THE INFLUENCE OF ENVIRONMENT CONDITIONS ON THE QUALITATIVE AND QUANTITATIVE COMPOSITION OF FISH COMMUNITIES FROM PREDELTAIC DANUBE SECTOR, BETWEEN SIRET RIVER AND PRUT RIVER MOUTH

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Abstract

The aim of the paper is to analyse the influence of environment factors on the capture and fish communities structure from Danube, between Siret River and Prut River mouth. Fish were collected from April to December 2011 in four fishing areas. During the year, 6027 kg, respectively 4805 fish of twenty three breeds were collected. Cyprinidae, the dominant family, 60.87% in term of number of breeds, was represented by 14 breeds (Cyprinus carpio, Carassius gibelio, Barbus barbus, Abramis brama, Abramis sapa, Blicca bjoerkna, Leuciscus idus, Vimba vimba, Aspius aspius, Pelecus cultratus, Chondrostoma nasus, Ctenopharingodon idella, Hypophthalmichthys molitrix, Hypophthalmichthys nobilis). Other families had the following structure: Clupeidae (4.35%) with one breed (Alosa pontica), Acipenseridae (13.04%) with 3 breeds (Huso huso, Acipenser stellatus, Acipenser ruthenus), Percidae (13.04%) with 3 breeds (Sander lucioperca, Zingel zingel, Zingel streber), Siluridae (4.35%) with one breed (Silurus glanis) and Esocidae (4.35%) with one breed also (Esox lucius). The highest capture was 2728.5 kg (45.29%), during the spring season (April-May), followed by autumn season (September –November), with 560.45 kg (9.29%). The water level and water flow showed high correlation with both number and total capture, respectively.

Key words: fish communities, Danube, environmental factors, catch

INTRODUCTION

The fishing resources are in a continuous decline as a consequence of the habitats degradation and of overfishing. This tendency generated mostly by the intensification of water usage (agriculture, electricity, navigation etc.) cannot be changed as long as it is not given enough attention to the fishing industry [3], [6].

An aquatic ecosystem is characterized by an assembly of ecological factors (biotic and abiotic) [4], [5]. The abiotic factors are represented by the physico-chemical characteristics of the water (temperature, turbidity, pH, disolved oxygen, hardness, nutrients etc.) and the hydrological ones (water level, discharge). The biotic factors are composed of the assembly of interactions between the individuals of the same breed or of different breeds (plankton, zoobenthos, ichthyofauna etc.) [1], [2].

A running water, as the Danube, the second river of Europe, represents an extremely variable and complex environment. Its multiple usages are arguments in favor of developing long-term systematic research in order to know the seasonal variation of the physico-chemical and hydrological parameters, which have extremely important consequences on the structure and dynamic of the fish communities (abundance, migration, diet, growth, reproduction, recruitment, mortality, catch etc.).

MATERIAL AND METHOD

Fishing area

The researches have been made on a 22 km segment in the predeltaic Danube, located between the Siret River mouth (km 155) and the Prut River mouth (Mm 72.5). On this segment are analysed the capture data

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The manuscript was received: 13.03.2013
Accepted for publication: 09.10.2013

registered in four fishing areas: Galati (km 150-151), Condrea (Mm 77-78), Muresanu (Mm 76-77) and Plopi (Mm 74-74.5).

Environmental characteristics

In order to define the influence of the abiotic environmental factors over the fish capture the following physico-chemical and hydrological parameters were determined: the water temperature, the turbidity, the water ph, the permanganate coefficient, the conductivity, the chlorides, the ammonium ion, the nitrates, the nitrites, the water level and discharge. All the measurements were made in 2011 in Galati area (km 150-151), except the discharge measurements which were made at The Iron Gates II. The basic information cames from the daily measurements made in the specialised laboratories from AFDJ-RA and SC Apa Canal SA Galati; afterwards, there were calculated the monthly and yearly medium values. The main biotic factors have been determined in the specialised laboratories of the Department of Aquaculture and Environmental Science from the Faculty of Food Science and Engineering Galati. The qualitative structure of the phythoplankton, zooplankton and zoobenthos has been deterined by processing the data from the monthly assays from Galati area. The qualitative and quantitative composition of the ichthyofauna was established by analysing the capture information resulted from the fishing between April-December, in the four areas mentioned above.

Fishing gears and methods

The fishig has been made with the same fishing filtering floating gears: gill nets and trammel nets. Dependent on the season and on the followed group of breeds, their sizes varied as follows: gill nets (Lp: 100-150 m; Hp: 2.5-3.5 m, a: 30-60 mm), trammel nets (Lp: 150-200 m; Hp: 2.5-4.0 m, a: 40-80 mm). The gill nets and the trammel nets are made of synthetic materials (relon). Monofilament gears were not used.

The analysis of the capture data

The capture data comes from two sources: the scientific fishing made by the fishermen coordinated by the researchers from ICDEAPA Galati and the scientific fishing made by the fishermen from „Dunarea de Jos” University of Galati, coordinated by the teaching staff and post-graduates from the Aquaculture and Environmental Science Department.

