

PISCES FAUNA OF THE TISZA DEAD-ARM AT KÖRTVÉLYES

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(Received July 26, 1976)

Abstract

There are published here the results of the qualitative and quantitative investigations into the fish population in one of the most valuable Tisza dead-arms of the Southern Great Plain in Hungary. Data are published on the quantitative relations of young fish and the author is dealing with the problems endangering the fish population of the dead-arm.

Introduction

The Tisza dead-arms, having taken shape in the course of the Tisza regularization, belong to the characteristic surface formations of the Southern Tisza basin. Among these, one of the most valuable arms is the Dead-Arm at Körtvélyes which — as a part of the Nature Conservation District at Mártély — is one of the main areas investigated by the Tisza Research Working Committee. The faunal fact-finding has already been performed concerning most groups of animals. The faunal and ecological investigation of the fish population in the dead-arm at Körtvélyes came to an end in the recent past. A brief summing up of the results of this is given below. It is all the more justified to publish these results because there are already some publications about the fish of the lower Tisza region both from the older zoological literature (CZIRBUSZ 1884; HERMAN 1887) and among the recent zoological publications (FERENCZ 1965; MARIÁN 1971) but concerning the fish fauna of the dead-arms belonging to the Tisza there was issued no publication, as yet.

Natural conditions

The Tisza dead-arm at Körtvélyes lies on the left bank of the river, 30 km north of Szeged, at the stretch between river-km 201 and 203. It is a 5 km long horseshoe lake of 300—300 m average breadth. The depth of water is, after the recession of the inundation waters, 70 to 100 cm, at a distance of 1 m from the riverside; in the deepest parts of the bed it reaches even 2,5 m.

At the edge of the bed, in a breadth of 1 to 3 m, a 20 to 50 cm thick silt-layer sank down to the bottom. There are, however, also some reaches where no silt can be found at all.

The dead-arm gets into direct touch with the Tisza on one or two occasions a year, due to the inundations: in May and June owing to the green flood, in the months September and October owing to the so-called leafy or autumn flood. On the occasion of the green flood, the fish population of the dead-arm refresh themselves. After the water receded to its bed from the inundated area, the fish that have got here from the river and owing to the recession no more can get back into the Tisza, save themselves by swimming to the dead-arm or into the adjacent borrowing pits.

The spawning-season of the species of the Cyprinidae family agrees with the time of appearance of the green flood. The young fish hatched out in the inundated area find protection and favourable essential conditions in the dead-arm. In Summer these individuals grow stronger and later, at the autumn inundation they get back to the Tisza. The role of the dead-arm at Körtvélyes is therefore important for the fish-fauna of the Tisza both in respect of spawning and in that of breeding the young.

The pH value of the water in the dead-arm agrees with that in the Tisza, their content in polluting matter is similar, as well. (The degree of the pollution of its water is, however, increased in the summer months by the water pumped from the rice-fields and drained through the dead-arm into the Tisza). Its oxygen-content is favourable (5—6 cm³/l) for the fish. I have not observed any eutrophization-induced fish-destruction.

Vegetation of the dead-arm

Phragmites communis, *Lythrum salicaria*, *Lythrum virgatum*, *Salvinia natans*, *Potamogeton* species, *Hydrocharis morsus-ranae*, *Trapa natans*, *Spirodela polyrrhiza*, *Wolffia arrhiza*.

In the zooplankton stock, except for April, the Rotatoria-species are dominant. Protozoa and Entomostraca take place in medium species- and individual numbers (GÁL 1975).

In the summer months, the quality of water is deteriorated. In August it is the worst. Then the number of the oligo-beta mesosaprobic species decreased to 32,7 per cent. Instead of them, beta-alpha mesosaprobic species appeared in a larger individual number (27,8 per cent). The maximum of the increase in zooplankton-number is in May but a lower maximum can be observed in September, as well.

From the bird-species feeding on fish living in the water of the dead-arm the following are most frequent: *Egretta garzetta*, *Ardeola ralloides*, *Larus argentatus*, *Ardea cinerea*, *Nycticorax nycticorax*.

