Composition and structure of algal communities of the River Someş Basin

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Abstract

Species composition and algal community organisation were studied in 34 sample sites located along the main river courses of the Someş Basin. Relative abundance of species in the communities was performed and expressed as percentage. The frequency distribution pattern of the species has been described by employing the truncated normal curve model. Affinities at the level of algal communities have been tested by cluster analysis using the floristic similarity index of Sorensen. Species diversity, as well as relative information has also been computed according to Shannon's formula. Diatoms were found to be dominant in the river communities both as number of taxa and population density. They were used to evaluate the saprobic status of water in sampling sites. Floristic composition and structure of the investigated communities inhabiting the river sectors were found to differ according to the local conditions.

Key words: algae, Transylvanian rivers, diversity, relative abundance, floristic affinities, saprobic status.

Introduction

The algae of the Transylvanian running waters have not yet been well documented. The first phycological records were provided by Schaarschmidt (1879-1893) and forty five years later by Lepşi (1925-1926). The investigations carried out by Robert during the sixties (1960-1969) have mainly floristic character and concern a number of selected springs an rivers (the Mureş River at Târgu Mureş, some of the oxbow lakes of the Mureş, the Şieu River, some saline rivulets at Sângeorgiu de Mureş, freshwater springs at Cluj etc). Later, Péterfi & Momeu (1984, 1985), Momeu, Peterfi, Pandi-Gacsadi & Şipoş (1988) investigated the structure of diatom communities of the Arieş, Ampoi and Crişu Repede rivers. Algal communities inhabiting the running waters of the Retezat National Park have been investigated by Péterfi (1993). Recently, Hamar (1995) published the algae of the river Mureş.

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As concerning the Someş Basin, Prunescu-Arion & Baltac (1967) published the first hydrobiological investigation on the river Someşul Cald, one of the main branches, from the spring (Peştera Rădesei) to its confluence at Gilău with the Someşul Rece branch. Unfortunately, their data concerning the algal communities are rather unsatisfactory. The systematic studies on the composition and structure of algal communities on the whole Someş Basin started in the early nineties by the algology team of the Institute of Biological Research, Cluj-Napoca, by Péterfi, Momeu and Rasiga. They analysed the species composition of algal flora, the structure of communities in natural and polluted sectors of the river, from the mountainous regions to the lowland (Rasiga, Péterfi & Momeu, 1992, 1994, 1995/1996, 1996, 1997). It should be mentioned that more recently Nagy-Tóth (see in this volume) carried out floristic observations on the river Someş.

Material and methods

The algae were sampled from the main water courses of the Someş Basin, using standards methods for benthic river communities. The samples were taken from previously selected stand sampling sits, during the years 1993-1996 (in May 1993 from the River Someşul Rece, in May 1994 from the river Someşul Cald, in May 1995 from the Someşul Mic, in May 1993 and June 1996 from the Someşul Mare, and in July 1996 from the river Someş, 'united' Someş (Figure 1.).

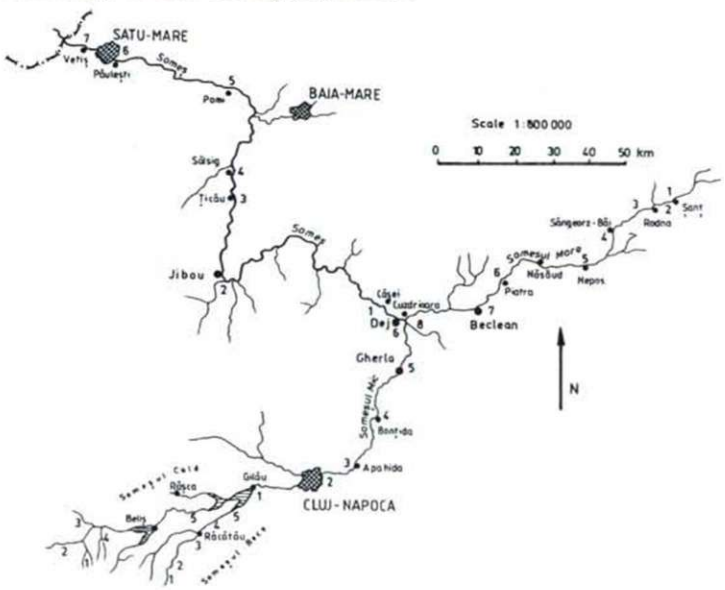

Figure 1. Sampling sites in the five investigated water courses of the Someş Basin. Someşul Rece: 1-downstream Blăjoaia, 2-downstream the dam, 3-upstream Răcătău, 4-at the electric plant, 5-upstream Someşull Rece-village. Someşl Cald: 1-Pârâul Rosu, 2-Izbuc Valley, 3-Ponor Valley, 4-Călineasa Valley, 5-at the electric power station; 1-Fântânele dam reservoir, 2-Tarniţa dam reservoir, 3-Gilău dam reservoir. Someşul Mic: 1-Gilău, 2-downstream Cluj-N., 3-Apahida, 4-downstream Bontida, 5-downstream Gherla, 6-upstream Dej. Someşul Mare: 1-upstream Şant, 2-upstream Rodna, 3-downstream Rodna, 4-downstream Sângeorz-Băi, 5-Nepos, 6-Piatra, 7-Beclean, 8-Cuzdrioara. 'united' Someş: 1-downstream Dej, 2-upstream Jibou, 3-icău, 4Sălsig, 5-Pomi, 6-Piăuleşti, 7-Vetiş.

There were also sampled by means of a plankton net (27 um mesh) the artificial dam reservoirs of the river Someşul Cald and the potamoplankton of the 'united' Someş. The samples were fixed with 4 % formalin and studied in light microscope (Npfk, Interfako - Carl Zeiss, Jena). For standard observations the diatoms were simply mounted in colophony and examined by Planchromat HI 100x/1,30 immersion lens. The relative quantitative studies on diatoms were performed by counting the individuals in 20 microscopic fields/sample. The contribution of each species to community structure (stand) was established in percentage. Species diversity in stand samples was computed by using Shannon's formula. Floristic affinities between communities was tested by the index attributed to Srenssen, based on the presence-absence data. The structure of community was described by truncated normal curves (Patrick et al., 1954). Based on floristic composition the saprobic degree of the water along the river was evaluated by the method of Zelinka and Marvan (1961).

Results

Comments on floristic aspects

In the samples collected in the river Someşul Rece 121 diatom species were identified (Table 1.), the other groups were neglected. In the river Someşul Cald, including dam reservoirs were found 181 algal species, which belong to the following divisions: *Cyanophyta* - 9, *Chrysophyta* - 6, *Bacillariophyta* - 158, *Chlorophyta* - 7 and *Dinophyta* - 2. The number os species was slightly different in the river (118) as compared to the reservoirs (139). In the river Someşul Mic (downstream the confluence of the two branches), 168 species were identified: *Cyanophyta* - 8, *Bacillariophyta* - 143, *Chlorophyta* - 14, *Euglenophyta* - 3.

The river Someşul Mare river was sampled twice, the total number of identified species being 272: 165 in May 1993 and 228 in June 1996, 122 being common for both samplings. They are distributed to the following divisions: 1993- *Cyanophyta* - 3, *Chrysophyta* - 1, *Bacillariophyta* - 152, *Chlorophyta* - 7, *Euglenophyta* - 2; 1996- *Cyanophyta* - 13, *Chrysophyta* - 2, *Xanthophyta* - 2, *Bacillariophyta* - 159, *Chlorophyta* - 32, *Euglenophyta* - 20.

In the 'united' River Someş 323 algal taxa were recognised: 272 in the potamoplankton (*Cyanophyta* - 8, *Chrysophyta* - 2, *Xanthophyta* - 1, *Bacillariophyta* - 137, *Chlorophyta* - 98, *Euglenophyta* - 30, *Dinophyta* - 1) and 220 in the benthic communities (*Cyanophyta* - 13, *Chrysophyta* - 2, *Bacillariophyta* - 142, *Chlorophyta* - 49, *Euglenophyta* - 14) (Figures 2., 3.).

According to the present findings, all communities are dominated by diatoms, a normal state in running waters, the other groups being less important quantitatively, except green algae in the 'united' Someş potamoplankton. The chlorophytes are very few indeed in the upper part of the basin (Someşul Cald, Someşul Mare), their diversity is

growing slowly downstream, especially in June, and became really high in the 'united' Someş. The same is true for the euglenoid flagellates. They are few or lacking uphill the different branches and tributaries of the Someş, showing a growing tendency towards downstream (Figures 4., 5.).

The check lists of species for the five investigated water courses are given in Tables 1-4. Most of the species are common forms, widely distributed and have great ecological tolerance, like *Achnanthes minutissima, A. lanceolata, Amphora pediculus, Cymbella minuta, C. silesiaca, Diatoma vulgaris, Cocconeis placentula, Fragilaria ulna, Gomphonema parvulum, G. olivaceum, Navicula lanceolata, N. cryptocephala, Nitzschia dissipata, N. linearis, Surirella brebissonii etc - Bacillariophyta; Closterium moniliferum, Cosmarium formosulum, Kirchneriella obesa, Pediastrum boryanum, Scenedesmus* species - *Chlorophyta*).

