

UDK 551.438.5(439-14)(282.24 Drava)  
627.42(439-14)(282.24 Drava)  
911.372.5(439-14)(282.24 Drava)

Preliminary communication  
*Prethodno priopćenje*

# The Impact of Microtopography and Drainage on Land Use and Settlement Development in the Hungarian Drava Plain

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The physical environment and society are closely interrelated and the role of physical conditions can be detected in the economic development and spreading of settlements in the Hungarian section of the Drava Plain. Throughout the history of the region, land use has always been fundamentally controlled by the topographic and hydrographic situation. Even relief of a metre or two has been decisive in delimiting areas suitable for fishing, gathering, forests or crop cultivation. Although the flow regulation of the Fekete-víz and the drainage of swamp-lands at the end of the 19<sup>th</sup> century reduced flood hazards and made new land available for cultivation, at the same time, they made the traditional life-style of gathering, fishing and hunting unfeasible for the poorer layers of society. Settlements formed on the higher-lying flood-free mounds ("ormány"-s). The paper employs GIS techniques in the study of spatial expansion of the largest of the settlements, the town of Sellye. It is concluded that the areas below 100 m elevation could only be developed following drainage measures.

**Key words:** relief, land use, land drainage, human settlement, settlement development, South-western Hungary

## Utjecaj mikrotopografije i dreniranja na uporabu zemljišta i razvoj naselja u mađarskom dijelu dravske ravnice

Prirodni okoliš i društvo tijesno su povezani, a uloga prirodnih obilježja izravno se odražava na ekonomski razvoj i širenje naselja u mađarskom dijelu dravske ravnice. Topografska i hidrografska obilježja oduvijek utječu na način uporabe zemljišta istraživanog područja. Denivelacija od metra ili dva imala je odlučujuću ulogu u razgraničavanju površina pogodnih za ribarenje od onih pogodnijih za sakupljanje plodova, šumarstvo ili uzgoj usjeva. Iako se regulacijom toka rijeke Fekete-viz i drenažom močvarnog zemljišta krajem 19. stoljeća smanjila opasnost od poplava i dobilo novo obradivo zemljište, siromašnije stanovništvo nije moglo nastaviti tradicionalni način života, tj. sakupljanje plodova, ribarenje i lov. Naselja su se razvila na ocjeditim uzvišenjima, gdje nema opasnosti od poplava (*ormány*). U ovom se radu analizira prostorno širenje najvećeg naselja, grada Sellye, uz pomoć geografskoga informacijskog sustava (GIS). Zaključeno je da se površine ispod sto metara nadmorske visine mogu razvijati samo nakon što ih se drenira.

**Ključne riječi:** reljef, uporaba zemljišta, drenaža, naseljavanje, razvoj naselja, jugozapadna Mađarska

## INTRODUCTION

The interactions between human society and its physical environment have been intensive throughout human history. The elements of the physical environment exert an influence on social, economic and infrastructural development (Tóth, 1981) and on the expansion of built-up areas of settlements (Mendöl, 1963; Marosi and Szilárd, 1974). Throughout history, different environmental potentials acquired a dominant role for the local population. Microtopography and even minor changes in hydrographic conditions could be decisive factors in the development and economic life of settlements (Czigány and Nagyvárad, 2000; Dövényi, 2005; Elekes, 2002, 2008; Gyenizse and Lovász, 1996; Gyuricza, 1996; Lóczy, 2002; Nagyvárad, 1993, 2000; Szabó-Kovács, 2007). The changing physical environment requires constant adjustment on the part of the whole population and involves a range of problems.

The present paper is meant to overview the physical factors which have been fundamental controls on the spatial development of settlements in the Hungarian Drava Plain. Historical, physico-geographical and ethnographical sources and military survey maps from the 18th-20th centuries have been used in the investigation and GIS analyses have been made.

## PHYSICAL GEOGRAPHY

The plains of the Drava River and the Fekete-víz watercourse, also called Ormánság, lie at 87 to 120 m elevation above sea level. This is a flat riverine lowland locally with some relief. The boundaries of the depression cannot be drawn precisely, as the marginal faults of the basement are mostly buried under recent deposits. The transition to the Inner Somogy Hills to the west and to the Zselic Hills to the north is gradual. To the east, the Pécsi-víz stream and the block of the Villány Hills form sharp boundaries, while to the south, the Drava River delimits the study area – although the Drava Graben continues in Croatia (Fig. 1).

The Plain is subdivided into three geomorphological districts. The smallest and lowest-lying of them is the Drava flood-plain, next to the channels of the Drava and its tributaries. It consists almost entirely of silty deposits. This area is least suitable for both intensive cultivation and human settlement.

The district north of the present-day Drava Valley, the Ormánság proper, is spotted by oxbows and blown sand dunes. Holocene blown sands are also present on the alluvium here, at the level of oxbows. Stabilized sand features occur on higher terrain between the oxbows. Without exception, the villages occupy such elevated terrain. Abandoned meandering channels and cut-off meanders are still recognizable. The oxbows are still water-logged today and used as meadows or pastures. Contiguous accumulations of blown sand form flat-topped elongated mounds of west to east strike (called "ormány" locally).

