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OBJECTIVES AND RESULTS OF COMPLEX INVESTIGATIONS IN THE LANDSCAPE PROTECTION DISTRICT OF MÁRTÉLY (HUNGARY)

GY. BODROGKÖZY

Department of Botany, Attila József University, Szeged

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Abstract

The research work on the natural conditions in the landscape protection district of the central part of the Great Hungarian Plain was started with geobotanical mapping in 1950. More extensive researches were launched in 1957, and later coordinated complex investigations followed from 1977. The results of this latter period will be reported now in Vol. XVII of Tiscia.

In the frame of the water quality program, the oxygen budget, salt dynamics, and the changes of organic load, while in the line of hydrobiology, first of all the dynamics of obligate and facultative fecal bacteria were investigated. The zooplankton studies were concentrated on the analysis of rotatorian fauna from the aspect of saprobiology. The seasonal investigation of phytoplankton revealed the increase of Euglenophytes in the eutrophyzed backwaters, therefore, these were qualified as indicator organisms.

In zoocenological respect, it could be stated that following the floods of the Tisza, the flood-plain is recolonized from external areas, which takes place in two steps. In the immigration phase, the initial increase of population is saturational, in the multiplication one it exhibits logistic growth. The observations were extended over some invertebrate groups, namely mollusks, butterflies and the family of Cerambycidae. Ichthyological ornithological and mammological investigations were also carried out.

In the frame of the phytocenological, synecological and ecological program, principally those changes were investigated which were caused by floods of different durations in the aquatic plant communities of the flood-plain, the marshy plant communities on alluvial soil, the plant communities of marshy meadows and mud weed vegetation. Correlation was sought between hese changes and other complex ecological effects.

Introduction

The ever increasing culture effects have produced enormous changes in the original features of the ancient landscape of the Tisza river. In the course of activities in the interest of satisfying the growing demand for arable land of the developing human society, the realm of marshy tracts of the Great Plain has disappeared. The regulation of the channel of the Tisza with short-cuts transformed and impoverished the biocenoses of groves and meadows in the flood basin. Thus, gradually, culture forests and plough fields began prevailing in this region, too. The rapid progress in economic field, however, cannot exclude the necessity resp. recognition of the urgent demand to protect, maintain and if possible reconstruct smaller or larger areas of a characteristic landscape and their original biota.

For the realization of that, a governmental regulation (No. 23 (1962) VI. 17)

was issued to effectuate the Act of Environmental Protection passed in 1961 under No. 28. On the basis of the authorization contained in this regulation the 2.760 ha area in the region of Hódmezővásárhely was declared Landscape Protection District. This is the second area allocated to function as an open-air museum in our country.

The southern boundary of this district is the Sas-ér known principally for its bird reservation. It had been placed under protection earlier. To the east the area reaches its western boundary the line of the Tisza river along the Mártély backwater. The flood-plain inside the protecting dykes comprises diverse landscape sections despite the fact that a considerable part of the area had been planted with American poplar species and ash earlier, some 30—40 years ago. After the final utilization of these woods will start the reconstruction of the original oak-ash-elm groves and willow-poplar woods.

In the course of the regulation of the river, two holms formed in this area. These are surrounded by the Tisza itself and its backwaters. The less affected of the two is the Körtvélyes holm, while the Ányás holm is most exposed to culture effects.

Development and state of ecological conditions in the district

The compilation of general information in connection with this topic (ANDÓ, BODROGKÖZY and MARIÁN 1974) provides a very comprehensive survey both in theoretical and practical respects. According to this work, the more elevated parts of this area has been inhabited by man since the stone age. Several relics of prehistoric pottery have been recovered here. The finds from the bronze age are suggestive of an inhabitation of great number. For these inhabitants and the dwellers of following periods, the water-beaten areas of this region secured excellent natural protection. Notwithstanding, of the settlements formed here in the course of historic periods, only the village Mártély exists now (sketch map). Kórhány and Körtvélyes (Courtuleous by its old name) were destroyed. Such denominations as Lake Hattyas (inhabited by swans), Sas- (eagle-) brook, Lake Gémes (inhabited by herons), Keselyés- (-vulture) Brook etc. extant from the documents of the XII. century are indicative of a very rich ancient avifauna in the marshy tracts, reeds and fisheable water bodies of this region.

In this area, the erosion and sediment-formation of the Tisza has equalizingly affected the environment. In the flat parts in some places thinner or thicker sand layers were formed producing areas rich in various surface forms as river valleys, buried or filling backwaters and other water courses.