In spite of this species group, almost common for the whole Someş Basin, the distinguishing pattern of the investigated water courses is given by the occurrence and abundance of those species which are less tolerant and are characteristic for overall local environmental conditions. As such, in the mountain water courses (Someşul Rece, Someşul Cald, Someşul Mare-upper part), especially towards their origins, the presence of clear water forms, characteristic for fast running cold rivers (rheophilous, katharobic, preferring lower mineral content) is obvious. To this category belong *Oscillatoria boryana, O. simplicissima - Cyanophyta; Chrysococcus rufescens, Hydrurus foetidus - Chrysophyta; Achnanthes bioretii, Diatoma mesodon, D. hyemalis, Fragilaria arcus, F. virescens, Meridion circulare, Navicula cryptotenella, Gomphonema angustum etc - Bacillariophyta; Ophyocytium cochleare, Goniochloris mutica, Ulothrix zonata - Chlorophyta* which are usually frequent, sometimes quite abundant in such uphill communities. There are also present in such habitats some alien species, which were washed into the rivulets from the surroundings (bogs, terrestrial habitats): *Achananthes subatomoides, Fragilaria pinnata, F. montana Tabellaria flocculosa, Navicula variostriata, N. contenta, N. gallica var. perpusilla, N. nivalis, Cymbella sinuata, Stauroneis smithii, Pinnularia* and *Eunotia* species etc - *Bacillariophyta*; *Netrium digitus - Chlorophyta* etc.

The communities inhabiting the lower portions of the mountain rivers (S. Rece upstream S. Rece-village, S. Cald at the water plant, S. Mare at Beclean and Cuzdrioara) exhibit a much higher species diversity due to the frequency of many ubiquistous forms, or species tolerating organic pollution, or adapted to more or less eutrophic conditions. Their occurrence clearly indicate the presence of eutrophication, as well as general pollution mainly due to human activities.

The communities inhabiting the Someşul Cald dam reservoirs are dominated by species characteristic for such habitats (*Asterionella formosa, Fragilaria crotonensis, F. construens)*, but also by the appearance of other phytoplanktonic species (*Oscillatoria lacustris, O. limosa, O. planctonica - Cyanophyta; Uroglena volvox, Dinobryon divergens, Mallomonas acaroides, Synura spinosa, Chrysosphaerella pseudospinosa-*

Chrysophyta; Fragilaria acus - Bacillariophyta; Oocystys lacustris, O. planctonica, Pseudosphaerocystis lacustris - Chlorophyta; Peridinium willei, Ceratium hirundinella - Dinophyta). The Fântânele reservoir exhibited the lowest phytoplankton diversity, the others, situated downstream, became more and more diversified. The number of species was lowest in the Fântânele reservoir, and the highest in Gilău (Fântânele - 10 species, Tarnița - 47 and Gilău - 68). In the Tarnița and Gilău reservoirs the phytoplnakton is more diversified than the others, due to the frequency of tychoplanktonic and indifferent forms. As concerning the benthic communities, they exhibit the same pattern: the lowest the altitude, the highest the species number and diversity (73 respectively 86 species). Besides the typical forms for such habitats (*Navicula pygmaea, Cymbella lanceolata* etc) there are many coenoxene and tychocoenotic ones.

In the river Someşul Mic the communities are dominated by ubiqiustous and cosmopolitan elements. For these communities, as compared with the montane water courses, the quantitative spectra exhibit diversity and heterogenity, with several frequent or abundant species. One should note in the Someşul Mic river downstream Cluj-Napoca, the occurrence of some tolerant species, adapted to high organic loading (*Navicula accomoda, N. subminuscula, Nitzschia palea - Bacillariophyta; Euglena proxima, E. texta - Euglenophyta*). Some of them were found subdominant others occurred less abundant.

In the 'united' Someş there are many new algal forms, lacking upstream some of them are typical plankton forms mostly chlorophytes (*Chlamydomonas metapyrenigera, C. monadina, Chlorella luteo-viridis, Coelastrum microporum, C. sphaericum, Eudorina elegans, Gonium pectorale, Pandorina morum, Pediastrum boryanum*) and euglenophytes (*Euglena acus, E. ehrenbergii, E. polymorpha, Lepocinclis ovum, Trachelomonas hispida, Strombomonas gibberosus, S. verrucosa* etc) but plankton diatoms are not lacking (*Asterionella formosa, Fragilaria crotonensis, Aulacoseira italica, Surirella splendida*). The number of preferentially eutrophic or saprophilous species is quite high (*Ankyra lanceolata, Cladophora glomerata, Closterium acutum, Euglena spirogyra, E. tristella, E. variabilis, Ceratium hirundinella, Oscillatoria brevipes, O. chlorina, O. princeps, O. tenuis, Pyrobotrys casinoensis, Stigeoclonium tenue, Lepocinclis ovum, L. texta, Nitzschia acicularis, Navicula viridula, N. trivialis* etc), among them some became dominant or abundant (*Cyclotella meneghiniana, Nitzschia palea, Navicula subminuscula, Nitzschia inconspicua*).

It is worth to mention the occurrence of many halophilous diatoms, most often recorded from sea water, littoral zone, estuaries or continental salt waters (*Gyrosigma scalproides, Navicula cincta, N. cuspidata, N. goeppertiana, N. pygmaea, N. slesvicensis, N. trivialis, Nitzschia calida, N. constricta, N. hungarica, N. inconspicua, N. intermedia, N. nana, N. reversa, N. sigma, N. sigmoidea, N. umbonata, N. vermicularis, Achnanthes brevipes, Amphora veneta, Entomoneis paludosa v. subsalina, Gomphonema augur, Navicula bacillum, N. halophila, N. salinarum, N. spicula, Nitzschia dubia, N. geitlerii, N. levidensis, N. lorenziana, N. tryblionella* etc). Some of them are quite frequent in the communities (*Cyclotella meneghiniana, Navicula erifuga,*

Thalassiosira weissflogii). The number of halophilous species is high in the 'united' Someş towards downstream Sălsig, then exhibits a lowering tendency, downstream Pomi they became quite rare.

Structure of the communities

The truncated normal curves suggest that the structures of communities inhabiting the upper part of the Someşul Rece, and partly the Someşul Cald and the Someşul Mare rivers are very near to those describing the natural character of unpolluted waters (Patrick et al., 1966). On the other hand the curves describing the structure of communities occurring in the lower part of the above mentioned rivers (ex. at the water plant station on the S. Rece) are characterised by somewhat flattened curves, with their modal interval shifted to the right, indicated slightly altered community structures.

The form of the curve obtained for the community inhabiting the Pârâu Roşu (branch of the Someşul Cald near its origin) looks very similar with those published by Patrick et al. (1966) for communities living in a distrophic stream or in a heavy polluted river. Because the Pârâu Roşu is a clear watered, fast running montane rivulet in which any pollution should be excluded, our findings could be explained by the somewhat distrophic, extreme conditions of the water. These conditions should be responsible for the low number of species (30) and their frequency distribution, with the dominance of a single species (*Diatoma mesodon* formed 85 % of the community).

The curves constructed for the communities inhabiting the lower part of the Someşul Cald (electric power station) and Someşul Mare (at Piatra) rivers, as well as the Someşul Mic (downstream Bonţida) indicate marked alteration of the structures. The shape of curves, namely the height and shifting of the modules, number of covered intervals, the values of H, 2, k, all suggest community diversification, caused by eutrophication and general pollution stress.

Based on floristic affinity there are two different community types (similarity level 65 %) in the River Someşul Rece, one characteristic for the upper course (stands 1, 2), the other for the lower sector (stands 3-5). The communities of the River Someşul Cald exhibit a similarity level of 50-60 %, those occurring in the Izbuc and Călineasa Valleys form a group joining at 65 % similarity level

It is normal that the plankton community of the Fântânele dam reservoir differs very much from those of Tarniţa and Gilău, being practically unispecific. The different communities of Gilău dam reservoir exhibits floristic affinities at 65 % level. The phytoplanktonic and epiphytic ones were the most similar.

High floristic similarity (over 70 %) show the communities of the river Someşul Mic, the highest being between the heavily polluted Bonţida and Gherla stands (about 80 %).

As concerning the river Someşul Mare, in May 1993 the communities of its upper course (stands 2-4) exhibited the highest (70 %) floristic affinity. The downstream

communities joined this aggregate, one by one, at lower levels. In June 1996, the communities were distributed in three small groups, corresponding to the upper, middle and lower courses of the river.

The plankton communities of the 'united' River Someş are rather homogenous, excepting the Păuleşti stand (6), very poor in algal species, these exhibit floristic affinity at 65-70 % similarity level. The benthic communities inhabiting the upper course (stands 1-3) are grouped at 70 % similarity level, those from the downstream course join the group at lower levels .

The specific diversity index exhibit a growing tendency from upstream towards downstream, namely from the montane towards the lower sectors of the rivers (Someşul Rece, Someşul Cald, Someşul Mare). The communities from the Someşul Mic river show an opposite tendency. In the 'united' Someş the diversity is rather uniform, being somewhat higher in the upper portion (downstream the confluence of its two branches).

The analysis of saprobity, based on diatoms, pointed out the xeno-, oligo- or beta-mesosaprobic character of the rivers from the upper basin. In the lower course of the Someşul Mare, but especially in the Someşul Mic rivers, the saprobity index show step by step, evident growth tendency towards their lower sectors. The same gradual growing tendency is true for the 'united' River Someş .

Conclusions

1. The natural character of the algal floras in the Someş Basin given mainly by geographic and hydrologic factors, sometimes is markedly affect by anthropic influences.

- The specific pattern of the montane water courses is given by the occurrence of rheophilous, katharobic, microthermal species, adapted to low mineral content.
- The lower sectors are characterised by the frequency of species with eutrophic preferences, the water courses being affected by the growing amount of nutrients and organic substances, dischharged into the rivers, partly due to human activities.
- The high frequency of tolerant algal species, preferencially eutrophic or saprobionts, indicated strongly eutrophic water courses (downstream Cluj, Dej, and on the lowland), with marked organic loading, due to intensive agriculture, industry and household wastes.

