazing fileds. Thus crop cultivation was soon blocked by the vast floodplains. At the same time the growing flood risk resulting from deforestation, endangered more than 800 settlements that used to be only a few metres above flood level so far. The growth of the croplands and the population of the floodfree areas and the repeated floodings all cried for a general river regulation project. Both economic and hydrogeographical factors contributed thus to launch an integrated environment-changing activity in the region.

Sámuel Lányi was engaged in the survey of the Tisza River Valley in 1834-46. Count Széchenyi published two articles on the above matter (1830, 1846). Széchenyi, the 'greatest Hungarian' put emphasis on the active water management that included the projects of not only the regulation, but those of irregation, canalization, river transportation and afforestation.

The construction affecting environment was enlarged from 1846 on. The works concentrated on the river regulation of the Tisza Valley in 1848-1918.

Pál Vásárhelyi and Péter Paleocapa both made a comprehensive plan of the Tisza regulation project. While Vásárhelyi preferred cutting off bends and dams built close to the river, Paleopaca proposed less cut offs and wider floodplains between dams. The compromise included many cut offs and wide interdam stripes. So the total length of the Tisza was decreased from 1419 km to 962 km. A canal system of 1200 km, and the dam system of 4500 km accompanies the river today.

The river regulation works started in Csongrád County in 1856. 11 bend cut offs were made and it resulted 58 km loss in the river's length within the county. (Today it is 108 km in Csongrád County, see Figure 3.)