The developing of its biota can be traced back to several thousand years. The prehistoric animal remains of the middle reach of the Tisza refer to nearly 600 million years. Let us think of the evidences from the Pleistocene *Elephas primigenius, Rhinoceros antiqualis, Eurycesmegaceros, Alces alces* etc. The flora and fauna of this region transformed gradually by natural geographic changes can be followed up to the present day. It was, how-ever, the anthropogenic effects that have caused the greatest changes leading to the degradation and empoverishment of the environment. Nevertheless, we are in the lucky position of still having things to protect or reconstruct, and for this the necessary spiritual and financial foundations are secured. The research program executed in the valley of the Tisza and consequently also in our landscape protection district since 1950 serves for the realization of these objectives.

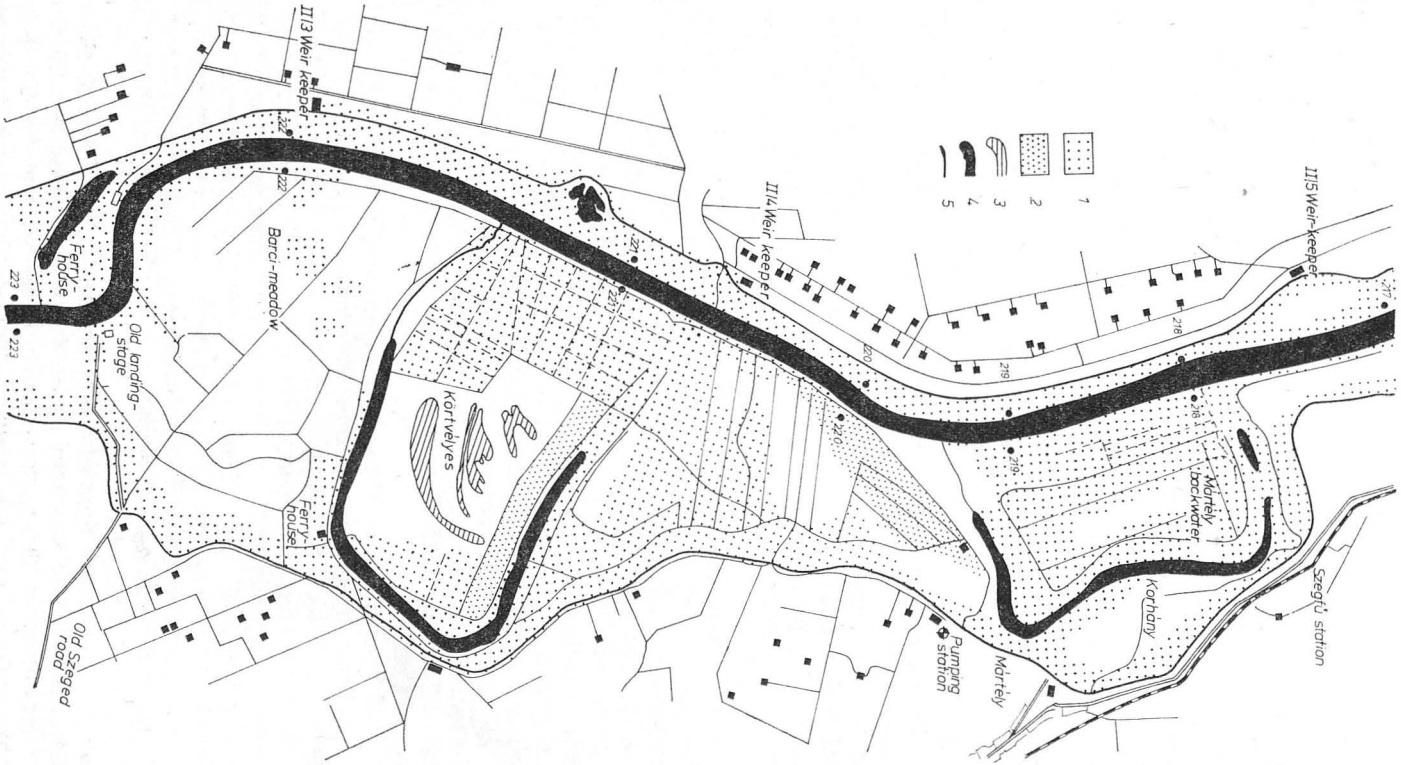

Fig. 1. Sketch map of the Landscape Protection District at Mártély. 1. Willow-poplar gallery forests and culture poplar forests in the flood-plain. — 2. Grape and fruit cultures perished on the effect of the lasting flood in 1970. — 3. Remainders of older backwaters. — 4. Younger backwaters. — 5. Protecting dyke (The boundary of the Landscape Protection District).