2. The structural features of the communities (relative abundance, frequency distribution of the species, floristic affinity and species diversity) confirm the presence of specific ecological algal groups characteristic for the different watercourses.

3. The analyses performed on the saprobic status of the river, by employing indices based on diatom populations structure, emphasised the gradual reduction of water quality along the longitudinal section of the Someş Basin, especially in the water courses found under human impact.

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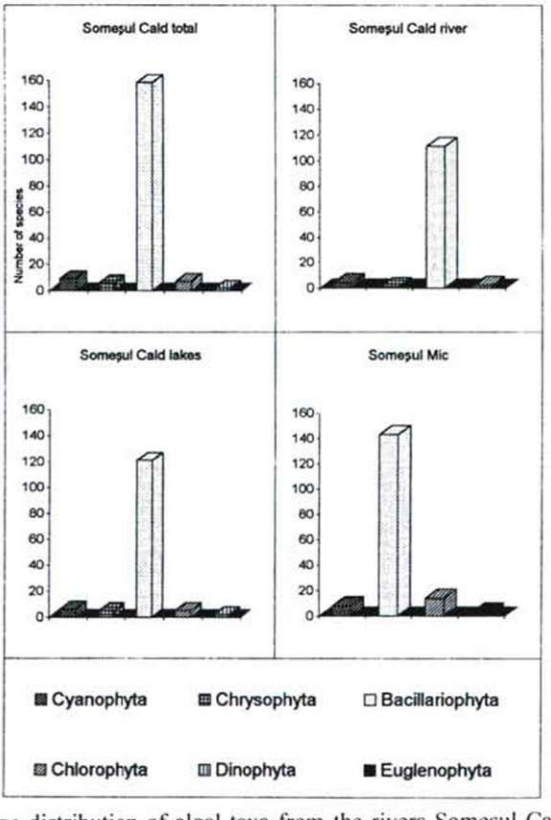

Figure 2. Percentage distribution of algal taxa from the rivers Someşul Cald and Someşul Mic rivers, to the main divisions

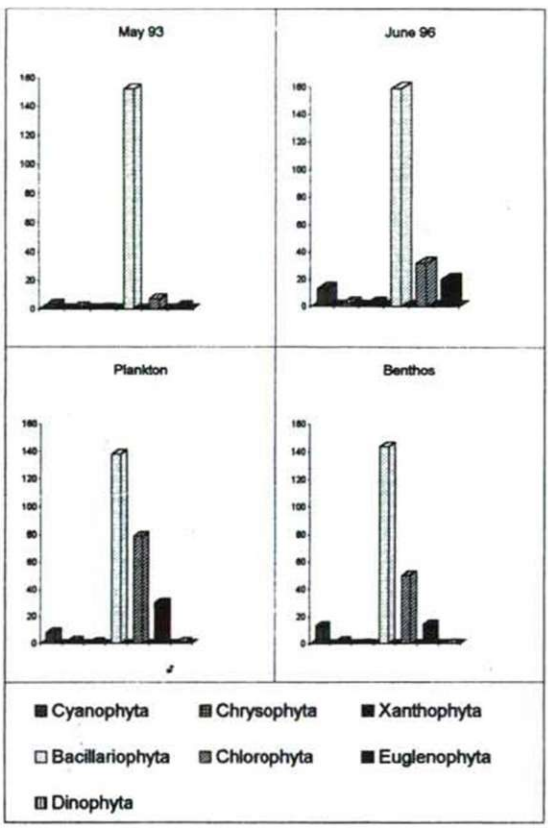

Figure 3. Percentage distribution of algal taxa from the Someşul Mare and 'united' Someş, to the main divisions

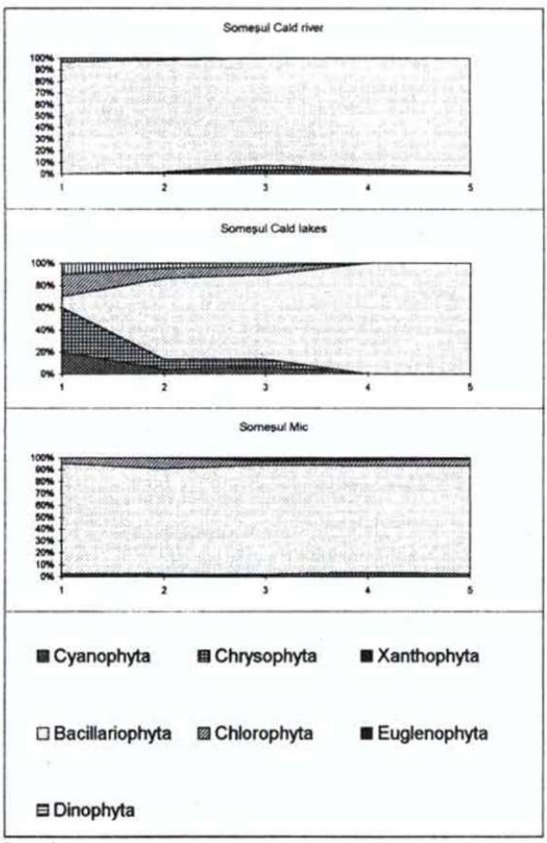

Figure 4. Changes in the number of taxa in the various sampling sites from the rivers Someşul Cald and Someşul Mic

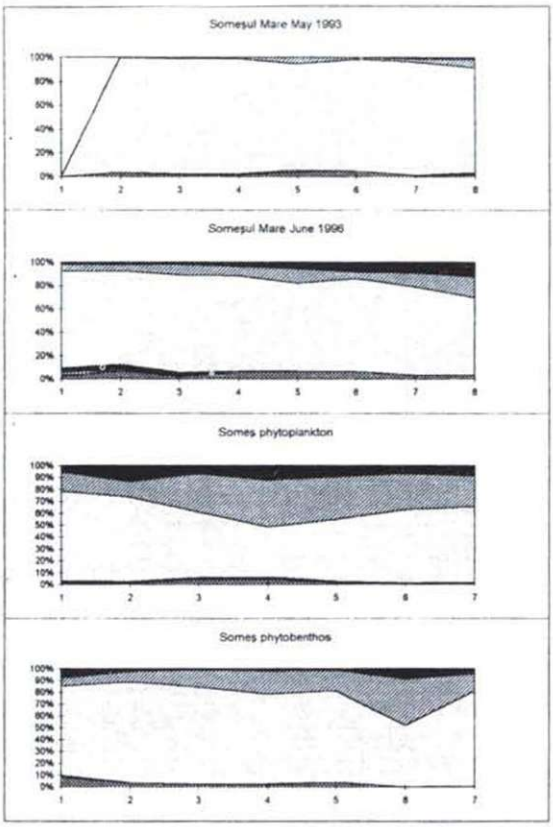

Figure 5. Changes in the number of taxa in the various sampling sites from the rivers Someşul Mare and 'united' Someş

Table 1. Floristic composition of algal communities in the Someşul Mic river

Nr. crt.	Taxa	Sampling sites															
		Someşul Rece					Someşul Cald					Someşul Mic					
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	6
	CYANOPHYTA																
1	*Microcystis aeruginosa*												+		+		
2	*Oscillatoria boryana*									+		+	+		+		
3	*O. chalybaea*											+		+	+		
4	*O. deflexoides*							+		+							
5	*O. gemminata*															+	
6	*O. limosa*											+					
7	*O. pseudogemminata*															+	
8	*O. simplicissima*										+						
9	*Phormidium molle*																
10	*P. uncinatum*													+			
	CHRYSOPHYTA																
1	*Hydrurus phoetidus*								+								
	BACILLARIOPHYTA																
1	*Achnanthes bioretii*	+	+	+	+	+		+	+	+	+	+	+		+		
2	*A. clevei*			+									+				
3	*A. conspicua*							+		+	+						
4	*A. exigua*			+													+
5	*A. hungarica*																+
6	*A. lanceolata*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
7	*A. laterostrata*										+						+
8	*A. minutissima*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
9	*A. oblongella*		+														
10	*A. peragalli*										+						
11	*A. subatomoides*	+	+	+	+	+	+	+		+	+		+				
12	*A. thermalis*			+													
13	*Amphora libyca*					+		+				+	+	+	+		+
14	*A. ovalis*			+		+					+	+		+			+
15	*A. pediculus*	+		+	+	+	+	+	+	+	+	+	+	+	+	+	
16	*A. veneta*					+											
17	*Anomoeoneis brachysira*			+													+
18	*A. sphaerophora*											+		+	+	+	+
19	*Asterionella formosa*										+	+	+	+	+	+	+
20	*Aulacoseira distans*	+			+	+					+						
21	*A. italica*										+						
	A. italica v. subarctica	+															
22	*A. granulata*												+				+
23	*Caloneis amphisbaena*					+						+			+	+	
24	*C. bacillum*						+	+			+	+					
25	*C. silicula*					+		+			+	+	+	+			+
26	*Cocconeis neodiminuta*							+		+	+	+	+				+
27	*C. pediculus*				+	+		+		+	+	+	+		+	+	+