RESULTS AND DISCUSSIONS

In various scientific works, has been proved that fish distribution and abundance are strongly influenced by the water quality, by the rainfall and by the variation of levels and discharges [1], [2].

Generally, the values of the physico-chemical parameters of the Danube water were in the limits of the effective quality standards (Order of The Ministry of Environment and Waters). Thus, the medium water temperature, during spring, varied between 4.5-17.3ºC, summer between 24.0-25.7ºC, autumn between 11.0-23.8ºC and in winter between 1.7-6.0ºC (fig.1).

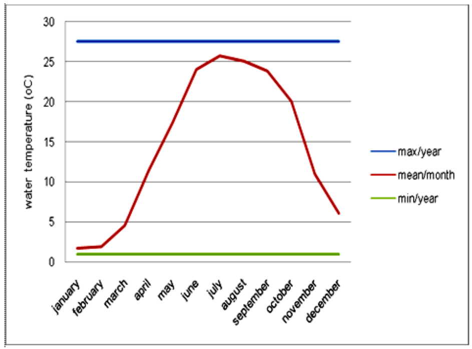

Fig.1 Water temperature variation

The medium water turbidity, in spring, varied between 19.3-25.3 nephelometric turbidity units (UNT), in summer between 16.4-21.0 UNT, in autumn between 14.2-19.2 UNT, and in winter between 17.2-29.2 UNT (1UNT=0.13 mg SiO_2) (fig. 2).

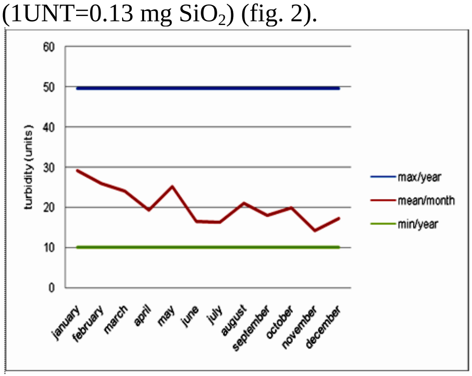

Fig. 2 Water turbidity variation

The medium water acidity (pH), in all the seasons, ranged between 7.8-8.0 units, very good for the fish (fig. 3).

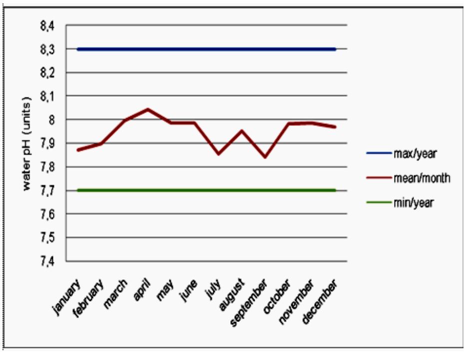

Fig. 3 Water pH variation

The medium water oxidability (the permanganate coefficient/CCO-Mn), in spring, varied between 3.39-3.65 mgO_2/l, in summer between 3.04-3.21 mgO_2/l, in autumn between 2.84-2.98 mgO_2/l and in winter between 2.75-3.75 mgO_2/l (fig.4). There must be mentioned that the active standard establishes a limit of 10 mgO_2/l for the waters in the second quality class.

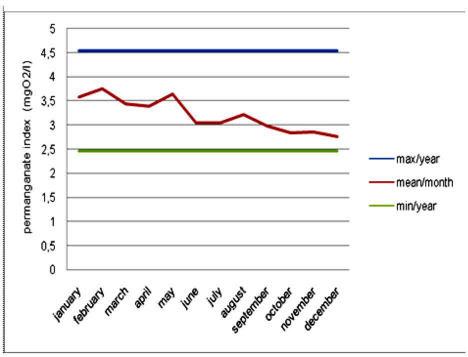

Fig. 4 The permanganate coefficient variation

The medium water conductivity, in spring ranged between 436-564 µS/cm^2,in summer ranged between 385-436 µS/cm^2, in autumn between 390-463 µS/cm^2 and in winter between 478-503 µS/cm^2 (fig. 5).

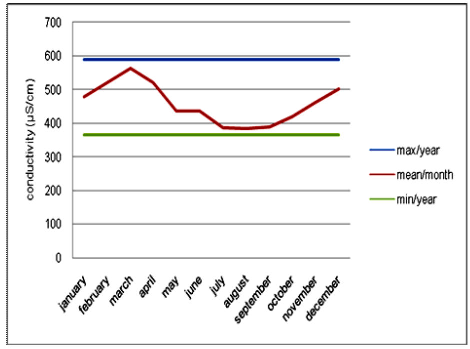

Fig. 5 The water conductivity variation

The medium values of the chlorides from the water, in spring ranged between 29.02-31.58 mg/l, in summer between 22.71-26.89 mg/l, in autumn between 22.32-24.17 mg/l and in winter between 23.05-27.50 mg/l (fig. 6).