Brief survey of the results of the complex investigations in the district

The research works sponsored and supported by the Hungarian Academy of Sciences started with the mapping of the flora in the region of Szolnok and Szeged. From zoological point of view the ornithological studies in the Sas-brook area in this period deserve mention.

More extensive investigations in the various sections of the valley of the Tisza, particularly in the area of the landscape protection district, have been carried out since 1957. Several scientific and popular reports appeared from the field of natural geography, water chemistry, hydrobiology, botany resp. zoology. Excellent possibility for publication has been secured by our journal entitled Tiscia which has been published annually in foreign language since 1965.

Results of the last plan period

1. The hydrochemical program comprised principally the investigation of the changes of water quality in the Körtvélyes backwater. In the course of that studies on oxygen budget, salt dynamics, and the seasonal changes of pollution load were performed. These studies yielded valuable ecological information for the solutions of hydrobiological tasks. The changes of the chemical conditions of water were established and the processes of nutrient enrichment revealed. During these investigations allowance was made also for the flushing effect of the floods of the Tisza.

The results showed that compared with the conditions established in the previous plan period, the quality of water in the Körtvélyes backwater has not exhibited essential changes during the last four years. (In these studies the coworkers of the Directorate of Water Conservancy of the Lower Tisza Region participated.)

2. In the frame of hydrobiological studies, the hygienic bacteriological investigations were extended over the Mártély and Körtvélyes backwaters. On the basis of seasonal analyses conclusions could be drawn concerning the quantitative and qualitative relationships of obligate and facultative fecal indicator bacteria as well as the spatial and temporary changes of occasional bacterial pollution on the basis of 910 examinations on 202 samples. (Collaborators in these investigations were the members of the Tisza Research Team of the Station of Public Health and Epidemics of Csongrád Comitat.)

In the frame of zooplankton studies, sampling and processing of samples were performed continuously for 6 years. These investigations yielded new information in connection with the qualitative and quantitative seasonal changes of the food basis of fish in the backwaters. The results showed that species of Rotatoria dominated both in respect of species and individual numbers. They were found to have two maxima with values of 65 resp. 75 ind. $10\ lit^{-1}$. From saprobiological aspect, water quality deteriorated during summer because the beta- and alpha-mesosaprobic organisms increased in number parallel with the changes of hydrological properties (Collaborator in this work was one of the members of the Zoological Department of Attila József University, Szeged).

Phytoplankton. The algal flora of the backwaters of the Tisza at Mártély and Körtvélyes was investigated in several cycles. It could be stated that the water of both had become eutrophic. This pertains mainly to the backwater of Körtvélyes. Here, namely, the number of species belonging to Euglenophyta was relatively great

and this is suggestive of the presence of fertilizing materials originating from external sources. The changes of the single algal communities were also studied. The presence or absence of some species namely were evidences that the particular algae are capable of utilizing not only mineral salts but also amino acids, carbohydrates, vitamins and plant hormones from the decomposing organic substances. This sould be also considered when establishing the indicator values for the single algal communities. Saprobity and trophity are connected not only by that the mineralization of organic materials causing saprobic conditions increase the degree of trophity but also by the ability of certain algal species to incorporate directly some of the organic materials. This partial heterotrophy can exhibit differences within one species, namely, there can be some kind of selectivity, as well.

In view of the above facts, it will be possible to form a more real and better judgement in connection with the role of algal species as indicator organisms in the field of biological water qulification as well as the food chain. (Collaborators in these investigations were the external coworker of the Department of Plant Physiology of Attila József University and our coworkers working at the Laboratory of the Directorate of Water Conservancy of the Lower Tisza Region.)

Zoocenological studies. The flood waves affecting the floodplain of the Tisza are at the same time the causes of the perturbation of epigeic animal communities. The catastrophe theory was used as model in its analysis. It could be stated that in the flood plain, the recolonization from external areas takes place in two steps. During the phase of immigration, the size of the initial population is of saturation type, in the phase of multiplication the growth of the original population is logistic. The possibilities for the shaping and the ratio of these two steps are the function of the migration bias of recolonizing populations and the strategy of growth of their propagulums. Namely, if we regard a flood as a typical ecological perturbation, then according to the scheme of "fold" catastrophe the following properties can be considered as ecological perturbation:

(a) Perturbation must be decreased to a level which is much smaller than the effect that causes dramatic changes in community structure at x_1 threshold value, to make it possible for the system to return to its original condition.

(b) Another threshold can also develop, from which there is no return to the positive range and this corresponds to irreversible perturbation. (Members of the Tisza Researches Team of the Zoological Department of the Attila József University participated in these studies.) Investigation of the cenoses of Mollusca in the flood-plain.

