

## ECOLOGICAL CASE STUDY ALONG THE SUB-BASIN OF MOGYOROD BROOK IN HUNGARY

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### **Abstract**

Environmental tasks have been increasing for decades. One line of the ecological, environmental researches are significant, face to the degraded water ecosystems' revitalisation. Prevention, expolartion, protection and conservation issues along brooks are appearing as current problematic topics. This case study reflects on the one hand very interesting, and it can be said typical history and present state of one of the capital-suburb brook, which has nearly got all the effects could have received in the last 100 years. Military maps from the Middle Ages and from the last centuries are showing developing and increasing human impact. Just only few examples made along Mogyorod- brook are worth mentioning: historical English garden, two new motorways (M3, M0), Formula-1 area (Hugaroring) and blocks of flats for nearly 100000 people. These influences modified not only the landscape, but also the watershed' ecosystems too. With the phenomenon of fragmentation and disappearing habitats new pollution sources have been appearing and can be noticed at the same time (illegal sand-mines with communal waste, etc.) This case study shows the changes in the time-process and the appearings in the pollution factors also. The research result shows clearly for the example between 1860-1988 the length of the brooks decreased with 80% in the area of M0 motorway.

### **Introduction**

For 200-300 years the area of North-Budapest has been changing. Especially in the last few decades can be seen very dynamic and strong modifications in landscape.

The study area is situated in middle-east-European country, in Hungary in the watershed of Danube. Geographically it belongs to the North-Region of Budapest with its south part and to Pest-country with its rest. The area of Mogyorod brook, which flows through 4 settlements (in order: Mogyorod, Fot, Dunakeszi and the capital, Budapest) has only 36km<sup>2</sup> catchment area. The sources are in the village of Mogyorod, few of them are in the area of the Hungarian Formula-1, in Hungaroring.

The sub-watershed area belongs to the big Alföld flora-region (Eupannonicum), and to the smaller Duna-Tisza floristic area (Praematricum). Different potential vegetation types on the catchment are the following: *Salicetum triandrae purpureae*, *Salicetum albae-fragilis* near the river Danube; *Molinetum*, *Astragalo-Festucetum sulcatae danubiale*, *Festucetum vaginatae danubiale*, *Brometum tectorum danubiale*, *Festucetum vaginatae danubiale*. (1)

The area was determined by the terraces of river Danube geologically, therefore the basic rock is calciferous quartz sand from the Danube riverbed and soils are mainly alluvial and sandy. Groundwater is influenced mainly by meteorological parameters (yearly precipitation is between 580-600 mm, aridity index: 1,17-1,21), and just secondly the water-levels of river Danube. (2)

## Methods

On one hand the study basics on different types of maps and their readable information on land-use and land-cover, on the other hand literary sources (as for example irrigation documents of the Karolyi farm) and civil engineering plans were used as well (3).

All the historical, mainly military maps, were digitalised and digital maps were made with using MapInfo 5.0 GIS software, from which detailed information could be read easily. Changings in land-use and land cover in time process were analysed by making browsers from different data, then graphics and charts were made to show clearly and numerically the difference in each period.

## Results and discussion

The result of the survey shows very well the increasing urban influence on the area. Changings had started with the field-nomination to Karolyi-family, to one of the most biggest Hungarian family, whose idea was realised with making castle with its English-park and intensive and irrigated agricultural field in the 19th century. While in the 18th and 19th century mainly pasturing was dominant as not intervening to the natural conditions (as chart No.1 shows), which can't be summited from the landuse after the beginning of the 19th century (see chart No.2).

chart No.1: LAND USE at the end of 19th century at the area of North-Budapest and South-Dunakeszi

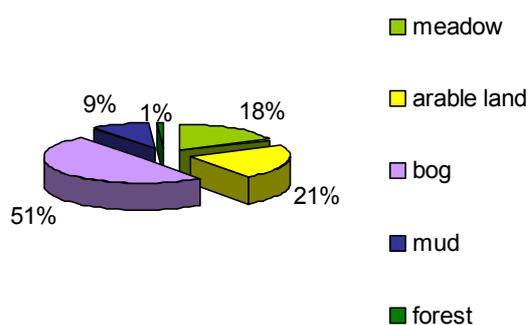
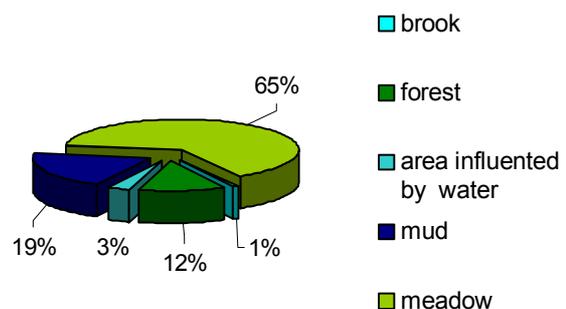


chart No.2: LAND USE in 1923 at the area of North-Budapest and South-Dunakeszi



During between the period of 50's and 70's many different determining land-modification had begun as appearing in chart No.3 and in No.4: opening different mines /sand and peat/ and exploitation had been done, parcellation for mainly setting up horticultural production /fruit plantation and garden cultivation/ and site for weekend houses were in all villages, which the catchment area includes, except for the area of North-Budapest, where changes had begun just in the 80's. In that mentioned field the government's social policy on building new houses had reached as well.