Table 1. continue

28	*C. placentula*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
29	*Cyclotella comensis*											+	+	+	+	+	+
30	*C. meneghiniana*										+		+	+	+	+	+
31	*C. radiosa*											+	+		+	+	+
32	*Cymatopleura solea*											+		+	+	+	+
33	*Cymbella affinis*			+		+	+			+		+	+	+		+	
34	*C. amphicephala*							+				+					
35	*C. aspera*							+									
36	*C. caespitosa*											+		+	+	+	+
37	*C. cistula*		+	+	+	+					+	+	+	+	+		
38	*C. cuspidata*														+		
39	*C. cymbiformis*	+				+											
40	*C. gracilis*							+			+						+
41	*C. helvetica*	+	+	+	+	+					+	+	+	+	+	+	
42	*C. lanceolata*											+		+			
43	*C. mesiana*	+								+							
44	*C. microcephala*									+		+					+
45	*C. minuta*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
46	*C. naviculiformis*		+	+		+		+			+	+		+	+		+
47	*C. prostrata*					+						+	+	+	+	+	+
48	*C. silesiaca*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
49	*C. sinuata*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
50	*C. subaequalis*							+									+
51	*C. tumida*				+							+		+	+	+	
52	*C. turgidula*											+		+	+		
53	*Diatoma anceps*	+									+						+
54	*D. mesodon*	+	+	+	+	+	+	+	+	+	+	+	+		+		+
55	*D. moniliformis*											+	+	+	+	+	
56	*D. tenuis*											+					+
57	*D. vulgaris*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
58	*Denticula kutzingii*											+					+
59	*D. tenuis*			+			+	+		+		+	+	+	+	+	
60	*Diploneis elliptica*			+							+	+		+			
61	*D. oblongella*			+		+											
62	*D. ovalis*							+		+	+						
63	*D. puella*												+				
64	*Epithemia sorex*											+					
65	*E. turgida*													+			
66	*Eunotia bilunaris*			+								+					
67	*E. exigua*			+			+	+									
68	*E. minor*							+	+								
69	*E. muscicola v. tridentula*	+	+														
70	*E. praerupta*										+						
71	*E. soleirolii*	+		+													
72	*E. sudetica et v. bidens*	+			+	+	+		+								
73	*E. tenella*	+	+	+											+		+

Table 1. continue

74	*Fragilaria acus*											+	+	+	+	+	+
75	*F. arcus*	+	+	+	+	+	+		+		+	+	+	+	+	+	+
76	*F. capucina*	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+
77	*F. construens*	+	+	+	+	+				+	+	+	+	+	+	+	
78	*F. crotonensis*										+	+					
79	*F. dilatata*											+		+			
80	*F. leptostauron*	+		+								+					
81	*F. montana*			+		+					+						
82	*F.parasitica v. subconstricta*										+		+				
83	*F. pinnata*	+	+	+	+		+	+	+	+	+						+
84	*F. ulna*	+	+	+	+	+			+	+	+	+	+	+	+	+	
85	*F. virescens*	+	+		+	+					+						
86	*Frustulia vulgaris*			+	+	+					+	+		+		+	
87	*Gomphonema acuminatum*	+	+		+							+		+		+	
88	*G. cf angustatum*	+		+	+	+	+	+		+	+						+
89	*G. cf. angustum*			+			+	+	+	+	+						
90	*G. clavatum*	+		+	+			+		+	+				+		
91	*G. gracile*													+	+	+	
92	*G. cf. minutum*											+	+	+	+		+
93	*G. olivaceum*	+				+			+		+	+	+	+	+	+	+
94	*G. parvulum*	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+
95	*G. tergestinum*						+	+			+	+					+
96	*G. truncatum*				+					+	+	+	+	+	+	+	+
97	*Gyrosigma acuminatum*											+	+	+	+	+	
98	*G. attenuatum*											+					
99	*G. nodiferum*					+						+					+
100	*G. scalproides*											+				+	
101	*G. spencerii*					+					+						+
102	*Hantzschia amphioxys*					+		+				+	+	+			+
103	*Melosira varians*										+	+	+	+	+	+	+
104	*Meridion circulare*	+	+	+	+	+	+	+		+	+	+		+		+	+
105	*Navicula accomoda*										+	+	+	+	+	+	
106	*N. angusta*									+							
107	*N. capitata*										+	+		+	+	+	+
108	*N. capitatoradiata*										+	+	+	+	+	+	
109	*N. cincta*											+					
110	*N. cocconeiformis*												+	+			
111	*N. contenta*			+													
112	*N. cryptocephala*	+		+	+	+		+		+	+	+	+	+	+	+	+
113	*N. cryptotenella*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
114	*N. cuspidata*											+		+			
115	*N. decussis*				+	+					+	+					
116	*N. elginensis*		+	+		+					+	+					
117	*N. gallica v. perpusilla*			+							+						
118	*N. goeppertiana*													+	+	+	+
119	*N. gregaria*	+		+	+	+					+	+	+	+	+	+	

Table 1. continue

120	*N. insociabilis*			+												+
121	*N. lanceolata*	+	+	+	+	+	+	+	+		+	+	+	+	+	+	
122	*N. medioconvexa*	+															
123	*N. menisculus*							+		+				+		+	+
124	*N. minima*	+	+	+	+	+		+		+	+	+	+	+	+		
125	*N. minuscula*	+	+	+	+	+		+				+			+	+	+
126	*N. mutica*	+	+	+								+		+			+
127	*N. nivalis*									+							
128	*N. oppugnata*											+					
129	*N. pelliculosa*			+	+					+	+		+	+	+	+	
130	*N. pseudobryophila*			+													
131	*N. pseudoscutiformis*	+															
132	*N. pupula*	+		+	+	+		+	+	+	+	+					
133	*N. pygmaea*											+	+			+	
134	*N. radiosa*						+	+		+		+	+	+		+	
135	*N. recens*										+						
136	*N. reinhardtii*							+									
137	*N. rhynchocephala*	+	+		+	+					+			+			
138	*N. salinarum*													+			
139	*N. schroeterii*											+					
140	*N. seminulum*												+	+			
141	*N. slesvicensis*													+		+	
142	*N. striolata*							+									+
143	*N. subminuscula*										+	+	+	+	+	+	
144	*N. tenelloides*			+	+	+											+
145	*N. tripunctata*	+		+		+		+			+	+	+	+	+	+	
146	*N. trivialis*										+	+	+	+	+		
147	*N. variostriata*	+															
148	*N. veneta*														+	+	
149	*N. viridula*										+	+		+	+	+	
150	*Neidium affine*			+								+					
151	*N. ampliatum*											+					
152	*N. binodeformis*									+							
153	*N. bisulcatum*	+		+													
154	*N. dubium*									+		+		+			+
155	*Nitzschia acicularis*										+	+			+	+	
156	*N. amphibia*	+		+							+	+					
157	*N. brevissima*											+				+	+
158	*N. capitellata*											+		+	+	+	
159	*N. constricta*													+			+
160	*N. dissipata*			+	+	+	+	+		+	+	+	+	+	+	+	
161	*N. dubia*													+			
162	*N. cf. filiformis*															+	
163	*N. fonticola*											+		+	+		+
164	*N. frustulum*					+		+	+	+	+	+	+	+	+	+	
165	*N. gracilis*										+						

Table 1. continue

166	*N. hantzschiana*			+	+	+		+	+		+	+					
167	*N. heufleriana*										+	+					
168	*N. homburgiensis*	+		+							+						
169	*N. hungarica*											+		+	+		+
170	*N. inconspicua*										+	+	+	+	+	+	+
171	*N. linearis*			+	+	+		+			+	+	+	+	+	+	
172	*N. microcephala*	+											+				+
173	*N. palea*	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+
174	*N. paleacea*											+		+	+	+	
175	*N. pura*								+	+							
176	*N. pusilla*							+		+	+	+	+	+	+	+	
177	*N. recta*											+		+	+		
178	*N. sigmoidea*											+					
179	*N. sinuata*									+							
	N. sinuata v. tabellaria					+						+	+				
180	*N. sociabilis*											+					
181	*N. sublinearis*										+	+	+	+	+	+	
182	*N. tryblionella*											+			+		
183	*N. vermicularis*											+	+	+			
184	*Pinnularia borealis*	+								+	+						
185	*P. gibba*				+												
186	*P. interrupta*	+		+		+					+						
187	*P. microstauron*	+		+		+	+					+					
188	*P. subcapitata*	+	+	+		+		+	+		+	+					
189	*P. viridis*	+	+	+		+	+				+	+					+
190	*Rhoicosphaenia abbreviata*			+	+	+				+	+	+	+		+	+	
191	*Rhopalodia brebissonii*											+					
192	*R. gibba v. parallela*			+													
193	*Stauroneis anceps*							+		+	+	+					
194	*S. kriegerii*	+							+								
195	*S. phoenicenteron*	+		+	+					+							
196	*S. smithii*			+						+		+					+
197	*Stephanodiscus cf. dubius*											+					
198	*S. hantzschii*											+					+
199	*Surirella angusta*			+	+	+				+	+	+		+			
200	*S. bifrons*					+											+
201	*S. brebissonii*			+		+					+	+	+	+	+	+	
202	*S. linearis*											+	+		+	+	+
203	*S. minuta*											+	+	+	+	+	
204	*S. ovalis*							+		+	+			+		+	
205	*S. splendida*										+	+					
206	*Tabellaria fenestrata*											+					
207	*T. flocculosa*	+	+					+	+		+	+		+		+	
	CHLOROPHYTA																
1	*Chlorella vulgaris*															+	
2	*Closterium acerosum*														+		

Table 1. continue

3	*C. moniliferum*						+					+	+				
4	*Kirchneriella subcapitata*											+					
5	*Monoraphidium arcuatum*												+				
6	*M. contortum*												+				
7	*Netrium digitus*							+									
8	*Pediastrum boryanum*											+				+	
9	*Scenedesmus acutus*											+	+	+			
10	*S. armatus*											+		+	+		
11	*Schroederia setigera*												+				
12	*Staurastrum tetracerum*												+				
13	*Stigeoclonium fasciculare*												+	+	+	+	
14	*S. tenue*															+	
15	*S. variabilis*														+		
	EUGLENOPHYTA																
1	*Colacium epiphyticum*													+	+		
2	*Euglena proxima*													+	+	+	
3	*E. texta*													+			