During the comparative studies of aquatic and terrestrial molluscs, their seasonal dynamisms was investigated from faunistical and ecological viewpoints. Evaluation of the species collected and identified from 21 sampling places pointed to the impoverishing of the terrestrial cenoses. Two factors gave grounds for that. Firstly, in the lower-lying parts of the flood-plain, the flushing through process of floods takes place often on 2—3 occasions during one year (Fig. 2). This is well indicated by the low values of diversity. On the other hand, there is perturbation of anthropogenic origin, too. Otherwise the composition of the molluscan communities of the original forest stands in the flood-plain correspond to those in the other parts of the valley of the Tisza.

In the Körtvélyes backwater, the survey of molluscan communities was performed in the light of the successional situations of the zonally arranged hydato- and helophytic communities (In these investigations the coworker of the Biological Department of Gy. Juhász Teachers Training College collaborated).

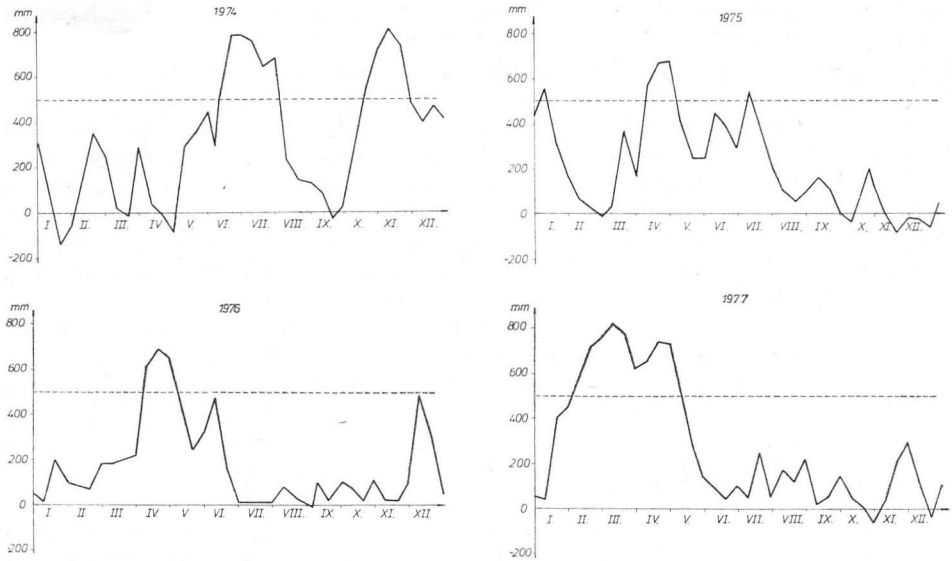

Fig. 2. Time and lastingness of floods in the area of the Landscape Protection District between 1974 and 1977. (The area was inundated at a water-gauge level above 500 mm)

As a result of the investigations on the butterfly fauna, we could report the occurrence of macro lepidopterans on the basis of specimens collected by various methods in the period between 1971 and 1980. The fauna list composed contains more than 2.600 captured and identified specimens. Parallel with that, comparison was made between the dominant species of materials collected by means of light-traps during one year at Mártély and those at Körtvélyes. The occurrence at Mártély of the rare owletmoth without zoo-geographical classification (Gorthyna borelli lunata (Pierret)) deserves mention here (The amateur lepidopterist of our working team collaborated in these investigations).

During studies on Cerambycidae the species of this family feeding on *Salix alba* were surveyed in the Körtvélyes holm from 1974 to 1980. 25 species with this food plant were identified. Most of them develop in brushwood. In connection with their ecological demands, it was stated that the conditions for the development of xylophagous species of Cerambycidae are critical in this area. In both the larval and the pupal stages of development, they are protected from flood, this protection is, however, far from being complete. The recurring high flood stage selects principally those species of Cerambycidae which live on dead *Salix* stems and cannot fly and for which several years are necessary to develop.

It was also stated that the phytoncydes of *Salix alba* represent an excluding factor for certain species. From practical point of view, monoculture-type *Salix alba* stands can be said as favourable, because these exempt the other planted culture forests from infections of such type.

Special mention should be made here of the rare *Molorchus salicola* (STILLER) and *Phymatodes puncticollis* (MULS.) found in this area (The biologist of F. Móra Museum collaborated in this work).

Ichthyology. The survey of fish species found in the backwaters of this area has been finished in the course of the last 4 years. In 1976 31, in 1981 29 fish species

figured in the fauna list. The feeding habits and food composition of pike and pike-perch in the Tisza were cleared. These studies also provided information in connection with the effect produced by recurrent floods on fishes (Fig. 2). The spread of *Esox lucius* can be related to the more than one flood period during February and March, and the high individual numbers of *Albanus albanus* and *Rutilus rutilus* (In this work one of the teachers of the G. Dózsa Special Secondary School participated).