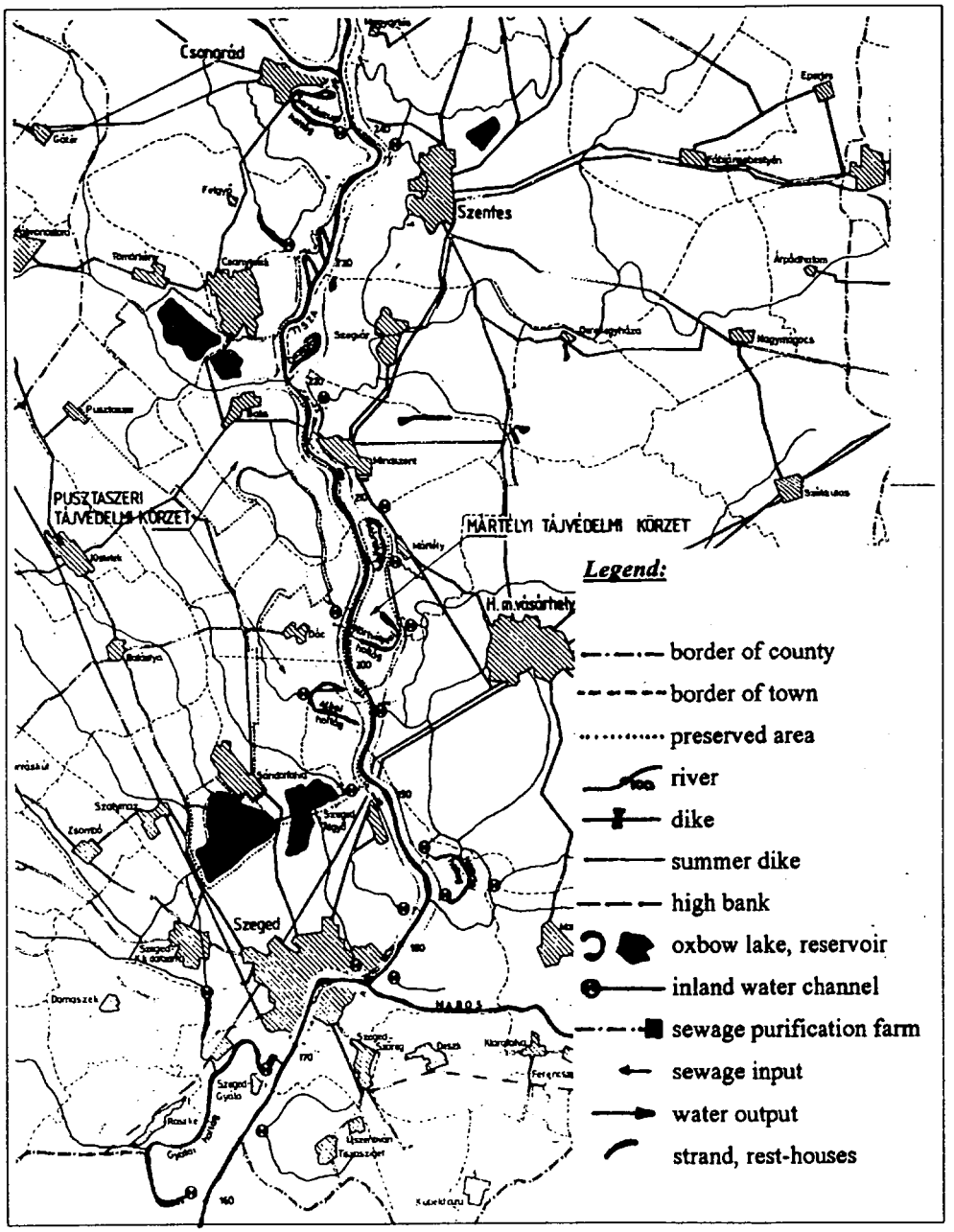

Figure 3. *The Csongrád County section of the Tisza River in the 20th century (source: Atikövizig, 1990)*

Regulation and water management works strongly affected the productive structure, ecological and living conditions and microclimate. Regulation caused a faster flood wave passing, accompanied with high and low water levels. The dropping level of low-water hardened shipping on the river.

An intensive accumulation in the foreshores also began. The floodplain of 2.48 million hectare was replaced by a total 100-120.000 hectare foreshore (Somogyi, S. 1994) and the river's float was deposited there. Thus the mineralogenic sedimentation and the streamwater supply of the mortlakes outside the dams were stopped.

The shrinking water surface made the groundwater level drop and it played a leading role in steppe formation and related soil transformation. The former floodplain groves, reedbeds, swamps dried out and a new soil formation was started. Marsh and swamp soils turned into meadow chernozem and alkali soils were developing in the former, salty floodplains.

With the water regulation works the *double face of the Hungarian Plain disappeared*: a uniform floodfree surface was formed in the previous floodfree and periodically flooded areas. This homogenous surface was dominated by crop rotation cultivation. Besides, both stabling and grazing livestock became characteristic of the region.

Several wetland plant and animal species became extinct and the fish stock was also reduced.

Local climate did also change: the shrinking water surface caused a lessened evapotranspiration, and the dried out surface became a subject to new forms of eluvial erosion.

The dropping groundwater level and the protecting dams made both the former high and low floodplains be part of the cultivated steppe. The willow, poplar and the reed survived only at spots of higher groundwater table. Croplands, orchards and settlements took the place of the cleared high floodplain woods. Mainly wheat, maize, potato and other industrial plants were grown in the croplands.

The dropping groundwater, the land cultivation and animal keeping emerging into the former pusta-meadows made the vegetation cover change at least partially on the loessy levels of the floodfree plains.

The sandy washes were stabilized with acacia and black pine. The remains of the sandy pusta-meadow could be found in small patches only. Where sand was stabilized, orchards and grape plantations thrived (the plainland viticulture gained special importance during the great phylloxera of the 1880s).

Water regulation works influenced infrastructural development as well, because road and rail networks could freely be built. All this and the above mentioned facts exercised an impact on settlements. More and more villages and farmsteads were built on the former floodplain. Building materials also changed: tile replaced thatched roofs, brick and adobe replaced mud-covered wooden walls.

Sanitary conditions improved; less typhoid, dysentery cases were reported and the ratio of infant mortality decreased. All this resulted in an increasing natural growth of the population.

One thing has to be noted, however. Series of humid and arid years alternate each other. Water regulation works so far has concentrated on the problems occurring during the humid periods, while irrigation, canalization and river transportation have not been paid enough attektion to. Their disadvantageous effects can still be felt today.

When the environmental human impacts of the 19th century is being summarized in a sentence, the regulation works can be regarded as a tool to dynamize the Plainland macroregion, leading it out from its four century long peripherical situation.

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