There are flat surfaces of old Drava meanders next to the meanders, filled by the deposits of the Pécsi-víz and Fekete-víz streams and by blown sands. To the north, the

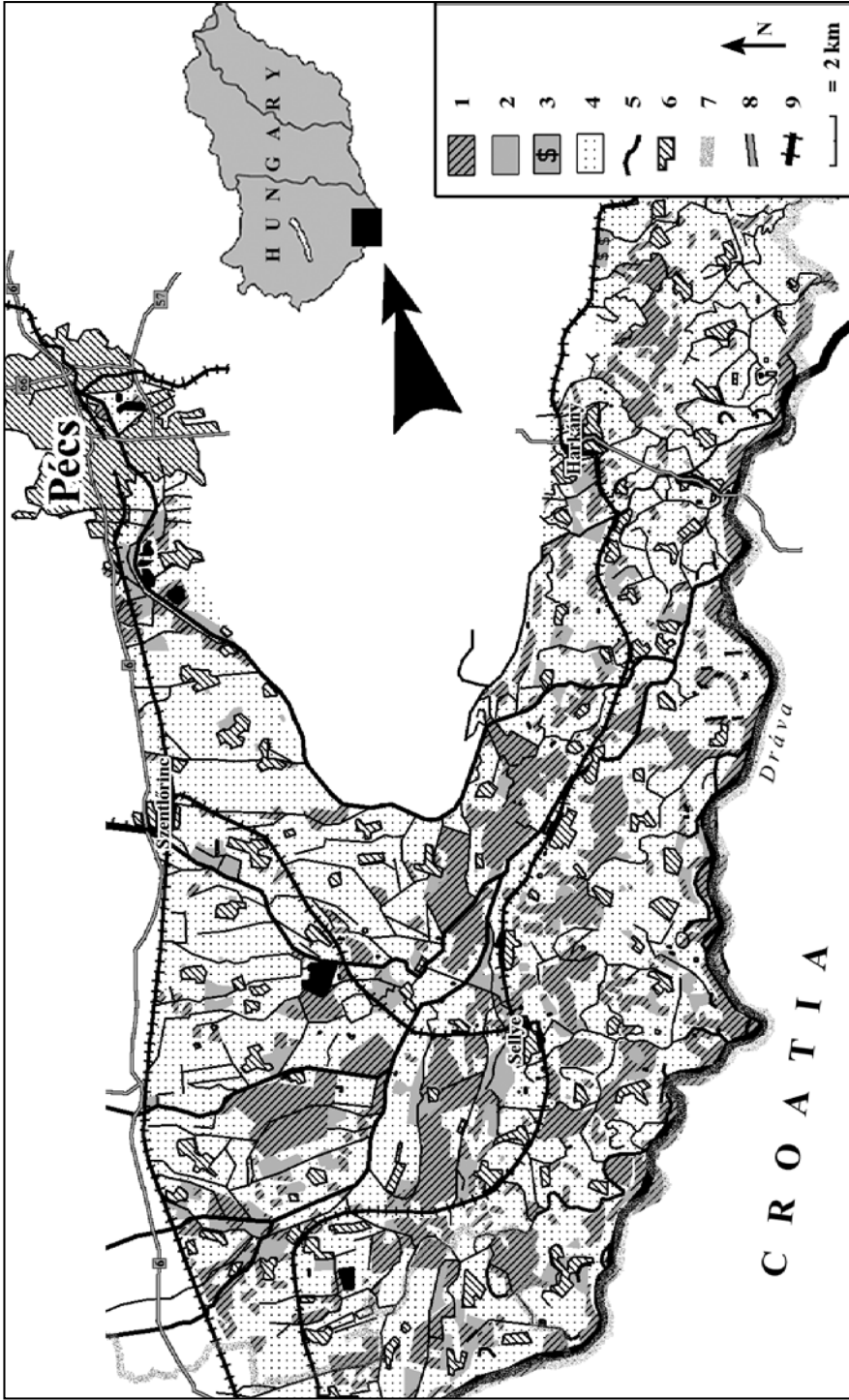


Fig. 1 The Drava and Fekete-víz Plains (part of the Nyárad-Harkány Plain included)

1 = forest; 2 = meadow; pasture; 3 = vineyard; 4 = arable land; 5 = watercourse; 6 = settlement; 7 = county and national border; 8 = main road; 9 = railway

Sl. 1. Dolina rijeke Drave i Fekete-víza (što uključuje i dio Nyárad-Harkány ravnice)

1 = šuma, 2 = livada, pašnjak; 3 = vinograd; 4 = obradivo zemljište; 5 = tekucica; 6 = naselje; 7 = županijska i državna granica; 8 = glavna cesta; 9 = željeznica

Fekete-víz Plain continues in a loess plain of very low relief. The loess-mantled terrain is dissected by shallow, NW to SE directed strips, where minor watercourses run down from the Mecsek Mountains and the Zselic Hills (Lovász, 1967, 1977).

Over the millennia, the population made a living from the utilization of natural resources. Quarrying exploited the minerals, which occurred in limited supply, while land cultivation was adjusted to relief, drainage and climate. Plant and animal products were collected. The valuable potentials of the region have only been used by agriculture. With the lack of major mineral resources and purchasing power, no manufacturing industry could develop here.

## LANDSCAPE HISTORY

Because of the constant flood hazard, unhealthy environmental conditions, poor accessibility and shortage of fertile land, the region was the last to be populated in Southern Transdanubia and provided rather limited opportunities for human settlement.