Ornithological studies in our area were carried out in several directions. The results of the analyses of the food samples from young (1-2-week-old) blue tit and tree-sparrow in the nesting box colony in the forests of Körtvélyes holm collected at 2 h intervals by means of ligular resp. neck-ringing methods may command special interest. Correlation was found between the percentual ratio of nesting box dwellers and the occurrence resp. absence of high-water period to the advantage of the former. — The survey of the avian fauna was also continued. Correlation was sought between the frequency of the floods of the Tisza and the nesting bird stand, resp. the qualitative and quantitative changes of bird migration. The share of Passeriformes stands in the circulation of materials and energy cycle of this area was demonstrated on the basis of the biomass of bird species (Participants in these studies were one research worker and the coworkers of Gy. Juhász Teachers Training College resp. F. Móra Museum).

The mammological studies were focussed principally on the effect of floods on the population of *Talpa europaea*. The observations were extended both over the flood-plain and the protecting dyke. It could be stated that in the soil under water cover the moles are unable to live. During flooding the protecting dyke secures protection for these animals. Regeneration can occur depending on several ecological factors and in different measure (Collaborator in this work was the mammologist of Gy. Juhász Teachers Training High School).

Phytocenology-synecology. Investigations in his line were performed in our landscape protection district for more than 10 years. The objectives of these studies were to analyze in detail the plant communities from phytocenological aspect and their phytomass production. The single associations were investigated from the aspects of environmental biology, soil ecology and hydroecology.

Results:

(a) The results showed that owing to the low geographic level of the area, its phytocenoses are quantitatively poorer than those in the other areas of the valley of the Tisza. The stands of hydatophytes in the backwaters of different ages were rather rich. The introduction of herbivorous silver carp, however, completely exterminated them. Now, after the fish have been caught, their return is in process. On the other hand, the meadow communities of helo- and hygrophytes in the flood plains are most diversified.

(b) Follow up studies in connection with the investigation of the phytomass production and seasonal changes of the three most frequent marshy meadow stands were performed for a number of years.

(c) The survey of changes occurring as a result of lasting water cover formed an independent topic. The stands of *Typhoides arundinacea* proved to be the most sensitive. — Other species were found to be sensitive to light. The shading effect of the *Populus alba* stands, especially in the north-west shade zone, was not tolerated by *Glycyrrhiza echinata,* and only in a small measure by *Lythrum salicaria.* This suggests from ecological point of view that light conditions are the most effective in the early morning hours.

(d) From synecological aspect one of the most important tasks was to determine the hydroecological adaptability of the species of the single associations. By working up the material collected during the phytocenological investigations along the Tisza river for 30 years (which was complemented with materials from other areas of our country) it was possible for us to further develop and complement the hydroecological system constructed by ELLENBERG and ZÓLYOMI et al.

References

ANDÓ, M. (1974): Regional ecological conditions of the Region-Conservation District at Mártély—Körtvélyes — T(Sz)$^{+}$, Aek^{++} *9*, 159.

ANDÓ, M. (1975): Areal ecological conditions of the Region-Conservation District at Mártély—Körtvélyes. — T (Sz) Aek. *10*, 94—95.

ANDÓ, M., BODROGKÖZY, GY. and MARIÁN, M. (1974): A Mártély—Sasér Tájvédelmi Körzet társadalmi hasznosításának biológiai és természeti földrajzi alapjai pp. 1—103+120 melléklet (Kéziratos pályamű) (Biological and naturalgeographical bases for the social utilization of the Landscape Protection Area at Mártély—Sasér pp. 1—103+120 enclosures (Competition essay in manuscript) (in Hungarian).

BÁBA, K.: (1982): Comparative faunistic and oecological investigations into the land-mollushe of the Körtvélyes reservation area. — T(Sz) Aek. *17*.

BELICZAY, I. (1975): Reconstruction of the naturel conservation district Mártély. — T(Sz) *12*, 77—84.

BERETZK, P. (1962): A körtvélyesi Tisza-holtág tavasszal (The backwater of the Tisza at Körtvélyes in spring). — Term. Tud. Közlem. 163—165. (in Hungarian).

BODNÁR, B. (1928): Hódmezővásárhely és környékének régi vízrajza (The old hydrography of Hódmezővásárhely and its environment). — Szegedi Alföld L. Biz. Kiadv. Szeged (in Hungarian).

BODROGKÖZY, GY. (1973): Természetvédelem Csongrád megyében (Nature conservation in Csongrád County). — Csm. Tanács Term.-véd. Biz. Kiadv. Szeged *1*, (in Hungarian).