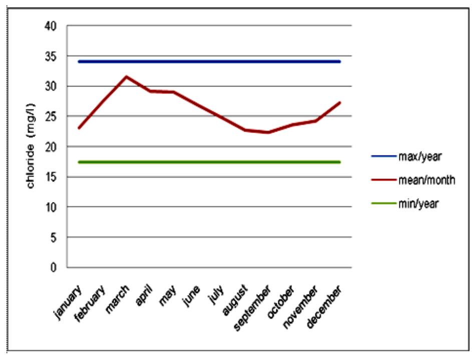

Fig. 6 The variation of chlorides from the water

Among the compounds of the nitrogen, only the ammonium ion (total ammoniacal nitrogen/N-NH_4^+) ranged in the normal limits according to the standard (max. 0.8 mg/l). During the seasons, the medium values varied as follows: in spring between 1.10-0.17 mg/l, in summer between 0.10-0.20 mg/l, in autumn between 0.12-0.17 mg/l and in winter between 0.20-0.25 mg/l (fig. 7).

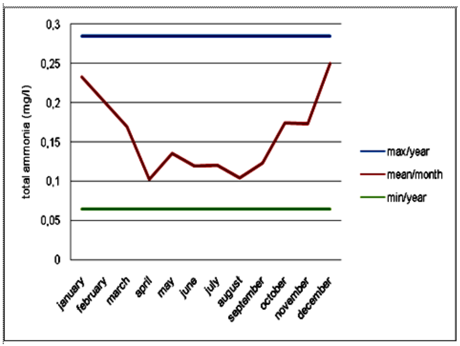

Fig. 7 The variation of the ammonium

The nitrates ($N\text{-}NO_3^-$), exceeded the normal medium values (3 mg/l) in all seasons: in spring, between 5.5-8.8 mg/l, in summer between 4.5-5.1 mg/l, in autumn between 4,8-5,9 mg/l and in winter between 5.2-8.8 mg/l (fig. 8).

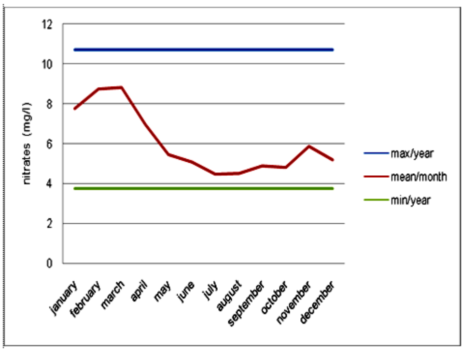

Fig. 8 The variation of the nitrates

The same, the nitrites ($N\text{-}NO_2^-$), exceeded the ordinary medium values (0.03 mg/l) in all seasons: in spring, between 0.07-0.09 mg/l, in summer between 0.08-0.13 mg/l, in autumn between 0.07-0.11 mg/l and in winter between 0.08-0.13 mg/l (fig. 9).

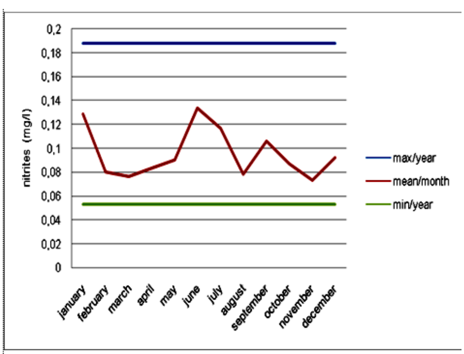

Fig. 9 The variation of the nitrites

The Danube level ranged as follows: in spring between 219-321cm, in summer between 194-216 cm, in autumn between 94-110 cm, in winter 78-481cm (fig. 10).

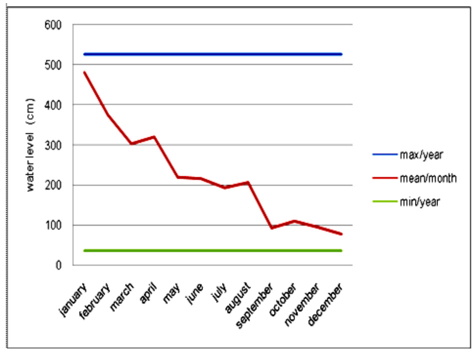

Fig. 10 The variation of the Danube River level

The Danube discharge ranged as follows: in spring between 3907-5342 m^3/s, in summer between 4004-4110 m^3/s, in autumn between 2369-2544 m^3/s, in winter between 2855-8286 m^3/s (fig. 11).

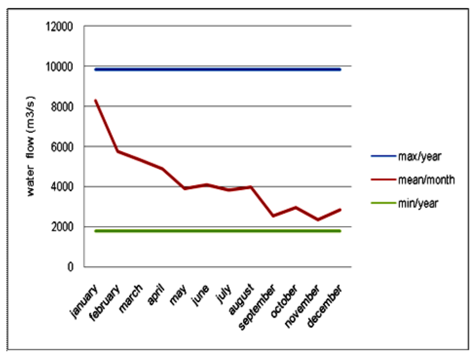

Fig. 11 The variation of the Danube River discharge at Iron Gates II

The reduction of the deposits transport from the Danube water allows a better clarity of the water and a generous development of the phytoplankton, zooplankton and zoobenthos . These trophic links represent the favourite food for young fish.

