

**SZENT ISTVÁN UNIVERSITY**  
Gödöllő

**THE HERITAGE AND FUTURE POSSIBILITIES OF WASH-LAND UTILISATION  
IN HUNGARY**

Ph.D. Theses

FODOR Zoltán

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**Ph.D. School**

**name:** Ph.D. School of Environmental Sciences

**branch of sciences:** Environmental management, environmental protection

**head:** Dr. MENYHÉRT Zoltán D.Sc.  
Professor  
Szent István University, Gödöllő  
School of Agricultural and Environmental Sciences  
Institute of Environmental Sciences

**Leader of subject:** Dr. ÁNGYÁN József C.Sc.  
Professor  
Szent István University, Gödöllő  
School of Agricultural and Environmental Sciences  
Institute of Environmental Sciences

**Consultant:** Dr. ANDRÁSFALVY Bertalan D.Sc.  
Professor  
University of Pécs  
Faculty of Humanities  
Department of Ethnography

.....  
Head of Ph.D. School

.....  
Leader of subject

## 1. FOREGOINGS AND OBJECTIVES

The topic of this dissertation goes back to 1995. It was in that year that I decided to go into the details of Hungarian wash-land utilisation. I applied for admission to the PhD course in 1996, in which I planned to study the history and future possibilities of wash-land utilisation in the Carpathian Basin.

Through the research work done over the years, I met several difficulties that incited me to think over and reassess my initial theory.

Observing the topic, I realised that there are three definite theories towards wash-land utilisation, which radically disagree in some fundamental questions. Thus, first I had to clarify how to characterise the kind of wash-land utilisation whose past and future I chose to deal with, based on the various theories and my own research, for it is necessary to make the past characteristics clear in order to outline a solid future plan after the evaluation of the present situation.

My research work, therefore, is centred on two main lines: the first part of it deals with the past of wash-land utilisation, and its concerning theories, while the second part evaluates the future applicability of wash-land utilisation along the Hungarian section of the River Tisza.

In the first part of my dissertation, I present the three theories on wash-land utilisation. By way of description and juxtaposition, I establish the main causes of disagreement, and suggest some ways by which these opposing theories may come closer to one another. The results of my own archival research is linked to this part.

Although at the beginning of my work I aimed at surveying the history of the whole Carpathian Basin, it soon became clear that this was too brave an attempt. The area of investigation had to be restricted first to the Hungarian Tisza-basin, then to the Hungarian section of the River Tisza. In the thorough elaboration of the results of my archival research, I dealt only with the fok-representations appearing on the manuscript maps of the present Hungarian section of the River Tisza. This elaboration meant basically the analysis of the hydrographic peculiarities of represented foks. Based on this analysis, I formulated some generalisations that may punctuate theories that had been regarded to have universal validity. These generalisations may also contribute to the formation of a viable connection between the three theoretical tendencies on wash-land utilisation.

In the second part of this paper I evaluate the present and future applicability of the principles of wash-land utilisation based on three pilot areas along historically surveyed river sections. Doing so, I present hydrographic changes after the 19<sup>th</sup> century river control based on a separate synopsis, as well as introduce the factors that necessitate the renovation of wash-land utilisation and the examination of the places of a possible reconstruction.

In the European Union, which we are soon to join, the Common Agricultural and Rural Policy (CARPE) is gradually replaces the emphasis of financial support from production to non-productive (environmental, social, employment, cultural etc.) areas, i.e. the European scale of values is aiming at the multifunctional agricultural model.

One of the possibilities to create multifunctional agriculture in Hungary is to revive the principles of wash-land utilisation, since this way of landscape management may create a chance to form and to care for environmental, social and cultural values.

I examine the theoretical renewal of flood plain management founded on regular inundation in its relation to water regime under controlled circumstances. I analyse the water regime in three sample areas where the need for the renewal of wash-land utilisation – on more or less local initiatives – has already arisen.

Besides these necessities, the problem is even more up-to-date, since the floods between 1998-2001 made the hydraulic engineers and the competent ministry think over flood prevention of the River Tisza.

The Ministry of Transport and Water Management worked up a conceptual plan entitled '*The Improvement on the Vásárhelyi Plan*', which intends to enlarge the flood-plain in certain places and to build lowland emergency flood reservoirs in order of successful flood prevention in the future.

As, in connection with the social acceptance of this conceptual plan, there were arguments claiming that the contemplated flood storage areas could be, utilised to a certain extent, similarly to the way before modern water controls, I evaluate the conceptual plan (that is, its version appearing in March 2002) from the viewpoint of wash-land utilisation. Since then, the plan has passed to the phase of exhaustive elaboration. The evaluation of these works, which are still under elaboration, and which are different in many ways from the original plan cannot be the subject of this thesis. The text, which was finished in reality in October 2002, was later supplemented by some smaller parts only, which make use of materials that are related to the observations and were published in the meantime.

In my paper I aimed at realising the following objectives:

1. Clarify the differences between the interpretations of wash-land utilisation, describe its reasons, and outline a possibility to interpret these views to one another.
2. Based on manuscript maps and place-name studies, I compile the collection of the foks along the Hungarian section of the River Tisza that once possessed individual names. I also classify the represented foks according to their hydrographic characteristics.
3. I evaluate three possible pilot areas from the viewpoint of theoretical realisation of wash-land utilisation along the Hungarian section of the River Tisza.

## **2. MATERIALS AND METHODS**

### **2.3. Inquiries concerning the history of wash-land utilisation**

The notion of 'wash-land utilisation' in Hungary was first introduced by ANDRÁSFALVY Bertalan. He thought that this way of landscape management had been based on the establishment of artificial channels named 'fok', which collect and spread out the inundation water of rivers. The artificial origin of foks was later questioned by many, claiming that these channels had natural origins.