BODROGKÖZY, GY. and HORVÁTH, I. (1974): Production examinations on the hayfields of the Mártély—Körtvélyes Region-Conservation District. — T(Sz) *9*, 164—165.

BODROGKÖZY, GY. and HORVÁTH, I. (1977): Study of the indicator role of plant populations of marsh-meadows along the Tisza in the water-household of the inundation area at Körtvélyes. — T(Sz) *12*, 65—70.

BODROGKÖZY, GY. and HORVÁTH, I. (1978): Connection between stock-structure and organic matter production in the marshlands of the flood-plain at Körtvélyes. — T(Sz) Aek. *13*, 180.

BODROGKÖZY, GY. and HORVÁTH, I. (1979): Effect of lasting floods on the species composition and organic matter production of the marshy-meadow lands in the flood plains of the Tisza. — T(Sz) Aek. *14*, 87—88.

BUGYI, I., CSIZMAZIA, GY., GORZÓ, L., HAVRANEK, L. und KOLOSVÁRY, G. (1965): Weitere Untersuchungen über die Entwicklung der Fauna des Tisza-Tales. — T(Sz) *1*, 81—92.

CSIZMAZIA, GY. (1962): Die ökonomische Bedeutung der Karnivoren Vögel der Inundations-Wälder. — Acta Biol. Szeged.

CSIZMAZIA, GY. (1972): Adatok az emlősök biokorróziójához a Szeged környéki árvízvédelmi töltéseken az 1970. évi árvíz idején (Data to the biocorrosion of mammals on the protecting dyces in the environment od Szeged during the flood of 1970). — Alsó-Tiszavidéki nagy árvízvédekezés 1970. VIZDOK (In: Vol. entiled "Alsó-Tiszavidéki nagy árvízvédekezés" 1970).

CSIZMAZIA, GY. (1973): On the mammalian fauna of the Landscape Protection District of Mártély—Körtvélyes. — T(Sz) Aek. *8*, 8.

CSIZMAZIA, GY. (1980): A Tisza magyarországi hullámterén végzett mammalológiai-ökofaunisztikai vizsgálatok. I. (Mammological and ecofaunistical investigations in the flood-plain of the Hungarian section of the Tisza). — J. Gy. Tanárképző Főisk. Tud. Közlem. Szeged, 1980.

CSIZMZAIA, GY. (1974): The mammalian fauna of the Region-Conservation District at Mártély—Körtvélyes. — T(Sz) Aek. *9*, 168.

CSIZMAZIA, GY. (1975): Mammalian associations in the Region Conservation District at Mártély—Körtvélyes. — T(Sz) Aek. *10*, 100—101.