My investigations were performed with the help of fishers. In the Autumns of 1973—1974 and 1975, I investigated the fish population with the assistance of fishers being active in that district, on the occasion of the finishing act of fishing. This act was carried out with fish-traps.

I assorted the fish according to their species and frequency.

In laying down a map of the fish-fauna, I was helped by my fishing equipment, as well.

Acipenser ruthenus LINNÉ. It does not spawn in the dead-arm. Its individuals getting in by the flood are rare and are not longer than 20 cm. It prefers the muddy, deep places. The dead-arm is not favourable for it for want of food and because of the water quality.

Esox lucius LINNÉ. There occur even individuals of 4—5 kg. This water is very favourable for its young, too, because the large number of young fish mean sure food for them.

Table 1. Fish-species of the dead-arm at Körtvélyes

Family	Fish-species	Frequency of occurrence
<i>Acipenseridae</i>	<i>Acipenser ruthenus</i> LINNÉ	+
<i>Esocidae</i>	<i>Esox lucius</i> LINNÉ	+++
<i>Cyprinidae</i>	<i>Rutilus rutilus</i> LINNÉ	++++
	<i>Leuciscus cephalus</i> LINNÉ	+
	<i>Leuciscus idus</i> LINNÉ	+
	<i>Scardinius erythrophthalmus</i> LINNÉ	++
	<i>Aspius aspius</i> LINNÉ	+++
	<i>Tinca tinca</i> LINNÉ	+
	<i>Gobio gobio</i> LINNÉ	+
	<i>Barbus barbus</i> LINNÉ	++
	<i>Alburnus alburnus</i> LINNÉ	+++
	<i>Blicca bjoerkna</i> LINNÉ	+++
	<i>Abramis brama</i> LINNÉ	++++
	<i>Abramis ballerus</i> LINNÉ	+++
	<i>Pelecus cultratus</i> LINNÉ	++
	<i>Rhodeus sericeus amarus</i> BLOCH	+++
	<i>Carassius carassius</i> LINNÉ	++++
	<i>Carassius auratus gibelio</i> BLOCH	+
	<i>Cyprinus carpio m.hung.</i> HECKEL	+++
	<i>Cyprinus carpio m.acuminatus</i> HECKEL	+++
	<i>Hypophthalmichthys molitrix</i> VALENCIENNES	+
<i>Siluridae</i>	<i>Silurus glanis</i> LINNÉ	+
<i>Amiuridae</i>	<i>Amiurus nebulosus</i> LE SUEUR	++
<i>Anquillidae</i>	<i>Anquilla anguilla</i> LINNÉ	+
<i>Gadidae</i>	<i>Lota lota</i> LINNÉ	+
<i>Centrarhidae</i>	<i>Lepomis gibbosus</i> LINNÉ	+++
<i>Percidae</i>	<i>Lucioperca lucioperca</i> LINNÉ	++
	<i>Lucioperca volgensis</i> GMELIN	+
	<i>Perca fluviatilis</i> LINNÉ	++++
	<i>Acerina cernua</i> LINNÉ	++++
	<i>Acerina Schraetzer</i> LINNÉ	++

+ their occurrence is sporadic, ++ less frequent, +++ frequent, ++++ very frequent.

Rutilus rutilus LINNÉ. It may be found in large quantities, but its 200—300 g individuals are rare. Its importance — as a food for predatory animals — is high.

Leuciscus cephalus LINNÉ. Its larger individuals are very rare. Its role, as compared with other fish of the dead-arm, is small.

Leuciscus idus LINNÉ. It is a little more frequent than the bullhead (*Squalius cephalus*), its individuals of 200—300 g were the biggest ones.

Scardinius erythrophthalmus LINNÉ. It moves in groups. The insects falling into the water form its main food. It can be fished in large number from early Spring till late in the Autumn.

Aspius aspius LINNÉ. Its individuals of 5 kg are not rare, either. In mid-April it comes out of the "living" Tisza to spawn. It remains in large number in the dead-arm even after the recession of water.

Tinca tinca LINNÉ. It is rare. A probable explanation of its low number may be the pollution of water. As a fish roaming about on the bottom it looks for its food in the mud, and there it is affected supposedly more by pollution.