In the argument about the origin of foks, the direction of the flooding of these channels had an important role. Those who were convinced about the artificial origin of foks thought it was due to human interaction that foks connected the riverbeds with the flood basins at their deepest, lowest parts. Those regarding foks to be of natural origin thought that these beds conducted outbursting water laterally, breaking through the banks, according to the inclination of the ground.

Since at the beginning of my work there were no contemporary observations about the formation of foks, I examined the validity of the theories concerning the direction of the flooding of foks based on the fok-representations on the 18-19<sup>th</sup> century manuscript maps of the Hungarian section of the River Tisza. Most of the material was provided by the National Archives, in the form of maps of the former Locotenential Council, the Royal Chamber Cartographic Directorate and the Hydrographic Institution. This was supplemented by the territorially relevant maps found in county archives.

Among the fok-representations that I found, the ones that led water to the flood plains at the upper parts of flood basins I named 'overflowing from above'. Foks at the lowest parts

of flood basins were named 'inundating from below'. Those connecting flood basins with the river approximately in the middle of the basin were named 'indeterminable'.

Based on the foks mentioned in written records and studies, and represented on maps, I compiled a name-collection. In this collection I put the names of foks in alphabetical order and numbered them. If a fok appears on maps as well, its number is written in italics, while if it appears only on longitudinal cross-section, in written records or studies, its number is written in standard form. In case of each fok, I gave the source where I found about it, as well as the name of the village or town that was nearest to the channel.

In the case of foks appearing on maps, I indicated which group they belonged to, according to their direction of flooding. The classification was rather difficult, since most of the channels are depicted as short channels, breaking through the river-ridges, so these maps do not provide definite information about the movement of the spreading water in the flood basins. The movement of water in these cases could be speculated only by matching the manuscript maps to the present-day contour maps, which would go beyond the scopes of my observations.

In the material concerned there were configurations named 'fok' that cannot be classified into any of the three base groups. Thus I had to set up new groups. I treated separately the foks that cut across river bends, shortening the course of the river. The foks connecting smaller runs in the flood plain of the River Tisza I treated as branches. I also classified here a few foks connecting waters on flood plains that had no represented connection with the riverbed. The lakes and waters that are connected with the water stream form a group on their own. Another group includes the isolated dry beds and plains not having represented connection with running water. In the analysis I separated the foks which were indicated only by their names, without any indication of actual channels. Naturally, in this last case the direction of inundating water was not possible to observe at all.

#### **2.4. The present applicability of the principles of wash-land utilisation**

The conceptual plan named '*The Improvement on the Vásárhelyi Plan*', which aims at the establishment of flood storage areas along the River Tisza, suggests that, in case of adequate water level of the River Tisza, there is a possibility to inundate these flood storage areas not only in case of emergency. This would introduce a landscape management based on this more or less regular inundation. Such flood water levels may presumably develop in six or seven years out ten. According to this, the present 73.6% ratio of arable lands on these territories would be radically decreased to 5.5%, and the ratio of forests, meadows, pastures and non-intensive orchards would be increased. Flood storage would probably take place in one year out of thirty.

Local initiatives emerging along the River Tisza support another approach, suggesting the renewal of certain elements in the type of land use practised before the river regulations in the 19<sup>th</sup> century, with the introduction of landscape management based on allowing flood water onto areas now protected from flooding. The areas altered this way are not intended to largely partake in storing extremely high or long-lasting floodwater, for water stagnation at a depth of several metres for several weeks would endanger the value of the newly created landscape.

The starting point of the two approaches fundamentally differ as much as the first one aims at the protection against extreme floods, while the latter projects to solve the utilisation of 'regular' floods. Despite these differences, both concepts suggest similar transformations in the system of land use in the pointed areas, even if their views regarding the system of operation are fundamentally different because of the differences in the projected aims.

In either case, one of the primary conditions of such a change in land use is the regular emergence of adequate floodwater levels along the area concerned which the new land use system can be built on. In the second part of my paper I examined whether the regime of the controlled rivers on the potential pilot areas of the three local initiatives (the BOKARTISZ Public Association in Karcsa, the local government of Nagykörű and the CSEMETE County Association in Szeged) in the basin of the Tisza enables the renewal of the landscape management based on regular inundation.

The BOKARTISZ is planning to inundate its pilot area next to Bodroghalom regularly from the River Bodrog via the Felsőberecki main channel and the Karos-Szerdahelyi channel. This area, which is about 500 hectares, will be enlarged further in the future. In the phase of experimental operation, the inundation is planned up to 96 metres above Baltic Sea level.

According to the Landscape Rehabilitation Project of the local government of Nagykörű, the water of the River Tisza would be led outside the embankment onto areas now protected from flooding in a controlled manner. First a 300 hectare pilot area would be inundated, up to 84 metres above sea level.

The CSEMETE County Association is planning a similar inundation in a cca 6000-hectare area on the right side of the river, north from Szeged, between the villages Dóc, Ópusztaszer and Baks, up to 78 metres above the Baltic Sea level. This area is included in the Improvement on the Vásárhelyi Plan, too, as the place of the contemplated emergency flood reservoir of Szeged.

I described the river regime of the regulated rivers next to the three areas by the diagrams based on the data of daily water levels recorded at the water gauges at Tiszabő and Mindszent by the River Tisza and at Felsőberecki by the River Bodrog. To create the diagrams I used the data between 1960-1999 collected from the database of the Water Resources Research Institute (VITUKI Rt.). In case of Felsőberecki I used only the data recorded after 1966, for they can be regarded homogeneous only from 1967, because of the relocation of the water-gauge. The collected data were analysed by computer. Values recorded on 29<sup>th</sup> February in leap-years were ignored.