Few archaeological finds have been recovered from the age of Transdanubian Linear Ceramics (4th to 3rd centuries B.C.), or from the Copper, Bronze Iron and Roman Ages. No major population concentration is known from the first millennium A.D. either. The first sporadic finds date from the time of the Magyar Conquest (10th and 11th centuries) (Bándi, 1979). In the centuries after the organization of the Hungarian state, contemporary documents present a diverse picture of a wilderness for most of the lowland. The left-bank section of the Drava Valley was interwoven with the braided channels of the Drava River and the main channel often shifted to a new location. During floods the mounds ("ormány"-s) remained dry, while the lower-lying lands became swamps after flood-water withdrew. As estimated from old documents, the area of swamps extended over *c.* 115,000 hectares.

The flat Ormánság lowland was an extensive water-logged area with swamp forests, fed by watercourses arriving from the Mecsek Mountains and the Zselic Hills and with an extreme hydrological regime: drying out occasionally along the lowland margins, while inundating vast areas during flash floods (Pirkhoffer et al., 2008; Ronczyk and Kovács, 2005).

On the west, the swamp-land was bordered by the braided Okor (formerly: Okur) stream, which followed the course of the present-day Fekete-víz. The Pécsi-víz of high discharge during floods was a tributary of the Okor, along with the Gyöngyös stream, which springs from Somogy County, and the Almás stream, with a swampy valley around Szigetvár (Ihrig, D. 1973).

In the 13th century, the whole environs of the Almás and Okor streams were called Ormánság. This border area had been guarded by Székely (Sicilian) population until the Mongol invasion (1241-42). Later the kings demanded more and more services from them and some were forced to move to more sparsely inhabited areas, where they established villages of the lower nobility (Györffy, 1987).

The destruction caused by the Mongols and Ottomans was relatively limited compared with the national level, and this can be explained by the defence function of the swamplands. The detailed occupational structure of Hungary, including the study area, was first

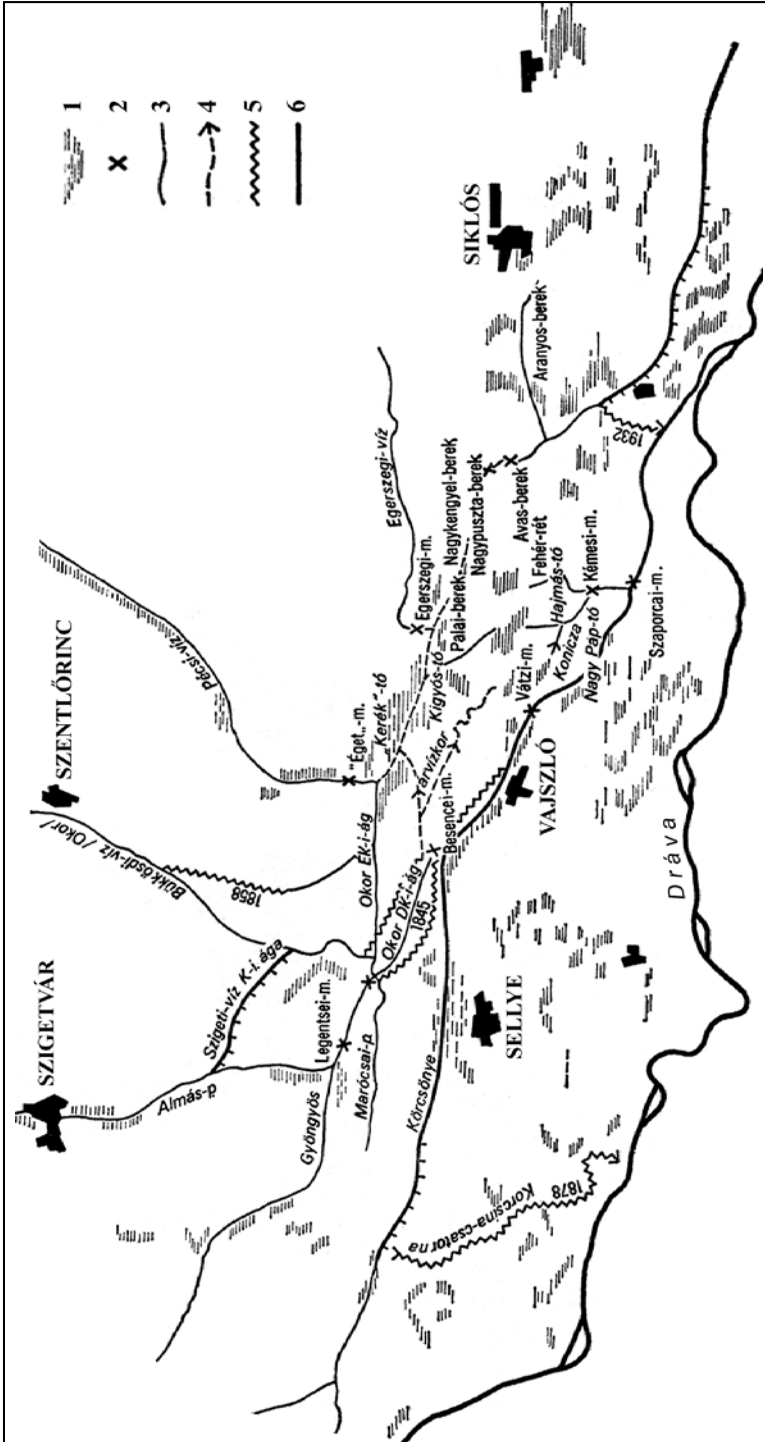


Fig. 2 Changes in the Fekete-víz drainage basin (after Erdősi, 1977)