Gobio gobio LINNÉ. It is a timid fish, occurring sporadically and lying in hiding on the bottom. Its role is not important.

Barbus barbus LINNÉ. The young hatched reach the size of 40—50 mm till Autumn. It is sensitive to pollution. It prefers the places of hard bottom, lying deeper.

Alburnus alburnus LINNÉ. It occurs in every part of the dead-arm. It is important as the food of predatory fish.

Blicca bjoerkna LINNÉ. It occurs in a large quantity. Its large individuals are, however, rare. But its young individuals can be found in large numbers in the riverside waters. Its role is important as a food of predatory fish.

Abramis brama LINNÉ. It is very much propagated. It prefers to change its place. At spawning it retires into the riverside waters. In Autumn, its individuals of 400—500 g are fished out. Its young hatched are a preferred food of predatory fish.

Pelecus cultratus LINNÉ. It swims in groups. At flood, it arrives in large quantities from the Tisza but after spawning it returns there. Its young develop in the dead-arm well.

Rhodeus sericeus amarus BLOCH. It is in comparatively large quantities and can be fished with a dipping-net, close to the riverside.

Carassius carassius LINNÉ. It forms a considerable part of the fish population in the dead-arm. It occurs in the waters of the dead-arm, close to the riverside, even in a distance of 3—4 cm from the riverside. It does not migrate and does not leave the place accustomed. Its largest individuals in the dead-arm are of 300—350 g. Owing to its low oxygen demand, it tolerates even low water very well.

Cyprinus carpio morpha hungaricus HECKEL. It can be found in large quantity. It spawns in the dead-arm. In 1975, a great many young carps remained in the dead-arm because there was no autumn flood. The young are to be found with crucian schools in the waters close to the riverside. Larger individuals of 1000 to 2000 g are observed in smaller quantities. Its growing rate is favourable, its 1-year old individuals weigh 20 to 30 g, the 2-year old ones 150 to 200 g.

Hypophthalmichthys molitrix VALENCIENNES. It is very probable that it spawns in the Tisza. I have fished it in every size in the dead-arm at Körtvélyes from 10 cm individuals to 50 cm ones. It is an extremely timid, quick fish. In the fish-trap, it beats itself until it bleeds. Even if rarely but it can be hooked. It was fished from the Tisza first five years ago. At present, it is already a characteristic fish of the dead-arm.

Silurus glanis LINNÉ. It occurs only casually in the deeper reaches. Immediately after flooding there is many a young silure which, if possible, leaves the dead-arm outright.

Amiurus nebulosus LE SUEUR. Its number is decreasing. As seen from the data of its fishing out, its quantity decreases from year to year the cause of which I see in water pollution.

Anguilla anguilla LINNÉ. Its occurrence is casual. It is no characteristic fish of the dead-arm though the essential conditions would be favourable for it.

Lota lota LINNÉ. It occurs rarely. It bores itself into the mud. It is difficult to fish it, as well.

Lepomis gibbosus LINNÉ. It occurs in large quantities. It generally stays at waters close to the riverside. Even some individuals of 150 to 200 g weight are not rare.

Lucioperca lucioperca LINNÉ. It is present in large numbers. It is sensitive to water pollution. Among its individuals, those of 200—300 g weight are most frequent. Rarely, there occur individuals of 4000 g weight, as well. In the dead-arm, there is many a pike-perch, it is to be supposed, therefore, that it spawns there, as well. Its main food is the stickleback.

Perca fluviatilis LINNÉ. It has found an excellent spawning place in the dead-arm. Its smaller individuals live near to the riverside, and the larger ones (of 500 to 600 g) in the middle part of the dead-arm.

Acerina cernua LINNÉ. It occurs in large numbers in the waters close to the riverside. It is the favourite food of the pike-perch.

Quantitative relations of the fish population

I began mapping the fish population of the dead-arm at Körtvélyes in the Autumn of 1973. At fishings in September and October, I evaluated the fish caught on several occasions. I took for a basis the average of the catchings by five fish-traps put out in different places of the dead-arm. Taking the quantity fished out as 100 per cent, from 312 fishes caught I have got the following result.