chart No.3: LAND USE in 1951 at the area of North-Budapest and South Dunakeszi

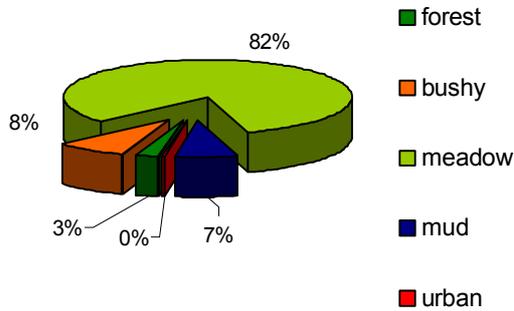
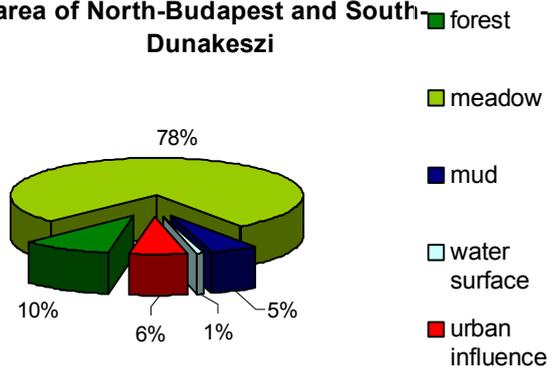
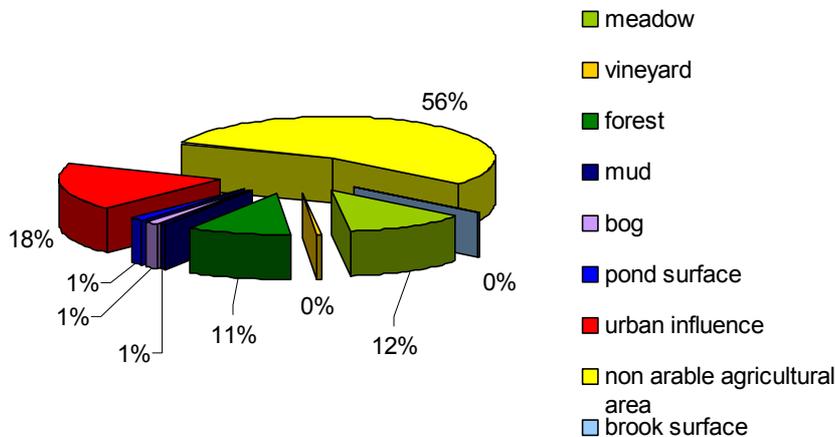


chart No.4: LAND USE in 1973 at the area of North-Budapest and South-Dunakeszi



According to this new kind of block of flats was planned, which was roughly realised from the beginning of 80's until the middle of 90's. Some other type of bigger land-modification has begun in Mogyorod village, too: new highway and Formula-1 area have been created. The highway construction has affected the village of Fot. Some orchards /mainly apricot plantation/ was cutted.

chart No.5: LAND USE in 1988 at the area of North-Budapest and South-Dunakeszi

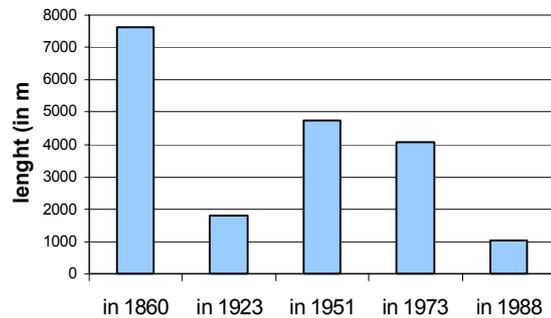


At the end of the 20th century as a continuation of occupying remained (semi-)natural territories new governmental investments and of private sector's were established. The newest part of M0-ring around the Hungarian capital was set up in the North border of Budapest in Ujpest, where just now the Danube bridge is missing making direct new contact between Buda and Pest, and in the same area of the watershed new flats and other investments (entertainment centres, shopping centres, etc.) have been building and the rest of the orchards have cutted as well to make place for new structures in the suburb of Budapest.

Just for example it is worth making numeric survey on changings in one area: at the border of Budapest and Dunakeszi, at the southest area of the watershed.

The length of Mogyorod-brook as the appearing chart No.6 is describing has decreased with 87% as taking into consideration the period of 1860-1923. Its background was the creation of two canals for gathering the water came from precipitation and groundwater into another brook. The reason for this work was the very rich soil, for especially horticultural plants, which was unusable because of the high groundwater level and the floods of Mogyorod-brook.

**chart No.6: The all length of brooks at the area of North-Budapest and South-Dunakeszi**



### **Conclusion**

The results of analisation are showing clearly the human effect on land-modification and on the landscape as well. The most sensitive vegetation is disappearing, wetlands was liquidated. The influence on nature are increasing - comparing the human influence by charts it showing clearly with its results: from 1% went to 18% (0.97km<sup>2</sup>) within less then 30 years.

The modification in landscape and also in natural relationship between habitats are mostly not existing. The greenbelt of Budapest's surrounding is disappearing intensively, because the occupation of builded area is growing very rapidly, therefore there should be a need to overthink the effect of this trend again and concentrate onto the remaining green seminatural areas and their good function: not as just habitat but also as potential or functioning recreational area and as landscape pattern, too.

### **Acknowledgements**

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### **References**

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- (2) S. Marosi., S. Somogyi: Magyarország kistájainak katasztere, 5<sup>th</sup> edition, MTA Földrajztudományi Kutató Intézet, Budapest, Hungary (1990)
- (3) 1:25 000 EOY maps from Hungary (1951,1973,1988)
- (4) 1<sup>st</sup> ,2<sup>nd</sup> , 3<sup>rd</sup> military survey maps from the Hungarian-Austrian Monarchy