1 = stagnant water at the beginning of the 19<sup>th</sup> century; 2 = water-mills; 3 = stream channel at the beginning of the 19<sup>th</sup> century; 4 = braided channel across marsh at the beginning of the 19<sup>th</sup> century; 5 = artificial channel reach formed since the middle of the 19<sup>th</sup> century; 6 = former reach abandoned during artificial diversion

Sl. 2. Promjene u slijevnom području Fekete-viza (prema Erdősi, 1977)

1 = stagnirajuća voda na početku 19. stoljeća; 2 = vodenice; 3 = korita na početku 19. stoljeća; 4 = prepletana korita u močvarnom području na početku 19. stoljeća; 5 = umjetni kanal izgrađen od sredine 19. stoljeća; 6 = napušteni dio kanala nakon umjetnog skretanja

presented in the first census of 1784-86. The map drawn from census data shows the sectorial distribution of active population. It is claimed that in the late 18th century the population of the Ormánság exclusively lived from agriculture, forestry or water management.

Complaints about the floods of the Drava River date back to around 1730. The landowners joined in an association between 1740 and 1750, under the reign of Maria Theresa, and began with the construction of flood-control dykes along the Dráva River. In 1839, the "Fekete-víz Drainage Association" was formed and in 1841 it commissioned the engineer József Beszédes to prepare drainage plans, which were largely implemented by 1848. Between 1926 and 1936, large-scale canal network expansion works took place (Ihrig, 1973). (Fig. 2)

During the last 120 years of water management, swamps have disappeared from the areas of 30 villages in the Ormánság. The average size of the drained land was 100–400 cadastral acres per village, but there were communities (Okorág, Kórós, Sellye and others) where 700–800 cadastral acres were drained.

The elimination of marshes at the end of the 19th century put an end to the former gathering, fishing, and hunting lifestyles. In the Ormánság, however, all the achievements of water management interventions were in the sole interest of big landowners. The smallholders' lands were virtually choked by large landed properties. The majority of the population, however, kept relying on land as a source of livelihood, and employment in the secondary and tertiary sectors was only notable in some of the more populous settlements. Birth regulation remained the only means for liberated serfs to keep enough land to ensure a living. In the period of only-childism, between 1900 and 1945, natural population growth was only 3.7 per cent – worryingly low as opposed to the national average of 52.8 per cent.

After World War II, nationalizations fundamentally transformed the structure of agriculture. Only-childism was no longer motivated and the natural growth rate in the Ormánság rose (Kolta, 1958). Under socialism, the majority of the population still lived from agricultural activities. There were a couple of bigger settlements with industry, mostly in the vicinity of Pécs, and tertiary employment. After the change of the regime, as a consequence of the dissolution of large co-operative farms, unemployment became widespread. Private farms as well as small to medium-scale enterprises could not employ people in sufficient numbers. The regional economy is still based on agriculture, a branch with unstable foundations.

### **ECONOMIC IMPACTS OF THE MICROTOPOGRAPHY AND DRAINAGE NETWORK**

In the past, topography and hydrography heavily influenced land use patterns (Bugya and Kovács, 2008; Czigány et al., 2008) (Fig. 3). In the water-logged areas below c. 95 m elevation, fishing was the only possible occupation. For gathering, the seasonally water-logged parts (between 95 and 97 m elevation) were available. The forested surfaces at around 100 m were the scenes of animal husbandry (swine masting, fodder collecting). Arable farming was an alternative above 100 m elevation. Cultivated land expanded or contracted according to the water regime. Before flow regulation, the land area suitable for farming was limited (Kiss, 1991). In the subsistence of local communities, land cultivation has not been so predominant, while gathering, fishing, hunting and extensive animal

husbandry have all been of equal importance. With the decline in the latter activities, as a result of forest management and river flow regulations at the turn of the 18th and 19th centuries, farming was not able to sustain the population. Famines ensued and led to the system of only-childism.

Following river flow regulations and drainage measures, as described by Haas (1845), arable farming became the leading branch of the economy. It was the group of big landowners who primarily profited from this development, since commoners remained engaged in subsistence, instead of commodity, farming as before. The most fertile soils are found south of the town of Szentlőrinc, where, coupled with favourable topographic, hydrographic and climatic potentials, the land is the most suitable for arable farming. Equally suitable are the higher flood-plain levels to the south, but here only the ridges of highest potential were cultivated and no commercial activities were carried out because of poor accessibility. Wheat growing was common everywhere during the 1840s (Haas, 1845). Maize and oats were also widespread produces along the Drava River. In the Siklós District, millet, flax and hops were grown in considerable amounts. Haas mentions the lack of profitable orchards throughout the entire Baranya County, but cited good examples, too (such as the apples and cherries of Terehegy and Pellérd, sold profitably on the market at Pécs). The most diverse ways of processing plums from the Drava region (drying, boiling for jam, distilling for brandy) are mentioned. (In the area, distilleries processing local fruits operated in Pellérd, Pécs and Beremend.) Haas points out the disadvantageously sporadic distribution of land, which prevented action against illegal grazing and consumed too much energy and time to access the land. As a consequence, villages with land of outstanding quality, like Szabadszentkirály, populated by lower nobility, were not counted among the communities with the highest income (Haas, 1845).