Increase of temperature in spring and summer accelerated the productivity cycle of plankton and also decomposition rates of organic materials, i.e. more food resources became available for fish [5] (tables 1-3).

Table 1 The qualitative structure of the phytoplankton from the Danube

No crt	Systematic group	The frequency of the phytoplankton											
		Jan	Feb	Mar	Apr	Ma	Jun	Jul	Aug	Sept	Oct	Nov	Dec
	CYANOPHYCEAE												
1	*Anabaena spiroides*	-	-	-	-	-	+	++	++	++	-	-	-
2	*Oscillatoria sp.*	-	-	-	-	+	++	++	+++	++	-	-	-
3	*Microcystis sp.*	-	-	-	-	+	+	+	++	+	-	-	-
	BACILLARIOPHYCEAE												
1	*Amphora ovalis*	-	-	+	++	++	+	-	-	+	++	+	+
2	*Asterionella gracilis*	+	+	++	+++	++	+	+	+	++	++	++	+
3	*Caloneis amphisbaena*	+	+	+	++	++	+	+	+	++++	+++	++	+
4	*Cyclotella comta*	+	+	++	++	++	++	++	++++	++++	+	+	+
5	*Cymatopleura solea*	-	-	+	+	++	+	-	+	+	-	-	-
6	*Cymbella affinis*	-	-	-	-	-	-	+	+	+	-	-	-
7	*Diatoma elongata*	-	-	+	-	++	+	+	++	+++	+	-	-
8	*Fragillaria capucina*	-	-	-	+	+	-	-	++	+	-	-	-
9	*Gomphonema constrictum*	-	-	+	-	+	+	+++	++++	++	+	-	-
10	*Melosira granulata*	+	-	+	+	++	++	++	++++	+++	+	+	-
11	*Navicula danubium*	-	+	-	-	+	++	+	+	++	+	-	-
12	*Navicula minima*	-	-	+	+	+	+	++	+	++	+	+	+
13	*Nitzschia linearis*	-	-	-	-	+	-	-	+	++	-	-	-
14	*Nitzschia palea*	-	-	+	-	++	-	++	+	+	+	+	-
15	*Pinnularia viridis*	+	-	-	+	+	+	++	+++	++++	++	+	+
16	*Surirella capronii*	+	+	-	+++	++	++	++	+++	++++	++	+	-
17	*Stephanodiscus astraea*	-	+	+	+	++	+	+	+++	+++	+	+	-
18	*Synedra acus*	++	+	++++	+++	++	+	-	-	+	++	+++	++
19	*Synedra ulna*	++	+++	++++	+++	++	++	++	+	++	++	+++	++
	CHLOROPHICEAE												
1	*Ankistrodesmus falcatus*	-	+	-	++	+	+++	+	+++	+	+	-	-
2	*Chlorella vulgaris*	-	+	-	-	+	++	++	++	++	-	-	-
3	*Closterium acuminatus*	-	-	-	+	+	++	++	+	+	+	-	-
4	*Closteriopsis sp.*	+	+	++++	++	-	-	-	+	+++	++	+++	++
5	*Coelastrum microporum*	++	+	++	++	+++	++	+++	++++	+++	++	+++	++
6	*Crucigenia tetrapedia*	+	++	++	+	+++	++	+++	++	++++	+++	++	++
7	*Pediastrum duplex*	+	++	+	+	++	+	++	++	+	-	-	-
8	*Scenedesmus acuminatus*	-	-	++	+++	-	++	-	++	+++	+	++	+
9	*Scenedesmus quadricauda*	-	+	-	-	+	++	+++	++	++	++	++	+
10	*Tetraedron minimum*	+	++	++++	+	++	+++	++	++	++++	+	++	+
11	*Ulothrix zonata*	+	++	++	++	+	+	++	++	+++	+	++	++
	EUGLENOPHYCEAE												
1	*Euglena viridis*	-	++	+	++	++	++	++	++++	+++	++	+	+
2	*Phacus pleuronectes*	-	-	-	+	++	+	++	+	++	+	-	-
3	*Trachelomonas sp.*	-	-	-	+	-	-	++	+	+	-	-	-
	CRYPTOPHYCEAE												
1	*Cryptomonas marsoni*	-	+	+	-	++	+	-	-	++	++	-	-
2	*Malomonas sp.*	-	-	-	-	+	+	-	+	-	++	-	-

+ isolated specimens; ++ rare specimens; +++ low frequency specimens; ++++ high frequency specimens;