Table 2. Floristic composition of algal communities in the dam reservoirs of Someşul Cald river

Nr. crt.	Taxa	Sampling sites				
		Fântânele	Tarniţa	Gilău		
		plankton	plankton	plankton	benthos	epiphyton
	CYANOPHYTA					
1	*Chroococcus turgidus*	+	+			
2	*Merismopedia glauca*	+	+			
3	*Oscillatoria boryana*			+		
4	*O. lacustris*			+		
5	*O. limosa*			+		
6	*O. planctonica*			+		
	CHRYSOPHYTA					
1	*Uroglena volvox*	+	+	+		
2	*Dinobryon divergens*	+	+	+		
3	*Mallomonas acaroides*	+	+	+		
4	*Synura spinosa*			+		
5	*Chrysosphaerella brevispinosa*	+	+	+		
	BACILLARIOPHYTA					
1	*Achnanthes bioretii*		+	+		+
2	*A. clevei v. rostrata*					+
3	*A. lanceolata*		+	+	+	+
4	*A. laterostrata*					+
5	*A. minutissima*		+	+	+	+ D
6	*A. peragalli*					+
7	*Amphora inariensis*			+		+
8	*A. libyca*		+		+	+
9	*A. montana*				+	
10	*A. pediculus*			+	+	+
11	*Anomoeoneis vitrea*			+	+	+
12	*Asterionella formosa*	+ D	+ D	+ CD	+	+
13	*Caloneis amphisbaena*				+	
14	*C. silicula*				+	
15	*Cocconeis placentula*			+	+	+
16	*Cyclotella meneghiniana*			+		+
17	*Cymatopleura solea*				+	
18	*Cymbella caespitosa*			+		+
19	*C. cistula*			+	+	+
20	*C. cuspidata*		+		+	
21	*C. helvetica*			+	+	
22	*C. lanceolata*			+	+	+
23	*C. microcephala*					+
24	*C. minuta*			+	+	+
25	*C. prostrata*		+			
26	*C. proxima*					+
27	*C. silesiaca*		+	+	+	+
28	*C. sinuata*			+	+	+
29	*C. subaequalis*		+			

Table 2. continue

30	*C. tumida*				+	
31	*C. turgida*				+	
32	*C. turgidula*		+		+	+
33	*Diatoma mesodon*		+		+	
34	*D. vulgaris*		+	+	+	+
35	*Denticula kuetzingii*			+		+
36	*D. tenuis*			+	+	+
37	*Diploneis parma*		+		+	+
38	*D.petersenii*		+			
39	*D. puella*		+	+		+
40	*Eunotia bilunaris*			+		
41	*Fragilaria arcus*		+	+	+	+
42	*F. capucina*		+	+	+	+
43	*F. construens*			+	+	+
44	*F. crotonensis*		+ CD	+ D		+ CD
45	*F. delicatissima*			+	+	+
46	*F. dilatata*			+	+	+
47	*F. leptostauron*					+
48	*F. parasitica v. subconstricta*				+	
49	*F. pinnata*		+	+	+	+
50	*F. ulna*		+	+	+	+
51	*F. virescens*					+
52	*Frustulia vulgaris*			+	+	+
53	*Gomphonema acuminatum*			+	+	+
54	*G. cf. angustatum*			+	+	
55	*G. gracile*					+
56	*G. olivaceum*				+	
57	*G. parvulum*				+	+
58	*G. tergestinum*		+			
59	*Gyrosigma nodiferum*				+	
60	*G. scalproides*				+	
61	*G. spencerii*		+	+	+	+
62	*Hantzschia amphioxys*				+	
63	*Melosira varians*			+		+
64	*Meridion circulare*				+	+
65	*Navicula bacillum*			+		
66	*N. bryophila*		+			
67	*N. capitata*		+	+	+	+
68	*N. capitatoradiata*			+	+	
69	*N. cryptocephala*		+	+	+	+
70	*N. cryptotenella*				+	+
71	*N. decussis*				+	+
72	*N. elginensis*					+
73	*N. gregaria*				+	+
74	*N. hambergii*				+	
75	*N. kraskeii*				+	

Table 2. continue

76	*N. lanceolata*		+		+	+
77	*N. menisculus*			+	+	
78	*N. minima*			+		+
79	*N. minuscula*				+	+
80	*N. oppugnata*				+	
81	*N. pelliculosa*					+
82	*N. pupula*				+	+
83	*N. pygmaea*				+ CD	
84	*N. radiosa*		+	+	+	
85	*N. rhynchocephala*		+	+	+	+
86	*N. subminuscula*				+	
87	*N. submolesta*				+	+
88	*N. tripunctata*				+	+
89	*N. trivialis*			+		
90	*N. utermoehlii*					+
91	*N. viridula*		+		+	
92	*N. vitabunda*		+			
93	*Nitzschia amphibia*				+	
94	*N. angustata*					+
95	*N. brevissima*				+	
96	*N. dissipata*			+	+	+
97	*N. fonticola*			+	+	+
98	*N. frustulum*				+	+
99	*N. gracilis*			+		
100	*N. heufleriana*			+	+	+
101	*N. homburgiensis*				+	
102	*N. linearis*		+	+	+	+
103	*N. palea*				+	+
104	*N. pusilla*			+	+ D	
105	*N. pura*				+	
106	*N. recta*				+	
107	*N.sinuata v.tabellaria*					+
108	*N. sublinearis*		+	+	+	+
109	*Pinnularia borealis*				+	
110	*P. divergens*		+			
111	*P. interrupta*				+	
112	*P. microstauron*				+	+
113	*P. subcapitata*				+	+
114	*P. viridis*				+	
115	*Rhoicosphaenia abbreviata*				+	+
116	*Stauroneis anceps*				+	
117	*S. smithii*		+			
118	*Surirella angusta*				+	+
119	*S. linearis*			+		
120	*S. minuta*				+	
121	*S. ovalis*				+	

Table 2. continue

122	*S. splendida*		+	+		
123	*Tabellaria fenestrata*					+
124	*T. flocculosa*		+	+	+	+
	CHLOROPHYTA					
1	*Oocystis lacustris*		+	+		
2	*O. planctonica*		+	+		
3	*Pseudosphaerocystis lacustris*	+	+	+		
4	*Eudorina elegans*	+	+	+		
5	*Microspora willeana*			+		
	DINOPHYTA					
1	*Peridinium willei*	+	+	+		
2	*Ceratium hirundinella*		+	+		

Table 3. Floristic composition of algal communities in the Someşu Mare river

Nr. crt.	Taxa	Sampling sites 1993								1996							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
	CYANOPHYTA																
1	*Calothrix kossinskaje*																+
2	*Chamaesiphon incrustans*		+			+	+										
3	*Oscillatoria boryana*									+	+	+					
4	*O. curviceps*														+		
5	*O. inigna*										+		+		+		
6	*O. gemminata*										+			+	+	+	+
7	*O. granulata*										+		+	+	+	+	+
8	*O. limosa*												+		+	+	
9	*O. princeps*													+			
10	*O. simplicissima*												+				
11	*Phormidium ambiguum*													+	+		+
12	*P. frigidum*													+	+	+	
13	*P. inundatum*		+			+	+	+	+								
14	*P. molle*		+	+	+		+					+	+				
15	*P. uncinatum*													+			
	CHRYSOPHYTA																
1	*Chrysococcus rufescens*									+			+				
2	*Hydrurus phoetidus*			+	+	+			+	+	+	+	+				
	XANTHOPHYTA																
1	*Goniochloris mutica*									+	+	+					
2	*Ophiocytium cochleare*									+	+'	+					
	BACILLARIOPHYTA																
1	*Achnanthes bioretii*		+	+	+		+		+	+	+	+	+	+	+	+	+
2	*Achnanthes flexella*			+													
3	*A. cf. helvetica*		+														
4	*A. hungarica*															+	
5	*A. lanceolata*			+	+	+	+			+	+	+	+	+	+	+	+
6	*A. minutissima*		+	+	+	+	+	+		+	+	+	+	+	+	+	+
7	*A. subatomoides*			+	+					+		+	+		+		
8	*Amphipleura pellucida*			+									+				
9	*Amphora aequalis*				+												
10	*A.inariensis*											+					+
11	*A. libyca*					+			+				+		+		
12	*A. montana*				+		+								+		
13	*A. ovalis*			+				+	+								+
14	*A. pediculus*		+	+	+		+	+	+		+	+		+	+	+	+
15	*Aulacoseira ambigua*																+
16	*A. granulata*		+														
17	*Caloneis amphisbaena*														+	+	+
18	*C. bacillum*		+	+	+		+	+				+	+	+	+	+	+
19	*C. silicula*		+	+	+		+				+	+	+		+		