Before drainage measures, arable land had been restricted to the highest terrain in the Ormánság. The lower-lying areas were occupied by

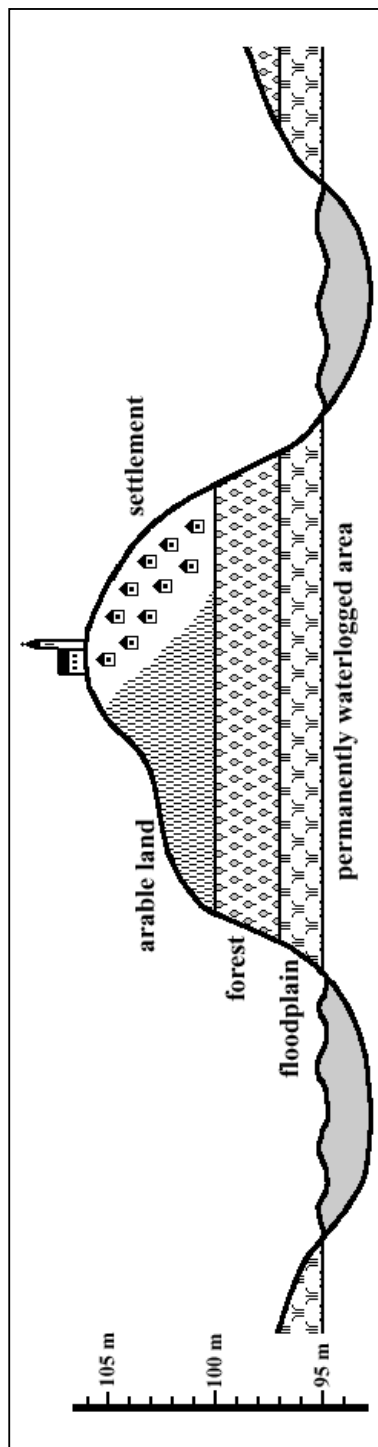


Fig. 3 Vertical zones of land use in the Ormánság (by Gyenizse)  
Sl. 3. Vertikálne zóny koristenja zemljišta Ormánság-a

extensive forests, pastures, meadows, swamps and ponds. Land use in the seasonally and permanently water-logged areas was quite different. The temporarily water-logged surfaces were used for extensive animal husbandry and gathering, the major sources of living for most of the Ormánság people. Crop cultivation did not yield a surplus but most of the animals could be sold on the market. In past centuries, the southern portion of the lowland was famous for cattle, which found excellent grazing lands in the groves and marshes after the spring floods passed. The pig stock was also considerable in the swamps and oak and beech forests. Maize growing also favoured pig-keeping. Pigs were sold on the markets of Croatia. Horse breeding was concentrated in Szentlőrinc and its environs, where many carriers also lived. Apiculture, as a subsidiary activity, is mentioned from the Siklós and Szentlőrinc Districts. Haas writes that Pellérd was among the first settlements where silkworm farming (sericulture) began in Hungary.

Natural woods and reed-beds had been of great importance almost up to the 19th century, when serfs were prohibited to enter them. Woods supplied timber for the columns and beams of houses, for handles of work-tools, furniture and carts. The inhabitants of the Ormánság were famed for their wood-carving craft. The woods and marshes were ideal for gathering of fruits, vegetables, mushrooms and other forest products. Medicinal plants, wild-bee honey and acorns were available for sale. Trapping and hunting provided food rich in protein (game meat, birds' eggs). After the serfs were driven out of forests in the first years of the 1800s and part of the marshes were converted to arable use, hunting and gathering lost ground.

The first document showing forest management is the map of the First Military Survey, fairly accurate for the lowland areas. The map sheets show that tree vegetation in the 18th century covered most of the area, with the exception of the "ormány" surfaces. By the mid-20th century, this was reduced to 10 per cent. Between 1865 and 1966, the proportion of arable land had grown considerably in the entire area of the Ormánság (Fig. 4).

The compilation "Geographical Names in Baranya County" shows that there were more than 70 ponds or water pits on the outskirts of the settlements studied in the years between 1970 and 1980, and that the number of water-courses and canals was estimated at more than one hundred (Pesti, 1982). In addition to animal husbandry, gathering and farming, the fourth main form of subsistence was fishing. The Drava and its tributaries, as well as the numerous natural and artificial ponds, were rich in fish and crabs. Fishery was a major source of income for big landowners but also contributed to the funding of the whole population. The fine fish caught in abundance reached the markets of not only Pécs but also of Kaposvár, Nagykanizsa, Pest and even Vienna. The drainage measures, which began in the first half of the 19th century and were completed after a century, blocked most of the inhabitants of the Ormánság from this kind of income.

## **THE IMPACT OF THE PHYSICAL ENVIRONMENT ON SETTLEMENT DEVELOPMENT**

In selecting the locations of settlements and in their further development, microtopography and the related hydrographical conditions have always been decisive factors. First of all, it was critical in the swamp-lands to find a flood-free site, but villages along