First, I examined whether the regime of the rivers at the given water gauges changed in the periods concerned. Thus, I evaluated the annual minimum and maximum measured on the water gauges, the calculated annual stage fluctuation range and the line of annual mean water levels with regression and correlation analysis. The data series containing 33 and 40 values, belonging to the various days of the year were arranged in increasing order. Then the smallest, the tenth, the twentieth and the fortieth data, and in case of Felsőbercki the first, the ninth, the seventeenth and the thirty-third values of the systematic data series belonging to the various days were plotted on the graphs in increasing order. The diagrams acquired this way display empirical exceeding probabilities of 100, 75, 50 and 2,5%.

Since these graphs display constructed stage hydrographs, they do not inform about the real number of water levels reaching the intended inundation height in various years. Therefore a further survey was made to reveal the actual frequency of adequate water levels during the period investigated. Since from the point of landscape management with inundation vernal and early summer floods are of paramount importance, I highlighted and elaborated thoroughly the data recorded between April and June, i.e. I defined the number of days in these months when water level reached the intended height. I also defined the number of days with the intended water levels with the exceeding probability of 50-75%.

These diagrams and calculations still do not inform about the predictable frequency of water levels in the future. In order to predict this, I counted the number of years when, between April and June, the water level reached the intended height at least on five, seven, ten, fifteen and twenty days. Based on the standard deviation of actual cases, I calculated the

minimal number of days when the intended water level developed with an accuracy of 95.4% in periods as long as the one observed, at least in half of the years.

### **3. RESULTS**

#### **3.1. The history of wash-land utilisation in the light of new research**

Table 1 shows the classification of foks found on the manuscript maps of the Hungarian section of the River Tisza, according to their direction of flooding. Here the dividing according to the direction of flooding is given referring to six smaller section of the River Tisza. In the appendix of my paper I included the thoroughly elaborated version of this chart, which enables to look up the exact data of the channels from the list of names.

Some important conclusions can be directly drawn from the classifications above. First and foremost, as regards their hydrographic characteristics, foks situated in the investigated area cannot be regarded as homogeneous. On the investigated maps the fok-names denote different kind of waters. Nearly the four-fifth of them belong to the three main categories: they are either inundating from below, overflowing from above or the direction of flooding is indeterminable.

The largest of the three main groups is the one collecting foks overflowing from below (126), though the number of those inundating from above (88) and those with indeterminable direction of flooding (50) together is higher (138).

For the most part, this ratio can be observed in cases of all the 6 separately studied river sections, as well. In the area spreading between the north-eastern frontier of the country and Záhony this is not true because of the insufficiency of the names appearing on the discovered manuscript maps. It is not true between Záhony and the mouth of the River Bodrog, either, where I found only one fok-name, which I could not even identify with any geomorphological element. Most probably, in the latter region, the Bodrogek and Rétkök area of holocene depression, there was a small number of channels named fok in the 18-19<sup>th</sup> century.

Along the section between Tokaj and Tiszavalk, there were more foks overflowing from above and indeterminable foks together than foks inundating from below. Along the section below the mouth of the Eger run, where, between Tiszaderzs and Tiszataskony, once there were the largest foks carrying water to the Nagykunság plain, I found approximately as many foks inundating from below as foks overflowing from above, while there was also a significant number of indeterminable ones. At the section below the town of Szolnok, there were more foks overflowing from above than inundating from below. There is an exception in the separately studied river sections: the region spreading from the mouth of the River Körös to the southern frontier, where there were more foks inundating from below than overflowing from above and indeterminable together. Nevertheless, we must admit that the number of foks that are also called 'runs', or that indicate mouths of runs is the highest here, which may be the cause of the large number of foks inundating from below.

The fact that foks were spread in such a dispersion stands for their natural origin. It is also doubtless, however, that the economically significant foks, used as fisheries, were preserved in good condition, and among these foks there were artificially established channels, as well.

Table 1 Foks appearing on manuscript maps according to their hydrographic characteristics and regional position.

|   | Foks inundating from below | Foks overflowing from above | Foks with indeterminate direction | Fok-names without indicated channel | Foks cutting across river bends | River branches named foks | Lakes named foks | Dry beds named foks | <i>Total</i> |
|---|----------------------------|-----------------------------|-----------------------------------|-------------------------------------|---------------------------------|---------------------------|------------------|---------------------|--------------|
| Tisza-becs – Záhony                         | 7                          | -                           | -                                 | -                                   | -                               | -                         | -                | -                   | 7            |
| Záhony – mouth of the Bodrog                | -                          | -                           | -                                 | 1                                   | -                               | -                         | -                | -                   | 1            |
| Mouth of the Bodrog – mouth of the Eger run | 35                         | 20                          | 18                                | 4                                   | 2                               | 9                         | 6                | 1                   | 95           |
| Mouth of the Eger run – mouth of the Zagyva | 42                         | 39                          | 16                                | 8                                   | 7                               | 3                         | 3                | 2                   | 120          |
| Mouth of the Zagyva – mouth of the Körös    | 16                         | 19                          | 4                                 | 1                                   | 2                               | -                         | 1                | -                   | 43           |
| Mouth of the Körös – Szeged                 | 26                         | 10                          | 12                                | 4                                   | 2                               | 5                         | -                | 1                   | 60           |
| <i>Total</i>                                | <i>126</i>                 | <i>88</i>                   | <i>50</i>                         | <i>18</i>                           | <i>13</i>                       | <i>17</i>                 | <i>10</i>        | <i>4</i>            | <i>326</i>   |



### 3.2. The theoretical feasibility of wash-land utilisation along the river Tisza

As the statistic analysis of the data series recorded on the water gauges near the three pilot areas revealed that the water regime at the water gauges in the period investigated did not change, the data series can be regarded homogeneous.