Table 3. continue

20	*Cocconeis neodiminuta*		+	+	+		+		+								
21	*C. pediculus*				+	+	+	+	+					+	+	+	+
22	*C. placentula*		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
23	*Cyclostephanos invisitatus*							+									
24	*Cyclotella atomus*															+	+
25	*C. meneghiniana*						+	+	+							+	+
26	*C. ocellata*												+				
27	*Cymatopleura solea*							+	+					+	+	+	+
28	*Cymbella affinis*		+	+	+	+	+	+			+		+	+	+	+	+
29	*C. amphicephala*		+	+			+			+	+	+	+	+		+	+
30	*C. aspera*		+	+								+		+			
31	*C. caespitosa*																+
32	*C. cesatii*				+								+				
33	*C. cistula*			+	+	+	+	+	+						+	+	+
34	*C. cuspidata*				+			+									
35	*C. cymbiformis v. nonpunctata*		+														
36	*C. gracilis*								+								
37	*C. helvetica*		+	+	+	+	+	+		+	+	+	+	+	+	+	+
38	*C. lanceolata*						+	+									
39	*C. minuta*		+	+	+	+		+		+	+	+	+	+	+	+	+
40	*C. naviculiformis*				+				+								
41	*C. perpusilla*		+		+												
42	*C. prostrata*					+	+	+	+						+	+	+
43	*C. proxima*							+	+								
44	*C. reichardtii*						+				+	+	+		+	+	+
45	*C. silesiaca*		+	+	+	+	+	+		+	+	+	+	+	+	+	+
46	*C. sinuata*		+	+	+	+	+	+		+	+	+	+	+	+	+	+
47	*C. subaequalis*			+	+		+					+	+				
48	*C. tumida*							+	+						+	+	+
49	*Denticula kutzingii*		+				+							+			
50	*D. tenuis*		+	+	+		+			+		+	+				
51	*Diatoma anceps*										+						
52	*D. ehrenbergii*		+	+	+	+	+	+	+			+	+		+	+	+
53	*D. hyemalis*		+														
54	*D. mesodon*		+	+		+	+	+		+	+	+	+	+	+	+	+
55	*D. moniliformis*		+	+	+	+	+	+		+	+	+	+	+	+	+	+
56	*D. tenuis*			+												+	
57	*D. vulgaris*		+	+	+	+	+	+		+	+	+	+	+	+	+	+
58	*Diatomella balfouriana*											+					
59	*Diploneis elliptica*		+											+			
60	*D. oblongella*													+			
61	*D. ovalis*			+	+					+		+	+				
62	*Ellerbeckia arenaria*							+									
63	*Entomoneis palludosa v. subsalina*															+	
64	*Epithemia adnata*		+						+				+		+	+	
65	*Eunotia bilunaris*				+												

Table 3. continue

66	*E. exigua*				+											
67	*E. implicata*										+					
68	*E. minor*			+												
69	*E. pectinalis*				+											
70	*E. praerupta*					+										
71	*E. soleirolii*											+				
72	*E. sudetica*			+												
73	*E. tenella*										+					
74	*Fragilaria arcus*		+	+	+	+	+	+		+	+	+	+	+	+	+	+
75	*F. capucina*		+	+	+	+	+	+		+	+	+	+	+	+	+	
76	*F. construens*			+			+	+		+		+					
77	*F. leptostauron*		+	+													
78	*F. montana*		+													+	+
79	*F. pinnata*		+	+	+		+								+		
80	*F. ulna*		+	+	+	+	+	+		+	+	+	+	+	+	+	+
81	*F. virescens*					+					+	+					
82	*Frustulia vulgaris*		+	+	+	+	+	+				+	+	+	+	+	+
83	*Gomphonema acuminatum*																+
84	*G. cf. angustatum*		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
85	*G. cf. angustum*		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
86	*G. clavatum*		+	+	+							+		+			
87	*G. gracile*		+	+	+							+	+		+		
88	*G. olivaceum*		+	+	+	+	+	+		+	+	+	+	+	+	+	+
89	*G. parvulum*		+	+	+			+		+	+	+	+	+	+	+	+
90	*G. tergestinum*		+	+	+	+	+	+		+	+	+	+	+	+	+	+
91	*G. truncatum*				+				+					+	+		
92	*Gyrosigma acuminatum*						+		+						+		+
93	*G. attenuatum*						+										+
94	*G. nodiferum*		+						+								
95	*G. scalproides*							+								+	
96	*G. spencerii*														+		
97	*Hantzschia amphioxys*		+	+	+		+	+	+			+	+	+	+	+	+
98	*Melosira varians*					+		+	+			+		+	+	+	+
99	*Meridion circulare*		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
100	*Navicula accomoda*				+			+				+	+		+	+	+
101	*N. bacillum*														+		
102	*N. capitata*															+	
103	*N. capitatoradiata*						+	+		+	+	+	+	+	+	+	+
104	*N. cincta*								+					+		+	+
105	*N. clementis*		+														
106	*N. cocconeiformis*		+	+	+	+	+	+		+	+	+	+	+	+	+	
107	*N. contenta*				+		+										
108	*N. cryptocephala*		+	+	+				+	+	+	+	+	+	+	+	+
109	*N. cryptotenella*		+	+	+	+	+	+		+	+	+	+	+	+	+	+
110	*N. cuspidata*							+	+			+			+	+	
111	*N. decussis*		+			+								+			

Table 3. continue

112	*N. elginensis*		+	+	+	+			+		+					+	
113	*N. gallica v. perpusilla*								+	+	+	+					
114	*N. goeppertiana*															+	+
115	*N. gregaria*		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
116	*N. lanceolata*		+	+	+	+	+	+		+	+	+	+	+	+	+	+
117	*N. libonensis*																+
118	*N. menisculus*												+		+		+
119	*N. minima*		+	+	+		+		+	+		+	+		+	+	+
120	*N. minuscula*		+	+		+	+	+	+	+	+	+	+	+	+	+	
121	*N. mutica*		+		+		+	+		+		+	+	+	+		
122	*N. oppugnata*				+							+					
123	*N. pelliculosa*													+		+	
124	*N. pupula*		+					+		+			+	+	+	+	
125	*N. pygmaea*							+	+							+	+
126	*N. radiosa*		+	+	+				+			+			+	+	+
127	*N. rhynchocephala*						+	+									+
128	*N. salinarum*															+	
129	*N. splendicula*											+					
130	*N. subhamulata*											+					
131	*N. subminuscula*			+	+		+	+	+							+	+
132	*N. tenelloies*		+	+	+							+					
133	*N. tripunctata*		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
134	*N. trivialis*		+	+		+			+	+	+	+			+	+	+
135	*N. variostriata*				+												
136	*N. viridula*		+		+	+	+	+	+	+		+	+	+	+	+	+
137	*Neidium affine*			+			+						+				
138	*N. ampliatum*														+		
139	*N. binodeforme*														+		
140	*N. dubium*				+				+								+
141	*N. cf. hercynicum*			+													
142	*N. cf. septentrionale*		+														
143	*Nitzschia acicularis*			+	+		+	+						+	+	+	+
144	*N. amphibia*													+		+	+
145	*N. brevissima*													+			
146	*N. calida*														+	+	+
147	*N. capitellata*				+			+	+			+	+	+		+	+
148	*N. communis*			+													
149	*N. constricta*														+	+	+
150	*N. dissipata*		+	+	+		+	+		+	+	+	+	+		+	+
151	*N. dubia*																+
152	*N. filiformis*															+	
153	*N. fonticola*		+								+	+					
154	*N. frustulum*		+	+	+	+	+					+	+	+			
155	*N. hantzschiana*		+		+		+	+			+	+	+				
156	*N. homburgiensis*												+			+	+
157	*N. hungarica*							+	+						+	+	+

Table 3. continue

158	*N. inconspicua*				+		+	+	+				+		+	+	+
159	*N. intermedia*															+	
160	*N. levidensis*															+	+
161	*N. linearis*		+	+	+	+	+	+		+	+	+	+	+	+	+	+
162	*N. microcephala*								+								
163	*N. palea*		+	+	+	+	+	+				+	+	+	+	+	+
164	*N. paleacea*			+	+	+		+									
165	*N. pellucida*																
166	*N. pusilla*		+	+	+	+	+	+		+		+		+			
167	*N. recta*														+		
168	*N. sinuata v. tabellaria*																+
169	*N. sociabilis*													+	+	+	
170	*N. sublinearis*			+			+			+		+			+	+	+
171	*N. umbonata*							+	+				+		+	+	
172	*N. vermicularis*													+	+	+	
173	*Pinnularia borealis*		+	+	+	+	+	+	+			+	+	+	+		
174	*P. divergens*			+													
175	*P. interrupta*			+						+							
176	*P. microstauron*		+	+				+	+			+	+	+	+		
177	*P. obscura*			+	+												
178	*P. stomatophora*			+													
179	*P. subcapitata*		+	+	+							+				+	
180	*P. viridis*		+	+	+	+	+		+		+	+	+	+	+	+	+
181	*Rhoicosphaenia abbreviata*				+		+								+	+	+
182	*Rhopalodia brebissonii*			+													
183	*R. gibba*			+				+									
184	*Stauroneis anceps*		+	+	+	+	+		+	+					+	+	+
185	*S. kriegerii*							+									
186	*S. phoenicenteron*														+		
187	*S. smithii*		+					+									
188	*Surirella angusta*			+	+	+	+		+	+	+	+	+	+	+	+	+
189	*S. brebissonii*		+	+	+	+	+	+		+	+	+	+	+	+	+	+
190	*S. minuta*		+	+	+	+	+	+	+		+	+	+	+	+	+	+
191	*S. ovalis*							+							+		+
192	*S. splendida*													+			
193	*Tabellaria fenestrata*										+						
194	*T. flocculosa*		+	+	+								+				
195	*Tetracyclus rupestris*											+		+			
196	*Thalassiosira weissflogii*							+	+							+	+
	CHLOROPHYTA																
1	*Chlorella luteo-viridis*													+			+
2	*C. vulgaris*								+			+					+
3	*Cladophora glomerata*													+		+	+
4	*Closterium acerosum*											+		+	+	+	+
5	*C. leibleinii*															+	+
6	*C. moniliferum*													+		+	+