Table 2 The qualitative structure of the zooplankton from the Danube

No.	Systematic group	The frequency of the zooplankton											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
	ROTATORIA												
1	*Asplachna priodonta*	+	-	+	+++	+++	++	-	++	++	++	-	-
2	*Brachionus calyciflorus*	++	++	++++	++	+++	++	++	++++	+++	++	+	+
3	*Brachionus urceolaris*	+	++	++	++++	++	+++	++	++	++++	+++	++	+
4	*Brachionus angularis*	-	+++	++	++	+++	+++	+++	++++	+++	++	+	++
5	*Filinia longiseta*	+	-	++	+++	++	+	++	++++	+	-	++	-
6	*Lecane luna*	+	++	-	+++	+	+++	++	+	+++	+	-	+
7	*Keratella cochlearis*	+	-	++	-	++	++	+++	++	+++	+	++	-
8	*Keratella quadrata*	-	++	+	+++	++	+	++	++	++++	++	+	-
9	*Polyarthra vulgaris*	+	+	+++	+	+++	++	+++	++++	++	+	+	++
10	*Trichocerca sp.*	-	+	-	++	+	++	++	+++	++	+	-	+
	COPEPODA												
1	*Cyclops strenuus*	+	+	++	+++	++	+++	+++	++++	++	+	+	-
2	*Diaptomus sp.*	-	-	+	++	-	+	-	+	-	-	-	-
3	*Eudiaptomus gracilis*	-	+	-	-	++	-	+	-	++	+	-	-
4	*Macrocyclops albidus*	-	++	+	++	+	++	+++	+++	+	+	-	+
	CLADOCERA												
1	*Bosmina longirostris*	-	+	+	-	++	+	++	+++	+	+	-	-
2	*Daphnia sp.*	-	-	+	++	+	+	++	+++	++	+	-	-
3	*Moina sp.*	-	-	-	+	-	-	++	+	+	-	-	-

+ isolated specimens; ++ rare specimens; +++ low frequency specimens; ++++ high frequency specimens

Table 3 The qualitative structure of the zoobenthos from the Danube

No crt	Systematic group	The frequency of the breed in the zoobenthos											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	BIVALVA												
1	*Anodonta sp.*	-	-	+	+	++	++	-	+	+	+	-	-
2	*Dreissena polymorpha*	+	++	++	++	++	+	++	+++	++	++	+	-
3	*Unio sp.*	-	-	+	++	+	++	++	++	+++	+	+	-
	GASTEROPODA												
1	*Bythynia sp*	-	-	-	+	++	++	++	+++	++	-	+	-
2	*Lymnaea sp.*	-	-	+	++	-	+	-	+	-	-	-	-
3	*Planorbis planorbis*	-	+	-	-	++	-	+	-	++	+	-	-
4	*Vivipara vivipara*	-	-	+	++	+	++	++	++	+	+	-	-
	INSECTA												
1	*Chironomus sp.*	-	+	+	-	++	+	++	+++	+	+	-	-
	VERMES												
1	*Lumbriculus variegatus*	-	-	+	++	+	+	++	+++	++	+	-	-
2	*Tubifex tubifex*	-	+	-	+	+	-	++	++	+	+	-	-

+ isolated specimens; ++ rare specimens; +++ low frequency specimens; ++++ high frequency specimens

Table 4 Fish species composition and frequency in the Danube River area, between Siret River mouth (km 155) and Prut River mouth (Mm 72.5).

No. Crt.	Systematic group		Common name	Month								
	Family	Species		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	Cyprinidae	*Aspius aspius (Linnaeus, 1758)*	Asp	+	++	+	++	+++	++	+	-	+++
2		*Blicca bjöerkna(Linnaeus, 1758)*	White bream	+	+	-	+	+	++	+++	-	+++
3		*Carassius gibelio (Bloch, 1782)*	Prussian carp	+	+++	++	+++	++	+++	-	++	++
4		*Abramis sapa (Pallas, 1814)*	White-eye bream	+++	+	+	++	+++	+++	+++	++++	++++
5		*Ctenopharyngodon idella (Valenciennes, 1844)*	Grass carp	-	+	-	-	-	-	-	-	-
6		*Cyprinus carpio (Linnaeus, 1758)*	Common carp	+	+++	++++	+++	+++	++	+++	-	-
7		*Vimba vimba (Linnaeus, 1758)*	Vimba	++	+	+	++	+++	+++	+++	++++	+++
8		*Barbus barbus (Linnaeus, 1758)*	Barbel	++	++	+++	++	+++	+++	++++	++++	+++
9		*Hypophthalmichthys nobilis (Richardson, 1845)*	Bighead carp	-	+	+	+	+	-	-	-	+
10		*Abramis brama (Linnaeus, 1758)*	Common bream	+	+++	+++	++++	++++	++++	++++	++++	++++
11		*Pelecus cultratus (Linnaeus, 1758)*	Ziege	+	+	-	-	++	+	-	-	-
12		*Hypophthalmichthys molitrix (Valenciennes, 1844)*	Silver carp	+	+	+	+	+	+	+	-	-
13		*Chondrostoma nassus (Linnaeus, 1758)*	Common nase	+	-	-	-	-	-	-	-	-
14		*Leuciscus idus (Linnaeus, 1758)*	Ide	+	-	-	+	+	+	-	-	-
15	Acipenseridae	*Acipenser ruthenus (Linnaeus, 1758)*	Sterlet	+	++	++	++	++	+++	+++	-	-
16		*Huso huso (Linnaeus, 1758)*	Beluga sturgeon	-	-	+	-	-	-	-	-	-
17		*Acipenser stellatus* (*Pallas, 1771)*	Stellate sturgeon	-	+	+	-	-	-	-	-	-
18	Clupeidae	*Alosa immaculata* (*Bennett, 1835)*	Pontic shad	++++	++++	++++	++++	-	-	-	-	-
19	Percidae	*Zinger streber (Linnaeus, 1758)*	Danube streber	-	-	-	-	+	-	-	-	-
20		*Zingel zingel (Linnaeus, 1758)*	Zingel	-	-	-	-	+	-	-	++	-
21		*Sander lucioperca (Linnaeus, 1758)*	Pike-perch	+	++	+	+	++	++	++	+	+
22	Siluridae	*Silurus glanis (Linnaeus, 1758)*	Wels catfish	+	+	+++	++	+++	+++	+++	-	-
23	Esocidae	*Esox lucius (Linnaeus,1758)*	Northern pike	-	+	-	+	-	-	-	-	-