Based on the stage hydrographs, the height of floodwaters regularly exceeded the intended inundation levels in the past decades.

The water gauge at Felsőberecki on the River Bodrog indicated water levels higher than 96 metres above Baltic Sea level in the first half of April, at an exceeding probability of 51,51% (Figure 1).

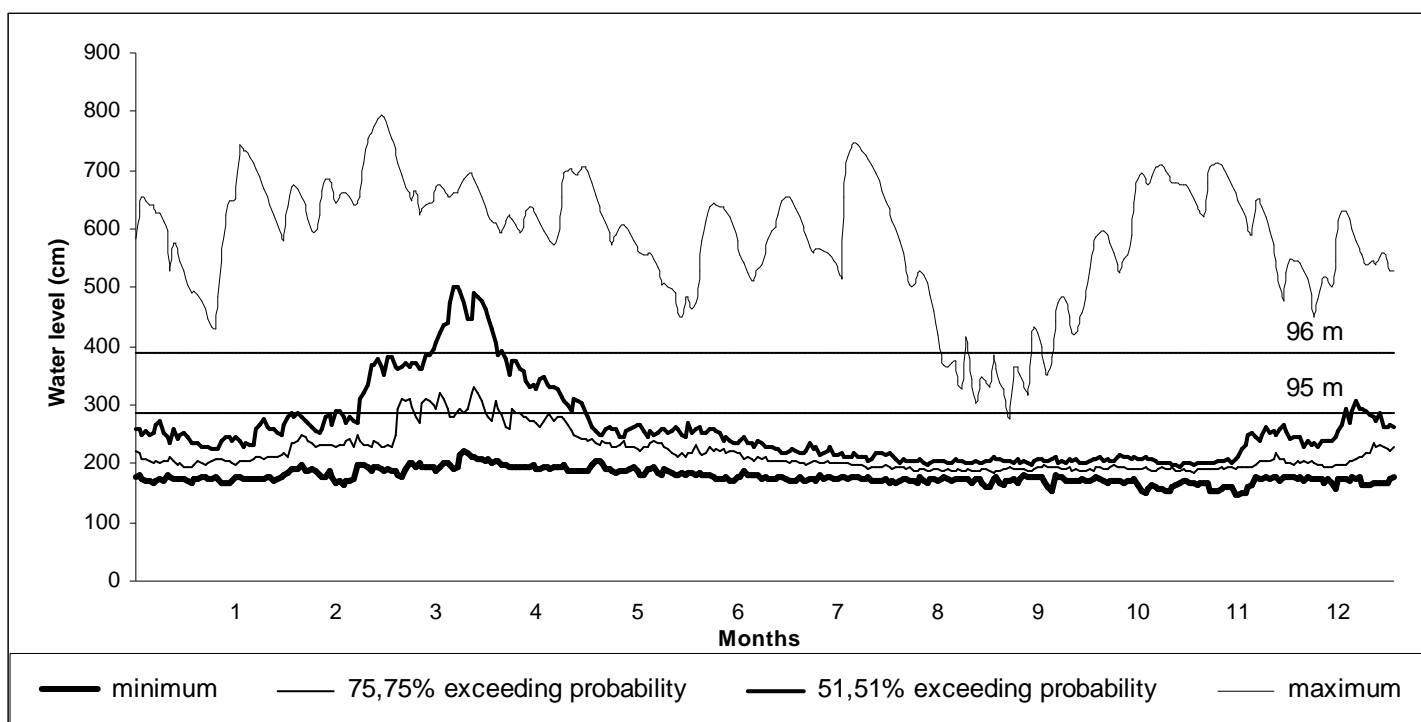


Figure 1.  
Empirical water level exceeding probabilities on the river Bodrog as measured on the water-gauge in Felsőberecki between 1967 and 1999  
(47.7 river km mark, 92.12 m)

The analysis of actual flood incidents revealed that at Felsőberecki between April and June the water level reached 96 m above Baltic Sea level frequently only in April, on 20 days at an exceeding probability of 51,51%, and on 13 days at an exceeding probability of 60,60%. Based on the standard deviation of the data, the water level at Felsőberecki is expected to reach 96 metres on seven or more days, in at least half of the years, only in April, with a certainty of 95,4%.

Figure 2 displays the diagram constructed from the daily water levels of the River Tisza at Tiszabő.