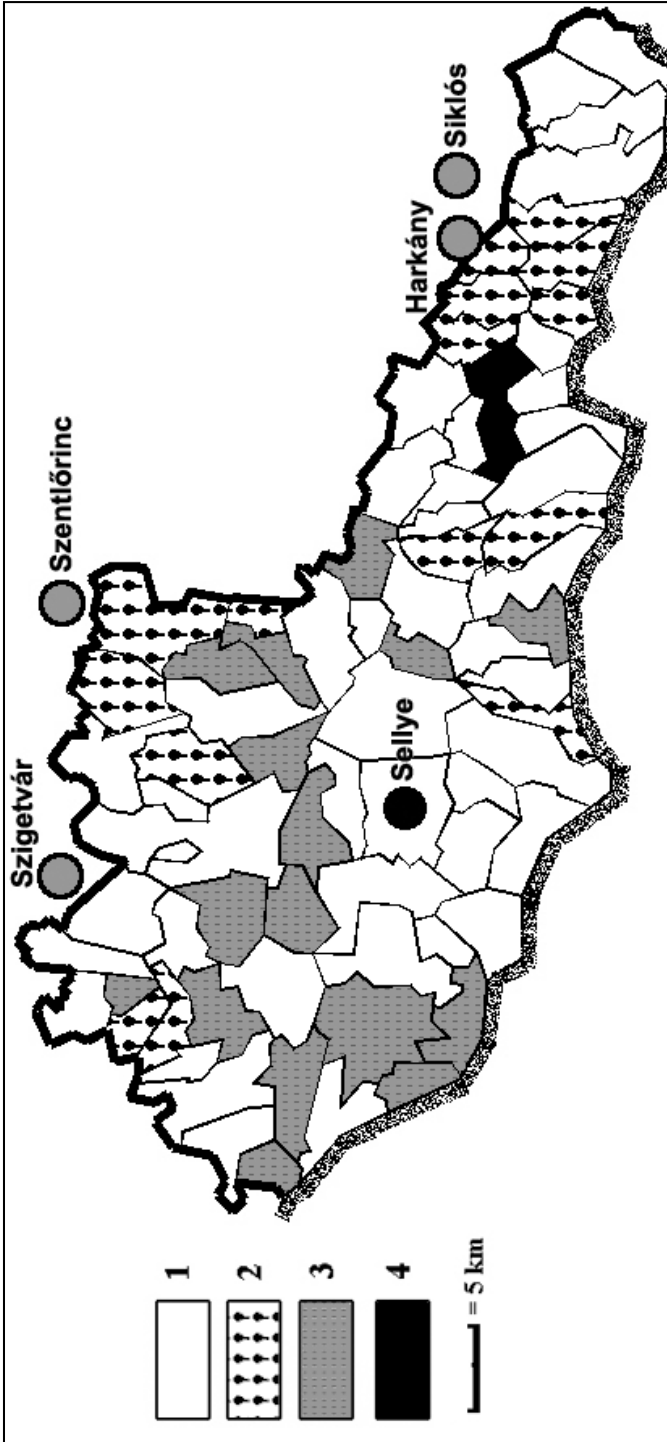


Fig. 4 Complex types of land use in the Ormánság, 1865-1966 (after Erdősi, 1978)

1 = increase in cultivated land (arable land and vineyard), decrease in grassland (meadows and pastures), decrease in forests; 2 = increase in cultivated land (arable land and vineyards), increase in grassland (meadows and pastures), decrease in forests; 3 = increase in cultivated land (arable land and vineyard), decrease in grassland (meadows and pastures), increase in forests; 4 = decrease in forests

Sl. 4. Složeni tipovi korištenja zemljišta u Ormánságu 1865-1966 (prema Erdősi, 1978)

1 = povećanje obrađenog zemljišta (oranica i vinograd), smanjenje travnjaka (livada i pašnjak), smanjenje šuma; 2 = povećanje obrađenog zemljišta (oranica i vinograd), povećanje travnjaka (livada i pašnjak), povećanje šuma; 3 = povećanje obrađenog zemljišta (oranica i vinograd), povećanje travnjaka (livada i pašnjak), smanjenje šuma; 4 = smanjenje obrađenog zemljišta (oranica i vinograd), smanjenje travnjaka (livada i pašnjak), povećanje šuma

the margins of the lowland, less threatened by inundation, also fully adjusted to microtopography. In the first third of the 20th century, any minor elevation of the ground provided an advantage for settlement over any low-lying site for the villages in the environs of Szentlőrinc (Karay-Szabó, 1926). The variations in elevation were even more marked in the closer vicinity of the Drava River, where settlements were built, without exception, on "ormány"-s or on clusters of flat sand ridges. The village centre invariably occupied the highest point of the ridge, next to the church. When the ridge top was completely built up, housing extended over the slopes ("horhó") and eventually towards the neighbouring low-lying areas ("lapis") (Kiss, 1986).

Both residential and farm buildings had to resist inundation to some extent and to be quickly restorable. To this end, wooden framed houses were used in the Ormánság. Dwellings and churches survived inundations and served the people for centuries. The buildings had a hardwood frame, which held up the roof and, thus, the walls had no loading. The walls were made of wattle and daub, easy to repair after a flood. Building materials were supplied by the extensive oak forests and willow groves, while mud was available everywhere. Roofs were covered by straw, sedge and later by thatch. When floods and wars occurred, houses and churches could be rolled away to a more secure place only to be returned later. Houses were entirely built of locally available materials, fully exploiting the potentials of the physical environment.

When drainage measures changed the environment, more space became available for spreading the settlement area. The largest settlement in the Ormánság is Sellye, where the opportunities for the expansion of the built-up area were investigated, using GIS techniques.