\+ 0 – 2%; ++ 2– 6 %; +++ 6– 15 %; ++++ >15 % of catch

Table 5 Quantitative fish communities composition in the Danube River area, between Siret River mouth (km 155) and Prut River mouth (Mm 72.5).

No crt	Species	Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec		Total	
		No fish	B (kg)	No fish	B (kg)	No fish	B (kg)	No fish	B (kg)	No fish	B (kg)	No fish	B (kg)	No fish	B (kg)	No fish	B (kg)	No fish	B (kg)	No fish	B (kg)
CIPRINIDAE																					
1	Asp	6	7,4	39	52,4	13	22,5	8	8	34	33,1	12	10,3	1	2	0	0	7	7	120	142,7
2	W. bream	3	0,6	8	1,4	0	0	7	1,6	10	3,8	9	3,15	8	4,4	0	0	6	2,1	51	17,05
3	Pr. carp	1	0,5	108	28,3	34	16	43	20	10	3,5	21	5,7	0	0	2	0,7	2	0,4	221	75,1
4	We.bream	46	10,1	16	3,7	23	5,9	19	5,5	20	6,5	23	6,5	19	5,3	15	4,4	18	6,5	199	54,4
5	Grass	0	0	8	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	40
6	Carp	10	52,1	137	633,8	305	1247,2	29	27,9	19	59,4	14	21,3	10	52,2	0	0	0	0	524	2093,9
7	Vimba	17	4,4	18	4,7	7	1,6	13	3,5	34	17,7	28	15,9	15	10,5	14	8,6	10	4,9	156	71,8
8	Barbel	34	28,3	87	213,6	85	163,6	16	15,5	31	38,4	39	58,8	30	48,4	11	13,3	8	4,6	341	584,5
9	Bigh. carp	0	0	22	93,1	8	30,8	4	7,5	3	6	0	0	0	0	0	0	1	0,5	38	137,9
10	Cm.bream	10	2,3	125	44,7	119	57,5	123	25,8	57	25	55	17,8	36	22,1	14	10,3	20	9,6	559	215,1
11	Ziege	9	1,6	4	1,2	0	0	0	0	6	1,2	5	1,2	0	0	0	0	0	0	24	5,2
12	Silver carp	6	1,3	5	16,4	12	2,6	4	2,2	2	0,6	1	0,3	2	1,6	0	0	0	0	32	25
13	Cm.nase	2	0,4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		2	0,4
14	Ide	1	0,3	0	0	0	0	3	1,1	1	0,4	1	0,5	0	0	0	0	0	0	6	2,3
TOTAL		**145**	**109,3**	**577**	**1133,3**	**606**	**1547,7**	**269**	**118,6**	**227**	**195,6**	**208**	**141,45**	**121**	**146,5**	**56**	**37,3**	**72**	**35,6**	**2281**	**3465,35**
ACIPENSERIDAE																					
15	Sterlet	7	3,5	54	80,3	42	34,5	9	4,2	11	3,8	17	11,4	9	6,9	0	0	0	0	149	144,6
16	Beluga	0	0	0	0	17	0,6	0	0	0	0	0	0	0	0	0	0	0	0	17	0,6
17	Stellate s	0	0	32	158,7	7	19,7	0	0	0	0	0	0	0	0	0	0	0	0	39	178,4
TOTAL		**7**	**3,5**	**86**	**239**	**66**	**54,8**	**9**	**4,2**	**11**	**3,8**	**17**	**11,4**	**9**	**6,9**	**0**	**0**	**0**	**0**	**205**	**323,6**
CLUPEIDAE																					
18	P. shad	460	110,4	876	236,9	617	170,9	82	18,4	0	0	0	0	0	0	0	0	0	0	2035	536,6
TOTAL		**460**	**110,4**	**876**	**236,9**	**617**	**170,9**	**82**	**18,4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2035**	**536,6**
PERCIDAE																					
19	D. streb	0	0	0	0	0	0	0	0	2	0,5	0	0	0	0	0	0	0	0	2	0,5
20	Zingel	0	0	0	0	0	0	0	0	1	0,2	0	0	0	0	2	0,6	0	0	3	0,8
21	P-perch	5	3,1	36	101,2	13	36	4	1,4	5	8	9	10,4	7	23,2	1	1,9	1	0,3	81	185,5
TOTAL		**5**	**3,1**	**36**	**101,2**	**13**	**36**	**4**	**1,4**	**8**	**8,7**	**9**	**10,4**	**7**	**23,2**	**3**	**2,5**	**1**	**0,3**	**86**	**186,8**
SILURIDAE																					
22	Wels	2	4,5	18	781,8	88	407,2	9	17,4	27	110,3	31	123,4	11	57,4	0	0	0	0	186	1502
TOTAL		**2**	**4,5**	**18**	**781,8**	**88**	**407,2**	**9**	**17,4**	**27**	**110,3**	**31**	**123,4**	**11**	**57,4**	**0**	**0**	**0**	**0**	**186**	**1502**
ESOCIDAE																					
23	N- pike	0	0	6	6,5	0	0	6	6,5	0	0	0	0	0	0	0	0	0	0	12	13
TOTAL		**0**	**0**	**6**	**6,5**	**0**	**0**	**6**	**6,5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**12**	**13**
TOTAL GEN		**619**	**230,8**	**1599**	**2498,7**	**1390**	**2216,6**	**379**	**166,5**	**273**	**318,4**	**265**	**286,65**	**148**	**234**	**59**	**39,8**	**73**	**35,9**	**4805**	**6027,35**

