DIATOMA OF RIVER "DRINO" DURING AUTUMN SEASON 2012 IN GJIROKASTËR (ALBANIA)

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ABSTRACT

The main objective of this paper is to investigate the diatom taxa identified from the Drino River during autumn season 2012 in Gjirokastër.
The study area included 5 sampling sites along the Drino River.
In total, 69 diatoma taxa were identified. The most species rich genera are Nitzschia (12 taxa), Navicula (9 taxa), Cocconeis (3 taxa), Surirella (4 taxa) and Cymbella, Gomphonema and Gyrosigma presented with 3 taxa, while other genera are presented with one or two species. Detailed floristic analysis of the diatoma flora has not been conducted before on these rivers. The determined taxa of the Drino river 69 species of diatoma, belonging to 29 genus, were found.

***Key words**: diatoma, season, autumn, river, Drino, Gjirokastër, Albania*

Introduction

The rivers in the south part of the country Albania, were mainly subject to these investigation, because many small rivers spill in river Drino. The river flows mainly trough urbanized territories from its springs to the national border with Greece. For that reason during recent decades, rivers in Albania became significant reservoirs of different pollutant. As a result there takes place considerable modifications within the hydro chemical composition of the water and of the algae community. Periphytic diatoms are excellent indicators of ecological condition of rivers and streams, because of their ability to respond rapidly to changes in nutrient concentrations. Diatoms are the most abundant and species rich primary producers in rivers, occurring in all habitats from source to mouth (Round 1991).

Material and methods

The samples were collected at 5 sampling stations along the river Drino in the autumn season of 2012.

Water samples were collected in 500 ml glass bottles, 10 cm beneath the water surface, using standard methods (Hindak, 1978). Conductivity, pH, salts, TDS (Total Disolved Salts), were measured in situ using mobile instruments (HACH), O_2 were measured with mobile instrument such as oxygenometer (Hana Instrument) and nutrients (N, P, Si) were analyzed by standard methods (DEV, 1981).

Epilithon was brushed from the stones with toothbrush and the upper layer of epipelon was pipetted off with a vacuum suction system (Sladeckova, 1962). Epiphyton was sampled with the substrate and placed in the plastic bottles.

The algae were examined using a Leica microscope, with a digital camera Fujifilm, which filmed the algae directly from the sample.

Diatoma cleaning

Cleaning of diatom frustules, preparation of permanent slides and determinations follow Krammer & Lange-Bertalot (1986-2001).

Diatoma identification was done according to the keys: *Bacillariophyta*: Kramer, Lange-Bertalot 1986, 1988, 1991a, 1991b.

Study area and sampling stations

Sampling station are:

1. Near of village Hormovë, located about 20 km from Gjirokastra city.
2. Near of village Andon Poci about 12 km from Gjirokastra city.
3. River Bridge in the enter of Gjirokaster city, highly polluted under anthropogenic impact.
4. Bridge of Kordhoca and
5. Near Glina village.

River Drino is main branch of river Vjosa with length 84.6 km, and with catchment area (1324 km^2). In river Drino spill many smallest rivers such as: rivers Sotira, Suha, Nimsa and Kardhiq.

In Drinos valley locate many urban centers such as: villages of Dropulli region, Libohova, Lunxheria, Lazarati, Humelica, Kardhiqi, Hormova, city Gjirokastra ect (Fig.1).

Figure 1: Study area and sampling stations in river Drino (1-Hormove, 2-Andon Poci, 3-River Bridge in Gjirokaster city, 4- Kordhoca Bridge, 5- Glina Bridge).

Results and Discussion

Our results demonstrate that diatom assemblages are distributed continuously along gradients of flow. Diatoms are often used to monitor the environmental changes.

Within division Bacillariophyta dominate gender Nitzschia with 12 species, followed by gender Navicula 9, Surirella-4, Cymbella and Gomphonema 3 species (Figure 2).