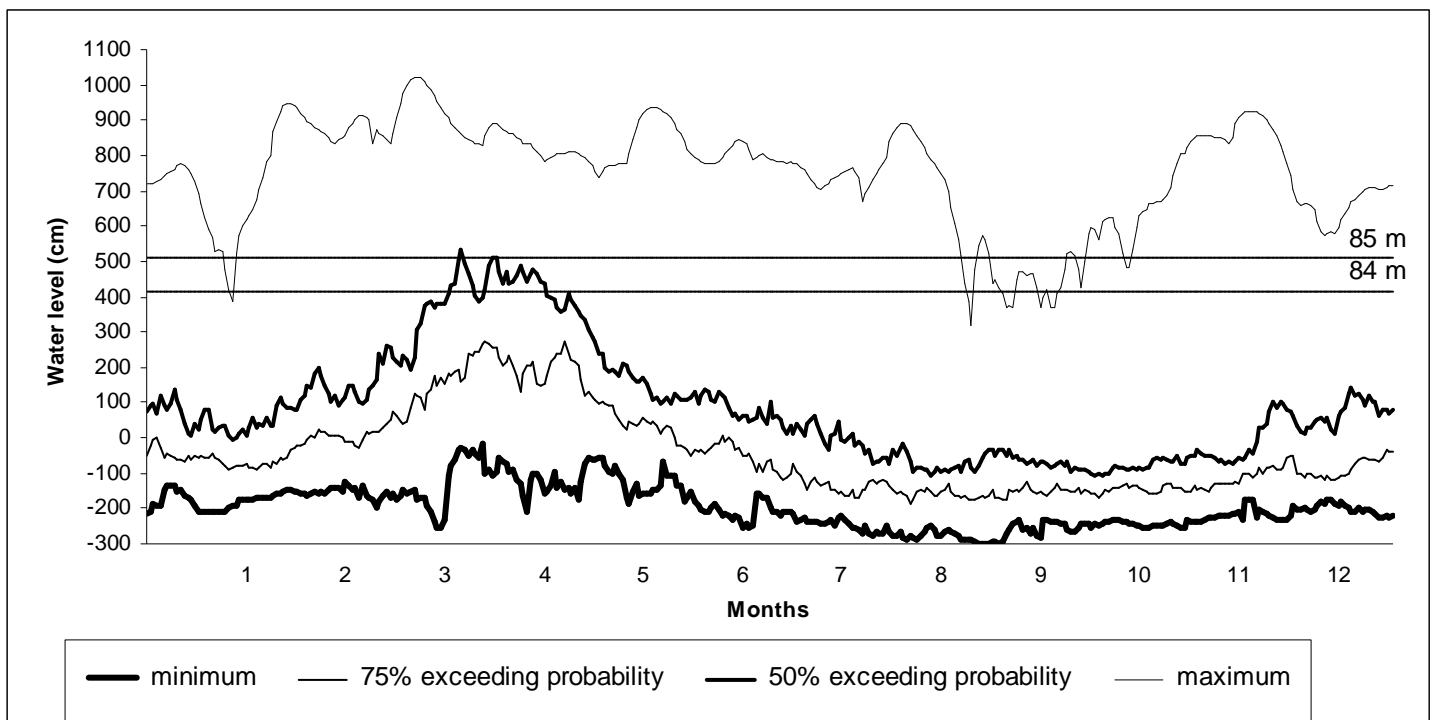


Figure 2.  
Empirical water level exceeding probabilities on the river Tisza as measured on the  
water-gauge in Tiszabő between 1960 and 1999  
(369.0 river km mark, 79.88 m)

The desired 412 cm water level corresponding to the 84 m Baltic Sea level, projected in the landscape rehabilitation plan, is exceeded only by the curve of exceeding probability of 50%, and it is over the intended inundation level for more than three days in April.

The analysis of actual flood incidents revealed that at Tiszabő in April and May the water level reached 84 m above Baltic Sea level regularly. In April, it happened on 17 days at an exceeding probability of 50%, on 11 days at an exceeding probability of 60%; and there was a day with the intended water level even at an exceeding probability of 75%. In May the water level reached the intended height on seven days at an exceeding probability of 50%, and on three days at an exceeding probability of 60%. Based on the statistic prediction, however, similarly to Felsőberecki, at Tiszabő we can expect only in April that water level reaches the intended height for a longer period in more than half of the years, but here it is expected to happen on not only seven, but at least ten days.

On the diagrams constructed from the data series of Mindszent, only the 50% exceeding probability curve is above the planned 78 meter inundation level for a long time, namely from the last ten days of March to the middle of May (Figure 3).