During the year, 6027 kg, respectively 4805 fish of 23 breeds and 6 families were collected. *Cyprinidae*, the dominant family, 60.87% in term of number of breeds, was represented by 14 breeds. Other families had the following structure: *Acipenseridae* and *Percidae* (13.04%) with 3 breeds each, *Clupeidae*, *Siluridae* and *Esocidae* (4.35%) with one breed each (table 4, fig. 12).

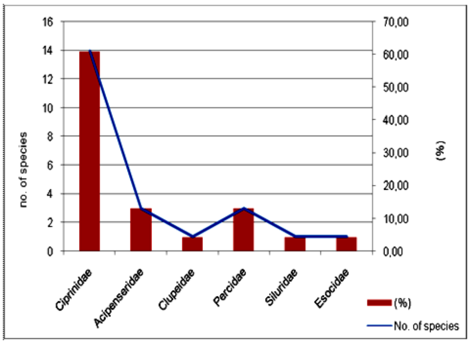

Fig. 12 Fish communities composition, by families and number of species

The total number of fish, on families, varied as follows: *Cyprinidae* with 2281 fish (47.47%), *Clupeidae* with 2035 fish (42.35%), *Acipenseridae* with 205 fish (4.27%), *Siluridae* with 186 fish (3.87%), *Percidae* with 86 fish (1.79 %) and *Esocidae* with only 12 fish (0.25%) (table 5, fig. 13).

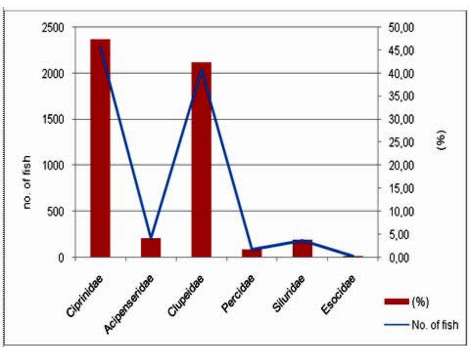

Fig. 13 Fish communities composition, by families and number of fish

The quantitative composition, on families is the following: *Cyprinidae* with a total biomass of 3465.35 kg (57.49%), *Clupeidae* with 1502 kg (24.92%), *Acipenseridae* with 323.6 kg (5.37%), *Percidae* with 186.8 kg (3.1%), *Esocidae* with 13 kg (0.22%) only (table 5, fig 14). The highest capture was 2728.5 kg (45.29%), during the spring season (April-May), followed by autumn season (September–November), with 560.45 kg (9.29%).

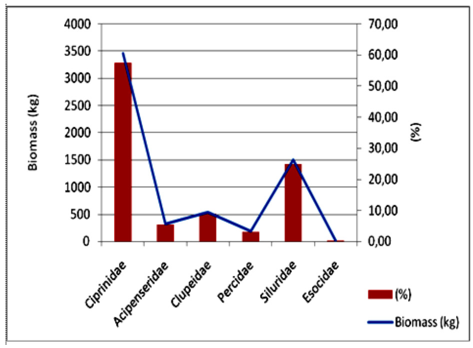

Fig. 14 Quantitative fish communities composition

During the summer and autumn, the water level and water flow variation showed high correlation with total capture (fig. 15, fig. 16).