Table 3. continue

7	*Coelastrum sphaericum*												+			+
8	*Cosmarium formosulum*														+	+
9	*Cylindrocapsa geminata*									+	+					
10	*Hormidium flaccidum*								+	+		+				
11	*Kirchneriella obesa*												+	+	+	+
12	*K. subcapitata*							+				+			+	
13	*Monoraphidium arcuatum*															+
14	*M. contortum*						+	+							+	+
15	*Pediastrum boryanum*												+	+	+	+
16	*Scenedesmus acuminatus*														+	+
17	*S. acutus*										+			+	+	+
18	*S. armatus*										+					
19	*S. ecornis*										+		+	+		
20	*S. denticulatus*														+	+
21	*S. gutwinskii*														+	+
22	*S. opoliensis*												+			+
23	*S. quadricauda*														+	+
24	*Schizomeris leibleinii*												+			+
25	*Stichococcus bacillaris*						+	+	+			+				
26	*Stigeoclonium amoenum*				+							+				
27	*S. flageliforme*															+
28	*S. lubricum*											+				+
29	*S. subsecundum*										+	+				
30	*S. tenue*												+	+	+	+
31	*S. variabile*															+
32	*Ulothrix tenue*				+											
33	*U. zonata*			+	+	+	+		+	+	+	+				
	EUGLENOPHYTA															
1	*Euglena ehrenbergii*													+		
2	*E. gracilis*							+			+	+	+	+	+	+
3	*E.oxyuris*														+	+
4	*E. pisciformis*														+	+
5	*E. polymorpha*						+							+	+	+
6	*E. proxima*													+	+	+
7	*E. spirogyra*													+		
8	*E. stellata*															+
9	*E. texta*												+			+
10	*E. viridis*												+	+	+	+
11	*Lepocinclis ovum*															+
12	*L. radiata*											+		+	+	+
13	*Peranema micromastix*														+	+
14	*Phacus arnoldii*													+		
15	*P. orbicularis*													+		+
16	*P. platalea*															+
17	*P. tortus*												+		+	+
18	*Strombomonas verrucosa*											+	+		+	+
19	*Trachelomonas oblonga*														+	+
20	*T. volvocina*								+	+	+					

Table 4. Floristic composition of algal communities in the 'united' Somes river

Nr. crt.	Taxa	Sampling sites													
		Plankton							Benthos						
		1	2	3	4	5	6	7	1	2	3	4	5	6	7
	CYANOPHYTA														
1	Aphanizomenon flos-aquae										+				
2	Gomphosphaeria aponina		+	+	+										
3	Microcystis aeruginosa	+		+	+										
4	Oscillatoria amoena								+						
5	O. boryana								+	+					
6	O. brevis						+		+						
7	O. chlorina			+	+				+						
8	O. granulata			+	+				+		+				
9	O. limnetica								+						
10	O. limosa			+	+			+	+	+					
11	O. princeps			+	+	+							+		
12	O. splendida												+		
13	O. tenuis			+	+	+		+	+	+		+	+		+
14	Phormidium ambiguum								+	+		+			
15	P. molle										+				
	CHRYSOPHYTA														
1	Chrysococcus rufescens				+				+						
2	Dinobryon divergens	+	+	+	+	+		+	+			+			
	XANTHOPHYTA														
1	Goniochloris mutica	+	+	+	+	+									
	BACILLARIOPHYTA														
1	Achnanthes biasolettiana	+	+	+		+	+	+	+	+	+	+	+		+
2	A. brevipes									+					
3	A. lanceolata	+	+	+	+	+	+	+	+	+	+	+	+		+
4	A. minutissima	+	+	+	+	+	+	+	+	+	+	+	+		+
5	Amphipleura pellucida														+
6	Amphora libyca					+	+	+		+	+	+			
7	A. montana			+		+		+	+	+		+	+		+
8	A. ovalis				+			+			+	+			
9	A. pediculus	+	+	+	+	+		+	+	+	+	+			+
10	A. veneta		+												
11	Asterionella formosa	+	+	+	+			+	+	+	+	+	+		+
12	Aulacoseira granilata										+				
13	A. italica	+		+	+	+									
14	Bacillaria paradoxa														+
15	Caloneis amphisbaena	+	+	+	+	+	+	+	+	+	+	+	+		
16	C. bacillum					+		+	+	+	+		+		+
17	C. silicula			+		+	+	+	+	+	+		+		+
18	Centric mic			+	+	+	+	+		+	+	+	+		+
19	Cocconeis pediculus	+	+	+	+	+	+	+	+	+	+	+	+		+
20	C. placentula	+	+	+	+	+	+	+	+	+	+	+	+		+
21	Cyclostephanos invisitatus	+	+	+	+	+	+	+	+	+	+	+			+
22	Cyclotella atomus			+	+	+	+	+				+	+		
23	C. meneghiniana	+	+	+	+	+	+	+	+	+	+	+	+	+	+

Table 4. continue

24	C. srelligera													+
25	Cymatopleura solea	+	+	+	+	+	+	+	+	+	+	+		+
26	Cymbella affinis		+	+	+	+	+	+	+	+	+	+	+	+	+
27	C. amphicephala							+		+			+		+
28	C. caespitosa					+	+	+		+	+				
29	C. cistula	+		+						+					
30	C. helvetica	+	+	+		+	+	+	+	+	+	+	+		+
31	C. lanceolata	+													
32	C. minuta	+	+	+		+	+	+	+		+		+		
33	C. naviculiformis														+
34	C. prostrata		+				+	+		+	+				
35	C. reichardtii					+			+		+				
36	C. silesiaca	+	+	+	+	+	+	+	+	+	+	+	+		+
37	C. sinuata	+	+	+	+	+	+	+	+	+	+	+	+		+
38	C. tumida	+		+		+		+	+	+	+				
39	Denticula kutzingii		+								+				
40	Diatoma mesodon	+	+	+		+	+	+	+		+		+		+
41	D. moniliformis	+	+	+	+	+	+	+	+	+	+	+	+	+	+
42	D. tenuis										+				
43	D. vulgaris	+	+	+	+	+	+	+	+	+	+	+	+		+
44	Diploneis oblongella												+		
45	D. oculata							+							
46	D. ovalis														+
47	Entomoneis paludosa v. sub	+		+											
48	Epithemia adnata						+	+							
49	Fragilaria acus	+	+		+	+	+	+	+						
50	F. arcus	+	+	+	+	+	+	+	+	+	+	+	+		+
51	F. capucina	+	+	+		+	+	+	+	+	+	+	+		+
52	F. construens					+					+				+
53	F. crotonensis	+	+	+	+	+		+	+	+					
54	F. delicatissima		+												
55	F. pulchella	+													
56	F. ulna	+	+	+	+	+	+	+	+	+	+		+		+
57	Frustulia vulgaris				+	+		+	+	+	+		+		+
58	Gomphonema angustatum	+	+	+	+			+	+	+	+		+	+	+
59	G. cf. angustum		+	+					+	+	+				+
60	G. augur									+					
61	G. clavatum											+			
62	G. gracile									+	+	+			
63	G. cf. micropus											+			
64	G. olivaceum,	+	+	+	+	+		+	+	+	+	+	+	+	+
65	G. parvulum		+	+	+	+		+	+	+	+	+	+	+	
66	G. cf pumillum											+			
67	G. cf sarcophagus									+					
68	G. tergestinum	+	+		+			+	+	+	+	+	+	+	+
69	G. truncatum								+	+					
70	Gyrosigma acuminatum	+	+	+	+	+		+	+	+	+	+	+		+
71	G. attenuatum														+
72	G. scalproides		+	+	+	+		+	+	+	+	+	+		+
73	G. cf spencerii			+											

Table 4. continue

74	Hantzschia amphioxys							+		+	+			+	
75	Melosira varians	+	+	+	+	+	+	+	+	+	+	+	+		+
76	Meridion circulare	+	+	+	+	+	+	+	+	+	+	+			+
77	Navicula accomoda	+	+	+	+		+	+	+	+	+	+			+
78	N. bacillum							+							+
79	N. capitata	+		+		+		+	+	+	+				
80	N. capitatoradiata	+	+	+	+	+	+	+	+	+	+	+	+		+
81	N. cincta		+	+							+	+			
82	N. clementis														+
83	N. cocconeiformis						+								+
84	N. cryptocephala		+			+		+	+	+	+				+
85	N. cryptotenella	+	+		+			+	+	+	+	+			+
86	N. cuspidata	+	+	+	+	+	+	+	+	+	+	+	+		+
87	N. decussis							+			+				+
88	N. elginenesis	+		+		+		+							+
89	N. erifuga	+	+	+	+	+	+	+	+	+	+	+	+		+
90	N. cf fracta					+					+				
91	N. gallica v. perpusilla					+									
92	N. goeppertiana		+					+		+	+	+			
93	N. gregaria	+	+	+		+		+	+		+	+	+		+
94	N. halophila		+												
95	N. lanceolata	+	+	+	+	+	+	+	+	+	+	+	+	+	
96	N. lapidosa								+						
97	N. menisculus				+			+	+	+	+	+	+		
98	N. minima		+		+	+		+	+	+	+	+	+		+
99	N. minuscula	+	+		+				+	+		+			+
100	N. mutica	+				+		+							+
101	N. nivalis									+					
102	N. pelliculosa									+	+				
103	N. pupula	+	+	+				+	+	+	+	+			+
104	N. pygmaca		+	+	+	+		+	+	+	+	+	+		+
105	N. radiosa							+			+				+
106	N. recens				+	+		+	+	+	+	+	+		
107	N. salinarum	+							+		+				
108	N. slesvicensis		+			+			+	+					
109	N. spicula	+													
110	N. subminuscula	+	+	+	+	+	+	+	+	+	+	+	+		+
111	N. tripunctata	+	+	+	+	+		+	+	+	+	+			+
112	N. trivialis	+	+	+	+	+	+	+	+	+	+	+	+		+
113	N. veneta					+				+					
114	N. viridula	+	+	+	+	+	+	+	+	+	+	+	+		
115	Neidium ampliatum	+					+		+		+				+
116	N. binodeforme							+	+						
117	N. binodis		+												
118	N. dubium					+		+					+		+
119	Nitzschia acicularis		+	+	+			+	+	+	+	+	+	+	
120	N. amphibia		+	+	+			+		+		+			
121	N. calida	+	+	+	+	+			+	+	+	+			+
122	N. capitellata	+	+	+	+	+	+	+	+	+	+				+
123	N. constricta	+	+	+	+	+	+	+	+	+	+	+	+		+