The site of the town has been almost continuously inhabited for 5000 years. Finds of the Lengyel Culture, from the Roman Age and from the time of the Magyar Conquest have been recovered (Bándi, 1979). The first mention of the settlement dates from the year of 1292. Medieval written documents prove that it was an administrative and economic centre. A palisade fortress was erected here in the 14th century, occupied later by Ottoman troops in 1532. Under Ottoman rule, it had a court and a garrison. Completely destroyed in the liberation war in 1689, Sellye was soon rebuilt and was raised to the status of a market town. At the turn of the 17th and 18th centuries, German and Croatian settlers arrived here, their proportion, however, never exceeded 20 per cent of the total population. An architectural monument of the town is the Draskovich Castle in the Baroque style, surrounded by an arboretum since the 1760s (a nature protection area since 1965). With the exception of the world wars and the decade of the regime change, settlement development has been uninterrupted over the past 150 years. The economy was based on agriculture and administrative functions in the 19th as well as in the 20th centuries. The town never had any heavy industry, only some food processing, but tertiary employment is still notable. The political changes in 1989-90 hit the town severely and unemployment figures are still around 20 per cent. Urban status was granted to Sellye in 1997.

At the site of present-day Sellye, late Würmian and early Holocene blown sand stripes join in swarms. They allowed the development of a village plan with several streets. In the 1780s, only the highest grounds were built upon in an S-shape (Fig. 5). Expansion towards the north was hindered by a water-logged depression. In the 20th century,



Fig. 5 The topography of the environs of Sellye and changes in the built-up area (by Gyenizse)  
1 = present-day built-up area; 2 = built-up area in 1784

Sl. 5. *Topografija okolice Sellye i promjene u izgrađenom području*  
1 = današnje izgrađeno područje; 2 = izgrađeno područje godine 1784.

expansion was directed towards the south, where the sand stripes meet. Slopes above 10 per cent inclination are of very limited extension and, thus, place no obstacles in the way of settlement spreading. Our terrain model, produced from a 1:10,000 scale topographical map, is supported by data from historical and ethnographical sources, which state that areas above 100 m elevation were the only ones suitable for settlement. River regulation and drainage measures, however, changed this situation. Today, most of the built-up area lies at 99-103 m and insignificant settled areas are located below that, because of the high ground-water table and excess water hazard (Table 1). Therefore, neither slope exposure nor slope inclination are regarded as limiting factors to the future development of Sellye – the only important control factor is elevation above sea level. Thus, areas suitable for development are found to the south and southeast, while those that are unsuitable are to the north and west (the Korcsina flood-plain and the still swampy oxbow, drained by the Sellye-Gürü canal).

Tab. 1 Percentage distribution of built-up areas in Sellye by elevation above sea level between 1784 and 1991  
 Tab. 1. Postotak izgrađenih područja u Sellyu prema nadmorskoj visini u razdoblju 1784-1991.

	1784	1856-60	1880	1950	1967	1991
97.1-98m	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
98.1-99m	0.0%	0.8%	0.0%	0.4%	0.4%	0.7%
99.1-100m	0.9%	1.6%	3.4%	11.4%	12.7%	31.6%
100.1-101m	3.4%	19.6%	18.8%	15.0%	14.6%	17.2%
101.1-102m	23.3%	23.3%	28.0%	29.1%	28.2%	17.9%
102.1-103m	35.5%	25.5%	23.0%	21.6%	21.3%	17.2%
103.1-104m	22.2%	18.6%	17.3%	13.1%	13.1%	8.7%
104.1-105m	5.3%	5.0%	4.2%	4.1%	4.5%	3.6%
105.1-106m	3.8%	2.2%	2.2%	2.4%	2.4%	1.7%
106.1-107m	1.6%	0.9%	1.0%	1.2%	1.2%	0.6%
107.1-108m	0.7%	0.5%	0.4%	0.6%	0.5%	0.3%
108.1-109m	2.4%	1.4%	1.2%	0.8%	0.8%	0.4%
109.1-110m	0.6%	0.4%	0.3%	0.2%	0.2%	0.1%
110.1-111m	0.3%	0.2%	0.2%	0.1%	0.1%	0.0%

## CONCLUSION

Table 2 provides a relative evaluation of the impact of the physical environment on the three spheres identified by Tóth (1981). Compiled from literature overview, this is only a preliminary approximation.

The Drava and Fekete-víz plains are poor in mineral resources. The joint impact of topography and hydrology is the strongest on the economic and social life and engineering structures in the settlement. Water-logged swamps are major obstacles to growth on the flood-plains. Their negative impacts cannot be compensated for by advanced construction technology. Although inundation, previously common, is no longer considered a hazard, excess water, high humidity and inclination to fog formation have to be reckoned with, since they unfavourably influence human health. It is no accident that settlements were built on terrain free of floods and excess water and on blown sand stripes with dry soils. The extensive flood-plain forests were the basis for animal husbandry, supplied timber for building houses and hardwood for making work-tools. The rich wildlife of the forests and waters was a major source of food. Soil quality improves from the south to the north and south of Szentlőrinc reaches 80–90 per cent of the most fertile soils in Hungary. The soil potential for agriculture here is the highest in the study area.

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Tab. 2 The impact of the physical environment on the other spheres of the tetrahedron model for the settlements of the Drava flood-plain and the Fekete-víz plain. ++ = promotes development considerably; + = moderately promotes development; 0 = negligible for development; - = inhibits development; -- = strongly inhibits development

Tab. 2. Utjecaj fizičkog okoliša na druge sfere tetrahedron modela za naselja dravske naplavne ravnice i ravnice Fekete viz-a. ++ = značajno potiče razvoj; + = umjereno potiče razvoj; 0 = ne utječe na razvoj; - = sprječava razvoj; -- = jako sprječava razvoj

Physical potentials:	Impacts of the physical environment on ...		
	economy	society	engineering structures
<b>Geological</b>	-	0	0
<b>Geomorphological</b>	+	+	++
<b>Hydrological</b>	--	--	--
<b>Climatological</b>	+	0	0
<b>Biological</b>	++	+	+
<b>Pedological</b>	++	0	0

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SAŽETAK

## Utjecaj mikrotopografije i dreniranja na uporabu zemljišta i razvoj naselja u mađarskom dijelu dravske ravnice

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Mikrotopografija, kao i manje promjene hidrografskih uvjeta, mogu biti presudne za razvoj naselja i njihov ekonomski život. Cilj ovog rada jest osvrt na prirodne čimbenike od temeljne važnosti za prostorni razvoj naselja u mađarskom dijelu dravske ravnice. Na temelju fizičko-geografskih i etnografskih izvora te arhivskih karata iz 18. stoljeća rekonstruirana je povijest pejzaža, a dobiveni podaci obrađeni su uz pomoć geografskoga informacijskog sustava.