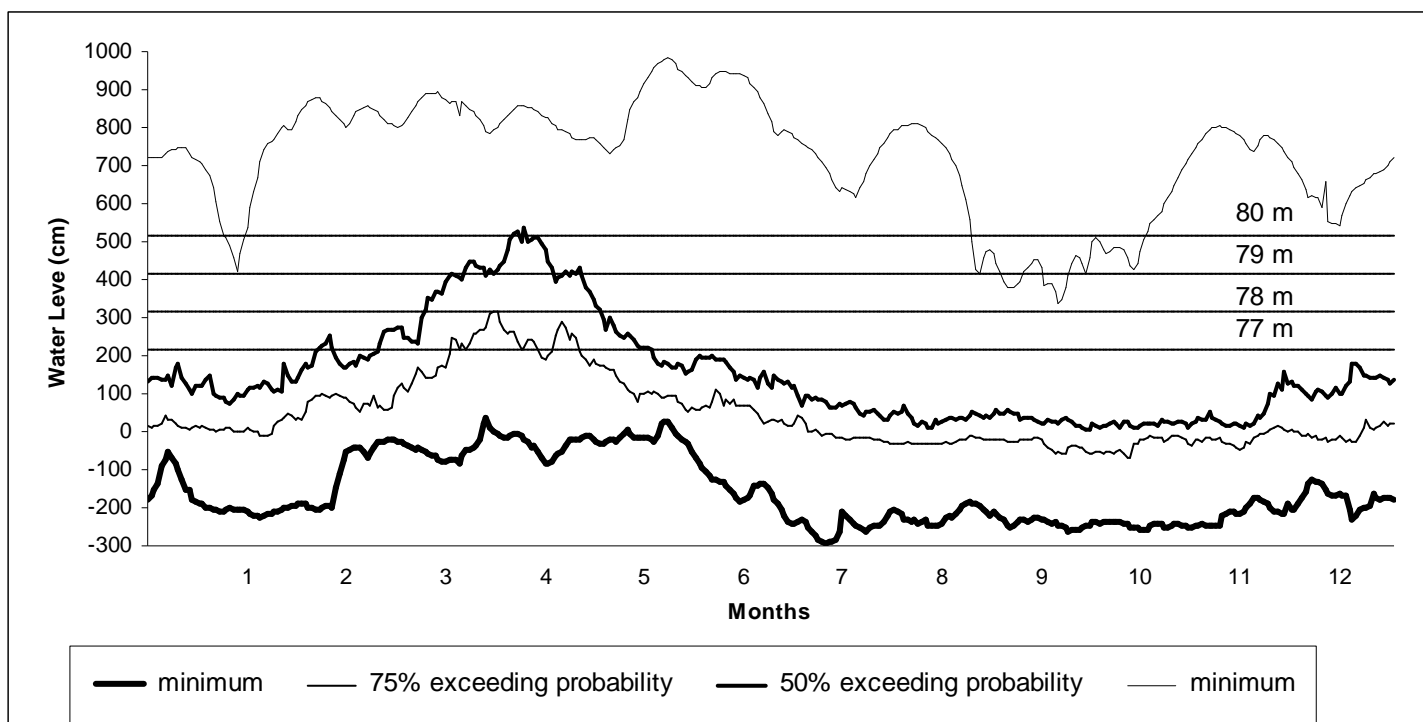


Figure 3.  
Empirical water level exceeding probabilities on the river Tisza as measured on the  
water-gauge in Mindszent between 1960 and 1999  
(217.7 river km mark, 74.82 m)

Based on the actual flood events, water level reached 78 metres at Mindszent in every month from April to June. In April, it happened on 25 days at an exceeding probability of 50%, on 20 days at an exceeding probability of 60%, and on 11 days with an exceeding probability of 75%. At the same probabilities, water level reached 78 metres on 13, 9 and 7 days in May. In June, such levels occurred only for shorter periods, on 4 days at an exceeding probability of 50%, and on two days at 60%.

By the statistic prediction estimating the expected duration of future floods, we can expect that the floodwater will be above the planned inundation level lengthily at Mindszent both in April and in May, in at least half of the years. This is expected to happen in 15 or more days, in April, and in 7 or more days in May.

### 3.3. New scientific achievements

According to the main subject matters of this thesis, my scientific achievements can be divided into two groups.

Achievements concerning the history of wash-land utilisation:

1. The presence of channels and water streams on the flood plain of a given river does not mean the presence of 'wash-land utilisation', the notion conceived the way it was introduced by ANDRÁSFALVY Bertalan after his observations along the River Danube. The discovered data do not help to decide whether foks had natural or artificial origin, therefore the presence of foks in a territory does not prove unambiguously the existence of deliberate regulation of waterways. This statement and the absence of foks in Rétköz in the 18<sup>th</sup> century, as shown by contemporaneous maps, and the stuffing of runs there in the

18<sup>th</sup> century, does not prove in itself that there had been wash-land utilisation based on foks, as was stated by RÉFI OSZKÓ in his inconsistent work.

2. I studied the surviving archival manuscript maps of the Hungarian section of the river, I collected the data of fok-representations appearing on them, and included them in the appendices. Based on the textual synopsis and the study of the maps, I concluded that the channels named foks, as regards their hydrographic characteristics, cannot be regarded as homogeneous. By their various characteristics, I classified foks into eight groups. The extent and proportion of the various groups is expressed in figures along six smaller sections of the River Tisza.
3. The observation of the flooding direction of the channels revealed that if a fok along the Tisza inundates water from below, it does not prove its artificial origin in itself. I also found that 'flooding from above' on river sections with low inclination does not exclude piscatorial utilisation, since there were examples of fishing on foks overflowing from above. All things considered, we may claim that the landscape of the flood plains of the River Tisza from the last decades of the 18<sup>th</sup> century to the river regulations in the 19<sup>th</sup> century is different in many ways from the characteristics observed by ANDRÁSFALVY on the flood plains of the River Danube in Tolna and Baranya counties. Foks were significantly shorter along the River Tisza; they broke through only the banks, as it were, while the territory below Tokaj was mainly bare, flood plain forests could not play a role in the control of water balance. The differences confirm the former statements of SZILÁGYI and SOMOGYI, according to which the role and significance of foks can vary greatly depending on the characteristics of the given area, and this warns against oversimplification. Former investigations along the River Tisza proved unambiguously that piscatorial utilisation based on foks – including the possible creation of artificial channels and their maintenance – was common along the Tisza, moreover, it was the most important basis of fishing. On the effects of these interactions on water regime and river control, however, no one has yet published a significant work.

Investigating the future possibilities of wash-land utilisation I intended to clarify whether the characteristics of the water regime of the regulated River Tisza enable the regular inundation of three pilot areas. Based on the data series recorded on a water-gauge on the River Bodrog and two other water-gauges on the River Tisza, I created diagrams with empirical water level exceeding probabilities, and thus I concluded:

4. In the investigated period, on the water gauges used to characterise the pilot areas in case of the annual maximums, there was no statistically verifiable increasing tendency in the level of floodwater (with a certainty of 99%). On the diagrams, the stage hydrographs at a probability of 75% never exceeded the inundation levels projected by the three local initiatives. The 50% exceeding probability curve surpassed the intended inundation level equally on the pilot area of BOKARTISZ in Bodrogek (96 m above Baltic Sea level), of the Landscape Rehabilitation Project of Nagykörú (84 m above Baltic Sea level) and of the CSEMETE in Szeged (78-79 m above Baltic Sea level). Based on these data, the inundation up to the intended level of these areas can be carried out in half of the years rather than in their three-fourth. Regarding the frequency and duration of adequate water levels, the pilot area of CSEMETE seems to be most suitable for the possible introduction of landscape management with inundation.

#### 4. CONCLUSIONS AND SUGGESTIONS

Discussing the questions concerning wash-land utilisation is rather problematic from the very first, since the various theories attribute different connotations to the word 'fok'. Therefore, a definition that can bring these theories closer to one another may prove to be a progressive movement.