CSIZMAZIA, GY. (1978): A contribution to the behaviour of *Talpa europaea,* living in the flood plain, during the flood. — T(Sz) Aek. *13,* 210—211.
CSIZMAZIA, GY. (1982): Die Wirkung des Hochwassers der Theiss auf die Population der Maulwürge *(Talpa europaea* L.) im Inundationsraum bei Körtvélyes (Ungarn). — T(Sz) *17.*
DOBLER, L. MRS. and HEGEDÜS, M. (1978): Data on the water quality of the Tisza dead-arms in the Region Conservation District at Mártély—Sasér. — T(Sz) Aek. *13,* 177.
DOBLER L. MRS. and KOVÁCS, K. (1982): Biological wajer quality in the Mártély and Körtvélyes backwaters of the Tisza from 1976 to 1980, with special regard to phytoplankton changes. — T(Sz) Aek. *17.*
DOSZTÁL, I. (1975): Some data on water-bug species of the flood plains of the Dead-Tisza at Körtvélyes and the Double-Körös. — T(Sz) Aek. *10,* 106—107.
EGYED, B. (1979): Investigation of the problems of land use and environmental protection in the area of the Mártély Region of Scenery Protection. — (Thesis in Hungarian, submitted to the Univ. of Agric. Sci) Gödöllő.
FARKAS, Á. (1972): Jelentés a Tisza körtvélyesi holt ága halainak vizsgálatáról (Report on the investigation of the fish fauna in the backwater of the Tisza at Körtvélyes) (Manuscript) (in Hungarian).
FARKAS, Á. (1975): Pisces fauna of the Tisza dead-arm at Körtvélyes. — T(Sz) Aek. *10.*
FARKAS, Á. (1977a): Pisces fauna of the Tisza dead-arm at Körtvélyes. — T(Sz) *12,* 101—108.
FARKAS, Á. (1977b): Ecological relations of fish stand of Körtvélyes dead-Tisza after the appearing of phytophagous fish. — Timely questions of fish greeding in natural waters in Hungary, Summaries 4.
FARKAS, Á. (1978): Experiences of the fish destruction at Körtvélyes the appearance of the herbivorous fishes and the ecological relations of their role. — T(Sz) Aek. *13,* 181—182.
FARKAS, Á. (1982): Ichtyological relations of Körtvélyes dead channel in Mártély landscape protection area. — T(Sz) *17.*
FÜGEDI, K. and HORVÁTH, M. (1982): Water quality in Körtvélyes backwater. — T(Sz) *17.*
GÁL, D. (1974): Zooplancton of the Dead-Tisza at Körtvélyes in 1972. — T(Sz) Aek. *9,* 165—166.
GÁL, D. (1978): Some characteristics of the zooplankton of the Tisza deas arm at Körtvélyes. — T(Sz) Aek. *13,* 179.
GÁL, D. (1982): Comparative zooplancton investigations in the dead reach of the river Tisza. — T(Sz) *17.*
GALLÉ, L., GYÖRFFY, GY. and HORNUNG, E. (1982): Flood as an ecological perturbation of epigeic animal communities. I. Some preliminary hypotheses on the application of catastrophe theory by evaluating some Mártély—Körtvélyes data. — T(Sz) *17.*
GASKÓ, B. (1979): Adatok a Szeged körtöltés melletti erdősáv Cerambicidai faunájához (Data to the Cerambycida fauna of the forest belt at the Szeged dyke. — Móra F. Múz. Évk. 1979.
GASKÓ, B. (1982): Cerambycid beetles developing on the willom Salix alba in Körtvélyes. — T(Sz) *17.*
HARKA, Á. (1972): The composition of fish stand in living Tisza. — Halászat *18,* 22—25. (in Hungarian).
HEGEDÜS, M., FODRÉ, Zs. and ZSIGÓ, M. (1980): Hygienic bacteriological investigations in the Tisza reaches between Csongrád and Szeged. — T(Sz) *15,* 35—44.
HEGEDÜS, M. and ZSIGÓ, M. (1982): Hygienic bacteriological investigations of the backwaters at Mártély and Körtvélyes. — T(Sz) *17.*
HORVÁTH, I. and BODROGKÖZY, GY. (1975): Connection between stockstructure and organic-matter production in the marshy meadows in the Tisza flood-plains at Körtvélyes. — T(Sz) Aek. *10,* 105—106.
HORVÁTH, I. and BODROGKÖZY, GY. (1977): The association conditions of the peat bogs in the flood-plain as a result of a lasing flood in the district of Körtvélyes. — T(Sz) Aek. *12,* 151.
KISS, I. (1976): Comparative algological investigation in to the dead arms of the Tisza at Mártély and Körtvélyes. — T(Sz) Aek. *10,* 150—151.
KISS, I. (1977a): Investigation of the water blooms of *Eudorina elegans* in the dead-arm of the Tisza at the community Mártély. — T(Sz) *12,* 37—48.
KISS, I. (1977b): Variability of *Scenedesmus ecornis* (RALFS/CHOD.) inthe dead-arm of the river Tisza at Körtvélyes. — T(Sz) *12,* 49—56.
KISS, I. (1977c): Comparative algological investigation into the dead arms of the Tisza at Mártély and Körtvélyes. — T(Sz) *12,* 150.
KISS, I. (1982): The algal flora and its seasonal asoects in the Körtvélyes and Mártély bacjwaters of the Tisza (Central Hungary). — T(Sz) *17.*
KOLOSVÁRY, G. (1966): Die Opilioniden des Reservates Sasér bei der Theiss. — T(Sz) *2,* 121.
KOVÁCS, S. T. (1982): Data to the knowledge of Lepidoptera fauna at Mártély—Körtvélyes, environment protection area. I. — T(Sz) *17.*