Table 2

Fish-species	No. of the individuals caught	Percentage as compared to the individuals taken out
<i>Abramis brama</i>	116	37.1
<i>Aspius aspius</i>	38	12.1
<i>Cyprinus carpio m.hungaricus</i>	48	15.3
<i>Carassius carassius</i>	32	10.3
<i>Blicca bjoerkna</i>	13	4.1
<i>Silurus glanis</i>	4	1.2
<i>Esox lucius</i>	5	1.6
<i>Abramis ballerus</i>	20	6.4
<i>Perca fluviatilis</i>	19	6.1
<i>Lucioperca lucioperca</i>	10	3.2
<i>Lota lota</i>	1	0.3
<i>Tinca tinca</i>	6	1.9

The reliability of the data measured is unfortunately affected unfavourably by the fact that the small fishes cannot be fished out by means of fish-traps, the mesh of which is not small enough. These are: *Scardinius erythrophthalmus*, *Rhodeus sericeus amarus*, *Gobio gobio*, *Amiurus nebulosus*, *Lepomis gibbosus*, *Acerina cernua*, *Acerina Schraetzer*, *Alburnus alburnus*.

And in the waters close to the riverside there are no *Acipenser ruthenus*, *Amiurus nebulosus*, *Barbus barbus*, *Gobio gobio*, and *Anguilla anguilla*. The observation and catching of these is rather difficult and casual. They can be caught by means of fishing-hooks and various baits.

Investigations of young fish

The dead-arm is a favourable spawning place for the fish of the Tisza. The young fish hatched out are protected by the vegetation of the riverside and the insects falling in from bushes and water-plants supply rich food for them. The development of young fish is promoted by the rich zooplankton stock, as well.

In late Summer, early Autumn, immediately close to the riverside, there are already to be seen the the uncountable young fish of 30 to 60 mm size. The role of

this dead-arm is extremely important just because of helping the development of young fish and making possible their return into the Tisza on the occasion of repeated floods.

The investigation of the young fish was carried out in the water fringe, 3—4 m far from the riverside and in a depth of 0,5 to 1,8 m. As a tool, a lifting-net of 1,5×1,5 m size was used, with small meshes and 4×4 mm texture. Liftings took place at 5 to 10 min. intervals. On each occasion 50 to 100 young individuals were lifted up to the surface. After being determined and counted, these were returned into the dead-arm. The next sample was taken about 50 m far from the previous place.

In the September of 1975, on the opportunity of the investigations performed in different parts of the dead-arm, I collected with 20 liftings, and investigated, altogether 1374 small fishes.

Table 3. Quantitative distribution of the young of the fish species

Fish-species	No. of the individuals caught	Percentage as compared to the individuals taken out
<i>Abramis brama</i>	372	27.4
<i>Abramis ballerus</i>	289	21.0
<i>Aspius aspius</i>	177	12.9
<i>Cyprinus carpio morpha hungaricus</i>	110	8.0
<i>Carassius carassius</i>	151	11.7
<i>Rutilus rutilus</i>	212	15.4

In the September of 1974, I only observed the destruction of young fish, while in the May of 1976, apart from the large number of the young fish perished, the carcasses of some fishes of 3 to 4 kg could also be observed. The large-scale destruction of fish-stock was induced, in my opinion, by more causes.

The water drained from the adjacent rice-fields and the communal refuse water pumped over through the canal of Kútvölgy were led by the canal of the pumping station at Körtvélyes into the dead-arm. The fish-destructions observed were probably induced by drainages following the applications of some stronger plant-protecting agents.

In the dead-arm at Körtvélyes intensive fishing is continued. The fish population is completed, at any rate, by a natural supply from the Tisza. Nevertheless, taking into consideration the Region-Conservation District, it would be good to take care of the fish stock so much that it would be possible to preserve the fish-species that are characteristic of the Southern Hungarian Plain, under natural conditions. This would be all the more justified because in the fishfauna of the dead-arm at Körtvélyes appropriately 60 per cent of the Hungarian fish species are contained.

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