Since the geographic-etymological approach and the explanation of the Hungarian Document Dictionary gives the most general definition, which agrees with the characteristics of foks appearing on manuscript maps, it is advisable to describe the definition of the word 'fok' by these features. Thus, foks are natural or artificial channels inundating the high water of lakes or rivers. This definition includes the basic characteristics of foks, therefore it can be accepted by all interpretations in connection with wash-land utilisation, as a 'symbolic generalisation'.

The detailed definition of foks must include that the direction of flooding in the channel depending on water level may be either unidirectional or, complying with the natural features, alternating, two-directional.

The generalisations and the differences in the opinions concerning wash-land utilisation necessitate deciding the flooding direction of foks wherever the historical possibility of wash-land utilisation emerges. Analysing data gained from maps only enables us to draw indirect conclusions only about the utilisation of flood plain, about was-land utilisation. In the future, it is strongly advisable to avoid the identification of fok-representations on maps with the existence of wash-land utilisation based on artificial foks.

Research work done on flood plains and the development of a uniform descriptive language could be largely improved if scientist of the various fields worked out an ecological-hydrological modell that could reveal the differences in the landscape in case of the presence and absence of planned, conscious wash-land utilisation founding on foks. At present, in this question we can rely on suppositions only.

In the last years, the studies on the development of channels on the flood plains of the River Tisza indicate that the extensive observation of present changes may help the detection of past events, as well.

## 5. PUBLICATIONS RELATING TO THE TOPIC OF THE PRESENT THESIS

### 5.1. Publication in journals

#### 5.1.1 Journal article without IF

**Fodor Zoltán** (2001): Az ártéri gazdálkodást tárgyaló elméletek és alkalmazhatóságuk a magyarországi Tisza-szakasz kéziratos térképein szereplő fokok alapján. In: *Agrártörténeti Szemle* XLIII/1-2. (87-149.)

**Fodor Zoltán** (2002): A Tisza menti fokok tájhasznosítási szerepe az újkori folyószabályozások előtt. In: *Falu Város Régió* 2002/4. (14-17.) (Role of points along the Tisza in the utilization of landscapes before modern regulations)

**Fodor Zoltán** – Jeney Zsuzsa (2002): A rendszeres árvízi elöntésre alapozott mezőgazdasági területhasználat elvi lehetősége Három Tisza-völgyi mintaterületen. In: *Hidrológiai Közöny* 82. évf. 6. sz. (348-352.)

**Fodor Z.** (2003): Concept for land use based on regular inundation in the contemplated flood storage areas above Szeged (Hungary). In: *Acta Agronomica Hungarica* 51 (1) pp. 19-24

#### 5.1.2 Electronic publication, published in foreign languages, revised

**Fodor Zoltán** (2002): The channels named “fok” and fok-husbanding along the bank of the Hungarian section of the Tisza River. In: *Hungarian Electronic Journal of Sciences*. (p. 11) <http://www.heja.szif.hu/ENV/ENV-020905-A/env020905a.pdf>

#### 5.1.3 Other articles

**Fodor Zoltán** (2001): Csontos László – Fehér László: Mérnökök, természettudósok, politikusok a magyar vízgazdálkodás történetében. In: *Agrártörténeti Szemle* XLIII. évf. 3-4. sz. (573-574.)

**Fodor Zoltán** (2001): Frisnyák Sándor (szerk.): Az Alföldi történeti földrajza. In: *Agrártörténeti Szemle* XLIII. évf. 3-4. sz. (574-578.)

### 5.2. Publication in conference proceedings

#### 5.2.1 In Hungarian, complete

**Fodor Zoltán** (1997): A Kárpát-medence ártéri hagyományinak ökológiai szempontú értékelése. In: *III. Ifjúsági Tudományos Fórum 1997. március 19.* Pannon Agrártudományi Egyetem, Georgikon Mezőgazdaságtudományi Kar, Keszthely. (93-97).

**Fodor Zoltán** – Szuda Zoltán (1998): A víz szerepe a Békés-Csanádi-löszhát tájtörténetében. In: *A táj változásai a Kárpát-medencében.* A Nyíregyházán 1998. November 4-6-án megtartott tudományos konferencia kiadványa. Szerk.: Fülek György. [I.k.] Gödöllő. (207-212.)

- Fodor Zoltán** (2001): Az ártéri gazdálkodás fokai a Tisza mentén. In: *A földrajz eredményei az új évezred küszöbén. A Magyar Földrajzi Konferencia tudományos közleményei.* Szeged, 2001. októbere 25-27. CD kiadvány. Szeged, SZTE TTK Természeti Földrajzi Tanszéke. (10 o.) ISBN 963 482 544 3
- Fodor Zoltán** (2002): A magyarországi Tisza-szakasz egykori fokai kéziratok térképeken. In: *JUTEKO 2002 Konferencia.* CD-kiadvány. Tessedik Sámuel Főiskola Mezőgazdasági, Víz- és Környezetgazdálkodási Főiskolai Kar, Szarvas. 5. o.
- Fodor Zoltán** (2002): A Tisza menti fokok sajátosságai a XVIII-XIX. században. In: *A táj változásai a Kárpát-medencében. Az épített környezet változása. A Szent István Egyetemen Gödöllőn tartott tudományos konferencia kiadványa.* Szerk.: Füleky György. Környezetkímélő Agrokémiáért Alapítvány – Szent István Egyetem, Gödöllő. (79-84.)