Dravska dolina i vodotok Fekete-viz (Ormánság) leže na visini od 87 do 120 m. To je ravna riječna nizina s mjestimice vrlo umjerenim reljefom, prostrano područje bogato vodom i močvarnim šumama koje hrane vodotokovi s planine Mecsek i brežuljka Zselic, a karakterizira ga ekstreman hidrološki režim: povremeno isušivanje duž rubova nizine i plavljenje velikih područja za vrijeme iznenadnih bujica. Denivelacija od metra ili dva imala je odlučujuću ulogu u razgraničavanju površina pogodnih za ribarenje od onih pogodnijih za sakupljanje plodova, šumarstvo ili uzgoj usjeva. Iako se regulacijom toka rijeke Fekete-viz i dreniranjem močvarnog zemljišta krajem 19. stoljeća smanjila opasnost od poplava i dobila nova obradiva površina, siromašnije stanovništvo nije moglo nastaviti svoj stari način života, tj. sakupljanje plodova, ribarenje i lov. Ravnica se dijeli na tri geomorfološke cjeline. Najmanja i najniža cjelina jest dravska naplavna ravnica smještena uz Dravu i njezine pritoke. Sastoji se, gotovo u cijelosti, od nanosa mulja. To je područje najnepovoljnije za intenzivno obrađivanje i naseljavanje. Druga cjelina, sam Ormánság, smještena je sjeverno od današnje doline rijeke Drave, a obilježena je mrtvicama i pješćanim dinama. Akumulacije nanesenog pijeska tvore izdužena uzvišenja ravnih vrhova i horizontalnog pružanja u smjeru zapad – istok (lokalni naziv: *ormány*). Uz meandre se nalaze i ravne površine starih meandara rijeke Drave, zapunjene nanosima rječica Pecs-viz i Fekete-viz te nanesenim pijeskom. Dolina rječice Fekete-viz nastavlja se prema sjeveru na lesnu ravnicu vrlo niskog reljefa, koja predstavlja treću cjelinu.

Različiti potencijali okoliša bili su u prošlosti najvažniji za život lokalnog stanovništva. Osnova za praćenje promjena u uporabi zemljišta i modelu naselja kroz povijest, bile su vojne karte, danas dostupne u digitalnom formatu. Prvi dokument koji prikazuje šumsko gospodarstvo jest karta Prvoga vojnog istraživanja, prilično točna za nizinska područja. Na njoj se vidi da je u 18. stoljeću najveći dio istraživanog područja bio pod šumom, izuzimajući površine *ormány*, što je polovinom 20. stoljeća smanjeno na deset posto. Prije dreniranja obradivo je zemljište bilo ograničeno samo na najviši dio Ormánsága. Regulacijom rijeka i dreniranjem poljoprivredno gospodarstvo postalo je vodeća grana ekonomije. Između 1865. i 1966. dio obradivog zemljišta znatno se povećao u čitavom području Ormánsága.

Zbog stalne opasnosti od poplave, nezdravog okoliša, loše dostupnosti i nedostatka plodnog zemljišta ta je regija nudila prilično ograničene mogućnosti za naseljavanje te je stoga i bila posljednja naseljena u Južnom Podunavlju. Razlike u visini terena bile su čak izraženije na području bližem Dravi, gdje su se naselja gradila samo na površinama *ormány* ili zaravnjenim pješćanim gredama. Središte sela redovito je zauzimalo najvišu točku grede, odmah do crkve. Kad je drenažni sustav izmijenio okoliš, dobilo se više prostora za naseljavanje. Najveće je naselje u Ormánságu Sellye, u kojem su mogućnosti širenja istražene uz pomoć GIS-a. Na temelju topografske karte u mjerilu

1 : 10.000 autori su napravili terenski model koji potvrđuje zaključak povijesnih i etnografskih izvora da su površine iznad sto metara na području Sellya bile jedini tereni pogodni za naseljavanje. No to se stanje promijenilo regulacijom rijeka i dreniranjem. Ni izloženost ni nagib padine ne smatraju se ograničavajućim čimbenicima u razvoju Sellya – jedini je važan čimbenik nadmorska visina. I danas je većina urbanog područja smještena na nadmorskoj visini od 99 do 103 m. Ispod toga ima jako malo naseljenih područja zbog visoke razine podzemne vode i velike opasnosti od poplava. Područja pogodna za razvoj nalaze se južno i jugoistočno od današnjeg centra naselja, a ona nepogodna na sjeveru i zapadu. Združeni utjecaj topografije i hidrologije izravno se odražava na ekonomski i društveni život naselja.

Received (Primljeno): 2009 – 03 – 10

Accepted (Prihvaćeno): 2009 – 11 – 16

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