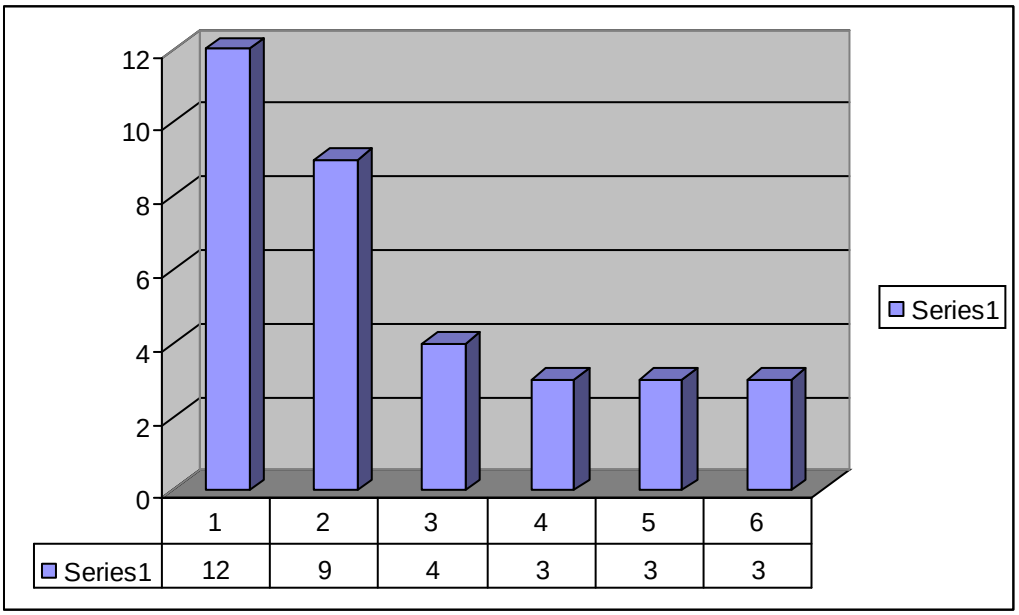


Figure 2. Graphic presentation of genera with more species such Nitzschia (12 species),

Navicula (9 species), Surirella (4 species), and three genus with three species such as: Cymbella, Gomphonema and Gyrosigma.

As we can show from Table 1, the most numerous from the point of their taxonomic difference are genders Nitzschia the quantity of which is about 17.39 % from the total number of the discovered diatomite followed by Navicula -13.04%, Surirella – 5.79 %.
At all localities found the Cymbella helvetica and Nitzschia dissipata.
The sensitivity of diatoms to eutrophication has led to development of monitoring methods and indices to assess water quality of rivers.
Several diatom-based indices are being used to estimate trophic status of European rivers (e.g. Kelly and Whitton 1995, Rott et al. 2003).
According to the number of algae along the stations show that the lower number of algae are in station 3 in River Bridge in Gjirokaster City, where determined the 30 species of algae, while the largest number detect in station 1 near of village Hormovë 42 species. The second station (village Andon Poçi) are enough rich with species, detect 38 species. At fourth and fifth station the number of algal species grow compared with third station (36 and 35 species). According to this can conclude that the station three a more polluted than other stations.
At all locality found only two species such Cymbella helvetica and Nitzschia dissipata, while in four locality found: Cymbella naviculiformis, Frustulia vulgaris, Melosira varians, Navicula cryptocephala, Navicula tripunctata, Stauroneis smithii, and Synedra acus .The other species found in three, two or one locality (Figure 3).

Table 1.Determined diatom in the river Drino during autumn season 2012

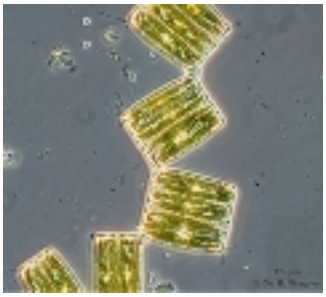
			LOCALITIES				
	Division CYANOPHYTA	**Level of Saprobity**	**1**	**2**	**3**	**4**	**5**
69	**Total number of diatoma**						
	Division BACILLARIOPHYTA						
1	Achnanthes hungarica (Grunow) Grunow	o	1		1		
2	A. coarctata (Bréb.) Grun.	o	1	1			1
3	Achnanthidium minutissimum (Kütz.) Czarneck		1			1	
4	Amphora lybica Ehrenberg		1	1			1
5	A. normani Rabenhorst	o	1		1	3	
6	Aneumastus stroesei (Ostrup) Mann			1			
7	**Cocconeis** pediculus Ehrenberg	o- β		1		3	1
8	C. placentula Ehrenberg	β	3				1
9	Craticula accomoda (Hustedt) Mann	o- β	1			3	
10	C. cuspidata (Kützing) Mann	o			1	1	1
11	**Cyclotella** ocellata Pantocsek			1		1	
12	**Cymatopleura** solea (Brébisson) W.Smith	β			1	1	