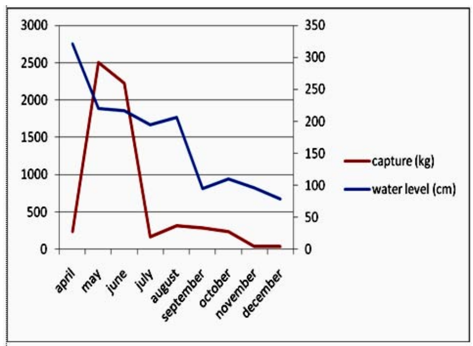

Fig. 15 The relationship between catch and water level

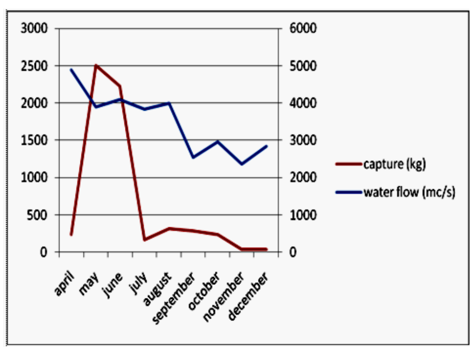

Fig. 16 The relationship between catch and water discharge

The relationships of water level and water flow with the total catch (in terms of biomass, individuals and number of species) showed a positive correlation. Generally, at the lower water levels and discharges the catch is bigger [4], [7]. The mush bigger captures, resulted in the spring months (April, May and even June) seem to invalidate the rule from above. Actually, the much higher level of the catch is explained by assigning a much bigger fishing effort, considering that the scientific fishing is made especially in the spring period.

CONCLUSIONS

The influence of abiotic and biotic factors on the total catch and fish communities composition were analysed. Generally, the values of the physico-chemical parameters of the Danube water were in the limits of the effective quality standards. Fish distribution and abundance are strongly influenced by the water quality and by the variation of levels and discharges.

The overall number of fish species caught from Danube area, between Siret and Prut River mouth, was 23, belonging 6 families. *Cyprinidae*, the dominant family, was represented by 14 species *(Cyprinus carpio, Carassius gibelio, Barbus barbus, Abramis brama, Abramis sapa, Blicca bjoerkna, Leuciscus idus, Vimba vimba, Aspius aspius, Pelecus cultratus, Chondrostoma nasus, Ctenopharingodon idella, Hypophthalmichthys molitrix, Hypophthalmichthys nobilis).* Other families had the following structure: *Clupeidae* with one species *(Alosa immaculata), Acipenseridae* with 3 species *(Huso huso, Acipenser stellatus, Acipenser ruthenus), Percidae* with 3 species *(Sander lucioperca, Zingel zingel, Zingel streber), Siluridae* with one species *(Silurus glanis) and Esocidae* with one species *(Esox lucius).* The research showed the presence of stabile ichthyocenosis, in special for *Cyprinidae* family.

Fish community composition is a basic ecological aspect, knowledge of which is necessary for the correct exploitation, regulation and management of fishing resources.

ACKNOWLEDGEMENTS

Researches was conducted in the framework of the project POSDRU “Quality and continuity of training in the doctoral studies – no. 76822 - TOP ACADEMIC”, funded by the European Union and Romanian Government. The authors thank to the management staff of the project for their support.

REFERENCES

[1] Gergely I.,.Romocea J.E, Oprea L., Sion C., Calin P. G., 2011: Comparative studies of the global ecological state variation of the aquatic environment in the Crisuri Hydrographic Space, AACL Bioflux, Vol. 4(2):159-169;

[2] Gergely I., Romocea J.E., Oprea, L. Sion C., Calin P. G., 2011: The influence of structural changes and ichtyofauna abundance on the ecological state of the Crisuri Hydrographic Area, AACL Bioflux, Volume 4(2):170-179;

[3] Gheorghe D., 2010: Researches regarding the foundation of durable exploitation of the fishery resources from the Danube and the Danube Meadow, PhD Thesys, University of Galati;

[4] Gutierrez-Estrada J.C., R. Vasconcelos R., Costa M.J., 2008: Estimating fish community diversity from environmental features in the Tagus estuary (Portugal), J. Appl. Ichth. 24, p. 150–162;

[5] Najah A. H., A-R. M. Mohamed, S. S. Al Noo, F. M. Mutlak, I. M. Abed, B. W. Coad, 2009: Structure and ecological indices of fish assemblages in the recently restored Al-Hammar Marsh, southern Iraq approaches, BioRisk Journal, 3, p.173-186;

[6] Navodaru I., 2008: The estimation of the fish and fisheries stocks, Ed. Dobrogea, Constanta;

[7] Oprea L., Rauta M., Razlog G., Ceapa C., 1995: Research related to hydrological and hydrochemical characteristics of Danube in the predeltaic sector, vol. “Abstracts” Scientific Symposium “Aquaculture in the Eastern European Countries”, Stara Zagora, Bulgaria;