LÁNYI, B. (1915): Csongrád megye flórájának előmunkálatai (Preliminary studies on the flora of Csongrád County). — Magyar Bot. Lapok *13,* 232—274.
MAGYAR, L. (1977): The role of artificial nesting boxes in winter in the aspen plantation of the flood-plain of the Tisza-stretch at Körtvélyes. — T(Sz) Aek. *12,* 152.
MAGYAR, L. (1978): Nutrition biological investigations in the artificial nestringbox colony of the forests in the flood plain at Mártély—Körtvélyes, Paris farmstreat. — T(Sz) Aek. *13,* 200—201.
MAGYAR, L. (1982): Feeding ecological investigations in the district of the nature conservation-area Mártély—Körtvélyes. — T(Sz) *17.*
MARIÁN, M. (1963): A Közép-Tisza kétéltű és hüllő világa (Amphibians and reptilia of the middle section of the Tisza river). — Móra F. Múz. Évk. 207—231.
MARIÁN, M. and PUSKÁS, L. (1982): Ecological and quantitative relations of the bird community in the holm Körtvélyes. — T(Sz) *17.*
MÓCZÁR, L. and GYÖRFFY, GY. (1982): Quantitative and qualitative data on the flying insect communities on the Körtvélyes inundation area. — T(Sz) *17.*
POKOMÁNDY, GY. (1890): Hódmezővásárhely természeti leírása (Description of the nature at Hódmezővásárhely) (manuscript in Hungarian).
SZEREMLEI, S. (1900): Hódmezővásárhely története I—V. Kiadta a város közönsége.
STERBETZ, I. (1974): Die Vogelwelt der Reservate des Überschwemmungsgebietes der Theiss bei Hódmezővásárhely (in Hungarian). — Aquila 1971—1972, 45—79.
STERBETZ, I. (1977): The rook *(Corvus frugilegus* L.*)* (1758) in the nesting community of the heronry at Sasér. — T(Sz) *12,* 141—144.
STERBETZ, I. (1980): The flood basis of rooks *(Corvus frugilegus* L.*)* (1758) wintering in the nature reserve at Mártély and Sasér. — T(Sz) *15,* 125—130.
SZITÓ, A. (1974): Quantitative and qualitative study of Chironomida larvae on the section of the Tisza between Tiszafüred and Kisköre. T(Sz) *9,* 83—86.
TANÁCS L. (1975): The Apoideae of the dams of Mártély—Körtvélyes and Tiszasziget. — T(Sz) Aek. *10,* 107.
TANÁCS, L. (1979): Regeneration of the Apoidea insect fauna in the flood area, as a function of the ecological conditions. — T(Sz) *14,* 175—185.
TANÁCS, L. (1979): Protected areas of the flood plain of the Lower-Tisza region, theire Apoidea insect population and the connections of these with nutritive plants. — T(Sz) Aek. *14.*
UHERKOVICH, G. (1967): Über die Sommerplankton des Altwassers von Mártély. — T(Sz) *3,* 13—20.
Országos Természetvédelmi Tanács (1951): Határozat Sasér természetvédelmi területté nyilvánításáról (Decision declaring the Sasér a nature conservation area in Hungarian).
Országos Természetvédelmi Hivatal (1971): A mártélyi és hódmezővásárhelyi Tisza-hullámtér tájvédelmi körzetté nyilvánító határozata (Decision declaring the flood-plain sections of the Tisza at Mártélya and Hódmezővásárhely nature conservation areas) (manuscript in Hungarian).

A Mártélyi Tájvédelmi körzet komplex kutatási feladatai és eredményei

BODROGKÖZY GY.

A József Attila Tudományegyetem Növénytani Tanszéke
Szeged, Magyarország

Kivonat

A Magyar Alföld középső szakasz tájvédelmi körzetének kutatása 1950-ben vette kezdetét a szervezett vegetáció-térképezés megvalósulásával. A szélesebb alapokon nyugvó program 1957 óta, összehangolt komplex jellegű munkálatai 1977 óta folynak. Ezen utóbbi időszak eredményei a Tiscia XVII. kötetében látnak most napvilágot.

A hidrológiai program keretében a holt ágak vizének oxigénháztartásával, sódinamikájával, illetve szennyeződés mértékének változásával foglalkozunk. — Hidrobiológiai vonalon elsősorban az obligát- és fakultatív faecal baktériumok dinamikájára, zooplankton vonatkozásában főleg a Rotatoria fajok szaporodás-biológiai nézőpontból történő elemzésére terjedtek ki. — A fitoplankton szezonális változásának értékelésénél az eutrofizálódott holt ágak vizében az Euglenophytonok elszaporodása volt konstatálható s ezek indikátor szervezeteknek minősültek.

Zoocönozisai vonatkozásában megállapítható volt, hogy a Tisza áradásai után külső területekről történik a hullámtér rekolonizációja, mégpedig két lépcsőben. Az inmigrációs fázisban az iniciális populáció nagysága szaturációs. — A megfigyelések kiterjedtek a Mollusca cönozisok, továbbá a Lepidopthera, Cerambicida fajcsoportokra egyaránt. Folytak továbbá ictiológiai, ornithológiai és mammológiai vizsgálatok is.

A fitocönológiai-synökológiai produkcióbiológiai program főleg a hullámtér vízi-, öntéstalajú mocsári-, mocsárréti valamint iszapgyomnövény társulásokra összpontosult. Összefüggést keresve az eltérő időtartamú áradások és egyéb környezetbiológiai változások komplex jellegű hatásával is.