13	**Cymbella** affinis Kützing	o- β	3		3	3	1
14	C. helvetica Kützing	o	3	1	1	1	1
15	C. naviculiformis (Auerswald) Cleve	β	3	1	3		1
16	**Diatoma** ehrenbergii Kützing		3	1		3	
17	D. moniliforme Kützing				3		1
18	D. vulgaris Bory	β		1	3	3	
19	Epithemia adnata (Kützing) Brébisson				3		1
20	Fragilaria ulna (Nitzsch) Lange-Bertalot				1		1
21	Frustulia vulgaris (Thwaites) De Toni	o	1	1	1		1
22	**Gomphonema** carolinense Hagelstein			1	1		1
23	G.grovei M.Schmidt		1			1	
24	G. parvulum (Kützing) Kützing	β	1	1			1
25	**Gyrosigma** acuminatum (Kützing) Rabenhorst	β	1		1		
26	G. attenuatum (Kützing) Rabenhorst	β	1			1	
27	G. scalproides (Rabenhorst) Cleve				1	1	
28	Hantzschia amphioxys (Ehrenberg) Grunow	α	1	1			1
29	Luticola goeppertiana (Bleish) Mann		1			1	1
30	Melosira varians Agardh	β	1	1	1	1	
31	Meridion circulare (Grev.) C. Ag.	o	1		1		1
32	**Navicula** capitatoradiata Germain			1		1	1
33	N. cryptocephala Kütz.	α	3	3		1	1
34	N. lanceolata (Agardh) Ehrenberg		3			3	
35	N. radiosa Kützing	o- β		1		3	1
36	N. rhynchocephala Kützing	α			3		
37	N. tripunctata (O.F.Müller) Bory		3	1		3	1
38	N. trivialis Lange-Bertalot		3		3		
39	N. viridula (Kützing) Ehrenberg	α		1		3	
40	N. viridula var.rostellata(Kützing) Cleve		3		3		
41	**Nitzschia** acula Hantzsch in Rabenhorst			1			1
42	N. acicularis (Kütz.) W. Sm.			1		1	
43	N. commutata Grun.				1	1	
44	N. dissipata (Kützing) Grunow	o- β	1	1	3	3	1
45	N. elegantula Grunow in Van Heurck			1		3	1
46	N. eglei Lange Bertalot			1			1
47	N. fonticola Grunow	o- β	1	1	3		1
48	N. levidensis (W.Smith) Grunow		3				
49	N. litoralis Gruow			1		1	
50	N. linearis (Agardh) W.Smith	o- β	1	1			1
51	N. recta Hantzsch	β -α	1		3		
52	N. sigmoidea (Nitzsch) W.Smith	β		3		3	
53	**Pinnularia** microstauron (Ehrenberg) Cleve	o-x	3	1			1

54	P.microstauron var. Brebisonii (Kützing) Mayer	x	3	1			
55	**Planothidium** ellipticum (Cleve) Round		3	1			
56	P. lanceolatum (Brébisson) Round		3				1
57	Reimeria sinuata (Greg.) Kociolek & Stoermer			1		3	
58	Rhoicosphaenia abbreviata (Ag.)Lange-Bertalot	x-o	1		1	1	
59	**Sellaphora** pupula [Kützing] Mjereschowsky	α		1	3	1	
60	S. pupula fo. rostrata (Hustedt) Bukhtiyarova		1				
61	**Stauroneis** smithii Grunow	x-o	1	1		1	1
62	S. anceps Ehrb.		1		1		
63	**Surirella** angusta Kützing	o		1			1
64	S. brebissonii var. kuetzingii Krammer & L-B.			1		3	
65	S. ovalis Breb.	o	1		1		1
66	S. robusta Ehrenberg				1	1	
67	**Synedra** acus Hustedt		1	1		1	1
68	S. nana Meister			1	1		
69	S. ulna Kützing		1			1	1
	Total number of species per locality		42	38	30	36	35

Cyclotella ocellata

Cocconeis pediculus



Diatoma vulgaris

Navicula lanceolata Gomphonema parvulum

Nitzschia sigmoidea Rhoicosphaenia abbreviata Synedra ulna & Meridian circulare

Figure 3. Diatoma of river "Drino" during autumn season 2012

Conclusions:

1. In river Drino during autumn season 2012 determined 69 diatoma species.
2. Bioindicator species are 35.
3. Dominanted the beta mesosaprobic bioindicators (9 bioindicators species).
4. Determined 7 species which belongs to oligo-beta mesaprob (o- β) level saprobity.
5. Determined 4 species which belongs to alfa mesosaprobic (α) level saprobity.
6. Not found bioindicators species which belongs to polisaprob (p) level of saprobity.
7. According to the bioindicators, investigate waters classified in second - II- class of bonity respectively at beta mesosaprob level.

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