### 5.2.2 In Hungarian, abstract

- Fodor Zoltán** – Szuda Zoltán (1998): A víz mint tájfenntartó elem a Békés-Csanádi-löszhát példáján. In: *Fenntarthatóság és vidék. 5. Közép-európai Tanácskozás. Gödöllő, 1998. Augusztus 27-28. Előadások és tömörítvények.* Pszicholingva, Szada. (34-35.)
- Fodor Zoltán** (1999): A kommunikáció szerepe a fenntartható ártéri táj kialakításában. In: *Környezet és kommunikáció. 6. Közép-európai Tanácskozás. Gödöllő, 1999. Szeptember 16-17. Tömörítvények.* Pszicholingva, Szada. (22-24.)
- Fodor Zoltán** (2001): Az ártéri gazdálkodás fokai a Tisza mentén. In: *Földrajzi Kutatások 2001. A Magyar Földrajzi Konferencia Szeged, 2001. október 25-27. absztrakt kötete.* Szeged, Szegedi Tudományegyetem TTK Természeti Földrajz Tanszéke, 2001. (50. o.) ISBN 963 482 543 5
- Fodor Zoltán** (2002): A magyarországi Tisza-szakasz egykori fokai kéziratok térképeken. In: *„J U T E K O 2002” „Tessedik Sámuel Jubileumi Tudományos Napok”.* Szarvas, 2002. augusztus 29-30. Előadások és poszterek összefoglalói. Tessedik Sámuel Főiskola Mezőgazdasági Víz- és Környezetgazdálkodási Főiskolai Kar, Szarvas. [Szerk.: Szabóné Dr. Komlószy Ildikó] (93-94. o.)
- Fodor Zoltán** (2002): A magyarországi Tisza-szakasz egykori fokai kéziratok térképeken. In: *JUTEKO 2002 Konferencia.* CD-kiadvány. Tessedik Sámuel Főiskola Mezőgazdasági, Víz- és Környezetgazdálkodási Főiskolai Kar, Szarvas. (1. o.)
- Fodor Zoltán** (2003): A területhasználati váltás lehetőségei a Tisza-menti árvédelmi rendszer fejlesztése jegyében. In: *Földhasználati és Területfelhasználási Fórum előadásainak összefoglalója.* Székesfehérvár, 2003. április 3-4. Szerk.: Dömsödi János. Nyugat-Magyarországi Egyetem Geoinformatikai Főiskolai Kar, Székesfehérvár. (98-99.)

### 5.2.3 In foreign language, complete

- Fodor Zoltán** (2002): Channels named „fok” indicated on manuscript maps along the bank of the Hungarian section of the Tisza River. In: *JUTEKO 2002 Conference.* CD. Samuel Tessedik College Faculty of Agricultural Water and Environmental Management, Szarvas. (p. 6 )

### 5.2.4 In foreign language, abstract

- Fodor Zoltán** – Szuda Zoltán (1998): Das Wasser als Grundelement landschaftlicher Nachhaltigkeit am Beispiel des Lössrückens Békés-Csanád. (p. 37-38) In:

*Nachhaltigkeit und landliche Raum.* 5. Mitteleuropäischer Workshop. Gödöllő, 27-28. August 1998. Vortragstexte und Kurzfassungen. Pszicholingva, Szada.

**Fodor Zoltán** (1999): Rolle der Kommunikation bei der Wiederherstellung von nachhaltigen Nasslandschaften in Ungarn. (p. 22-24) In: *Umwelt und Kommunikation.* 6. Mitteleuropäischer Workshop. Gödöllő, 16-17. September 1999. Kurzfassungen der Tagungsbeiträge. Pszicholingva, Szada.

**Fodor Zoltán** (2002): Channels named „fok” indicated on manuscript maps along the bank of the Hungarian section of the Tisza River. In: „*J U T E K O 20002*” „*Tessedik Sámuel Jubileumi Tudományos Napok*”. Szarvas, 2002. augusztus 29-30. Előadások és posztterek összefoglalói. Tessedik Sámuel Főiskola Mezőgazdasági Víz- és Környezetgazdálkodási Főiskolai Kar, Szarvas. [Szerk.: Szabóné Dr. Komlószy Ildikó] (95. o.)

**Fodor Zoltán** (2002): Channels named „fok” indicated on manuscript maps along the bank of the Hungarian section of the Tisza River. In: *JUTEKO 2002 Conference.* CD. Samuel Tessedik College Faculty of Agricultural Water and Environmental Management, Szarvas. p. 1

### **5.3. Book, paper**

#### *5.3.1 Book or extract in Hungarian*

**Fodor Zoltán** (2002): Az ártéri gazdálkodás. In: Hartman Mátyás (Szerk.): *Mezőgazdaság a természetvédelem szolgálatában.* Szaktudás Kiadó Ház, Budapest. (44-50.)



#### 5.4. Summary

| Type of publication                          |   | Points                             | Number of publications | Points gained |              |
|--|---|------------------------------------|------------------------|---------------|--------------|
|  |   |                                    |                        |               | <i>total</i> |
| <i>Publication in journals</i>               |   | <i>Min. 15</i>                     |                        |               | <i>28</i>    |
|  | Journal article without IF                                      | 5                                  | 4                      | 20            |              |
|  | Electronic publication, published in foreign languages, revised | 4                                  | 1                      | 4             |              |
|  | Other articles  | 2                                  | 2                      | 4             |              |
| <i>Publication in conference proceedings</i> |   | <i>Min. 15</i>                     |                        |               | <i>34</i>    |
|  | In Hungarian, complete  | 3                                  | 5                      | 15            |              |
|  | In Hungarian, abstract  | 1                                  | 6                      | 6             |              |
|  | In foreign languages, complete                                  | 5                                  | 1                      | 5             |              |
|  | In foreign languages, abstract                                  | 2                                  | 4                      | 8             |              |
| <i>Book, paper</i>                           |   | <i>Min. 0</i>                      |                        |               | <i>3</i>     |
|  | Book or extract in Hungarian                                    | 6/author's sheet, per book max. 30 | 1                      | 3             |              |
| <b>Total</b>                                 |   | <b>Min. 30</b>                     |                        |               | <b>65</b>    |