Table 4. continue

124	N. dissipata	+	+	+	+	+		+	+	+	+	+		+
125	N. dubia			+		+				+				
126	N. frustulum	+							+	+				
127	N. cf. geitleri			+										+
128	N. gracilis	+	+	+				+	+	+	+			
129	N. hungarica	+	+	+	+	+		+	+	+	+	+		+
130	N. inconspicua	+	+	+	+	+		+	+	+	+	+		
131	N. intermedia		+		+				+					+
132	N. levidensis			+					+	+				
133	N. linearis	+	+		+	+	+	+	+	+	+		+	+	+	+
134	N. lorenziana			+							+				
135	N. microcephala										+				
136	N. cf. nana								+	+	+	+			
137	N. palea	+	+	+	+	+	+	+	+	+	+	+	+	+	+
138	N. paleacea	+	+	+	+				+	+	+	+			+
139	N. parvula											+			
140	N. pusilla										+				+
141	N. recta		+		+				+	+	+				+
142	N. reversa								+		+				
143	N. sigma			+						+	+				
144	N. sigmoidea		+	+						+					+
145	N. sociabilis		+	+					+	+	+				
146	N. tryblionella			+						+					
147	N. umbonata		+	+	+	+			+	+	+	+			+
148	N. vermicularis			+				+		+	+				
149	Pinnularia borealis	+									+				+
150	P. divergens							+							
151	P. gibba		+			+				+					
152	P. interrupta							+							
153	P. microstauron					+				+	+	+			+
154	P. nodosa					+									
155	P. obscura							+		+	+				
156	P. viridis		+	+	+	+		+		+	+	+			+
157	Rhoicosphaenia abbreviata	+	+		+			+	+	+	+	+	+		+
158	Stauroneis anceps			+							+				
159	S. phoenicenteron		+		+	+		+							+
160	S. smithii									+					
161	Surirella angusta			+	+	+	+	+	+	+	+		+		+
162	S. brebissonii	+	+	+	+	+	+	+	+	+	+	+	+	+	
163	S. elegans							+							
164	S. linearis			+									+		+
165	S. minuta		+				+	+	+	+	+	+	+		+
166	S. ovalis	+				+			+	+	+				+
167	S. splendida		+	+		+	+	+	+		+				+
168	Thalassiosira weissflogii	+	+	+	+	+	+	+	+	+	+	+	+		+
	CHLOROPHYTA														
1	Actinastrum hantzschii	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2	Ankistrodesmus bibraianus				+										
3	A. fusiformis				+										
4	Ankira lanceolata				+	+									

Table 4. continue

5	Carteria abiscoensis			+	+							+			
6	Cephalomonas granulata				+							+			
7	Chlamydomonas composita					+	+						+	+	
8	C. debaryana					+							+		
9	C. metapyrenigera			+	+	+									
10	C. monadina	+	+	+	+	+		+				+			
11	C. neglecta											+	+		
12	C. passiva		+												
13	C. polypyrenoidosa			+											
14	C. pseudopertusa				+	+						+			
15	C. reinhardtii			+	+										
16	Chlorella luteo-viridis				+	+									
17	C. vulgaris				+	+						+			
18	Chlorococcum aquaticum	+						+							
19	C. schizochlamys					+	+								
20	Chlorogonium elongatum								+						
21	Cladophora glomerata									+		+			
22	Closterium acerosum			+	+		+		+		+		+		
23	C. acutum							+							
24	C. ehrenbergii			+	+				+						
25	C. moniliferum						+				+				
26	Coelastrum astroideum				+	+						+			
27	C. microporum				+	+	+	+							
28	C. proboscideum				+										
29	C. reticulatum							+							
30	C. sphaericum	+		+	+	+	+	+	+		+				
31	Cosmarium formosulum	+	+	+	+	+	+	+	+	+	+	+	+	+	+
32	Crucigenia apiculata				+	+									
33	C. quadrata							+							+
34	C. rectangularis				+	+									
35	Dictyosphaerium ehrenbergianum				+			+							
36	D. pulchellum			+	+	+						+			
37	D. simplex			+	+							+			
38	D. tetrachotomum			+	+										
39	Didymocystis planctonica				+							+			
40	Eudorina elegans	+	+	+	+	+	+	+							
41	E. ilinoisensis				+			+							
42	Franceia ovalis				+	+									
43	Golenkinia radiata				+	+		+							
44	Gonium pectorale			+	+	+		+							+
45	Hofmania lauterbornii				+			+							
46	Korschikoviella limnetica					+									
47	Kirchneriella mucosa														+
48	K. obesa	+		+		+	+	+							
49	K. subcapitata			+		+								+	
50	Lagerheimia citriformis					+									+
51	L. gerevensis					+									
52	L. wratislawiensis			+	+										
53	Lambertia ocellata			+							+				
54	Micractinium pusillum				+										

Table 4. continue

55	Monoraphidium arcuatum			+	+	+	+	+				+	+		+
56	M. contortum		+	+	+	+	+	+		+	+	+		+	+
57	M. griffithii		+	+	+	+		+							
58	M. indicum							+							
59	M. irregularis				+	+	+								
60	M. longiusculum				+										
61	Neochloris dissecta					+									+
62	Oocystis coronata				+										
63	O. lacustris				+	+									
64	O. marsonii					+		+							
65	O. planctonica					+									
66	O. verrucosa			+		+									
67	Pandorina morum	+		+	+	+	+	+							
68	P. smithii							+							
69	Pediastrum angulosum					+		+							
70	P. boryanum	+	+	+	+	+	+								
71	P. duplex				+	+	+								
72	P. tetras			+	+	+	+								+
73	Pseudococcomyxa simplex														+
74	Pseudosphaerocystis lacustris					+									
75	Pyrobotrys casinoensis			+	+										
76	Quadricoccus laevis			+		+		+					+		
77	Radiophylum irregulare								+						
78	Scenedesmus acuminatus		+	+	+	+		+			+	+			
79	S. acutus	+	+	+		+		+		+	+	+	+		+
80	S. alternans		+	+	+						+				
81	S. arcuatus				+										
82	S. armatus				+	+		+							
83	S. denticulatus			+	+										
84	S. dispar				+	+						+			
85	S. ecornis			+	+	+		+			+				+
86	S. gutwinskii	+			+	+					+				
87	S. intermedius	+	+	+	+	+	+	+	+		+	+	+	+	+
88	S. opoliensis	+	+	+	+	+	+	+			+				+
89	S. ovalternus					+							+		
90	S. protuberans			+		+	+	+						+	
91	S. quadricauda	+	+	+	+	+	+	+			+	+	+	+	+
92	S, spinosus			+		+		+			+				
93	Siderocelis ornata				+										
94	Sphaerellopsis fluviatilis					+									
95	Stigeoclonium tenue	+		+	+		+			+		+	+	+	
96	Tetrachlorella alternans			+	+			+							
97	Tetraedron caudatum				+			+		+	+				
98	T. incus				+										
99	T. minimum				+					+					
100	Tetraselmis cordiformis		+	+	+				+		+				
101	Tetrastrum glabrum			+				+							
102	T. punctulatum			+	+					+	+				
103	T. staurogeniaeforme			+			+								
104	Treubaria planctonica			+	+										

Table 4. continue

##	T. varia							+						
	EUGLENOPHYTA													
1	Euglena acus	+	+	+	+	+		+						
2	E. ehrenbergii	+	+		+	+				+				
3	E. gracilis	+	+	+	+		+	+	+				+		+
4	E. oxyuris			+	+	+	+	+						
5	E. pisciformis			+	+	+	+	+				+		+	+
6	E. polymorpha		+		+	+		+	+						
7	E. proxima		+	+	+		+		+						
8	E. spirogyra		+		+				+	+					
9	E. tristella			+	+										+
10	E. variabilis		+												
11	E. viridis		+	+				+	+			+			+
12	Lepocinclis ovum	+	+	+		+		+	+						+
13	L. playfariana		+												
14	L. texta		+		+			+		+	+				
15	Phacus acuminatus				+										
16	P. longicauda				+										
17	P. orbicularis		+		+				+						
18	P. platalea	+							+						
19	P. pseudonordstedtii				+		+							+	
20	P. pusillus								+						
21	P. tortus		+												
22	P. triqueter					+		+							
23	Strombomonas fluviatilis							+							
24	S. gibberosa		+	+		+		+							
25	S. verrucosa		+	+	+	+		+							
26	Trachelomonas hexangulata				+										
27	T. hispida			+	+	+									
28	T. oblonga		+			+									
29	T. planctonica					+									
30	T. volvocina					+									
31	T. volvocinopsis				+	+									
	DINOPHYTA														
1	Ceratium hirundinella				+			+							