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ABSTRACT

The phytoplankton diversity of Nyamuhinga stream was investigated at the first time from January to December 2014. It recorded a total of 135 species, belonging to four major divisions namely: Bacillariophyta (49.6%), Chlorophyta (21.5%), Cyanophyta (20.7%) and Pyrrophyta (8.2%). Comparatively, a higher number of species was recorded in the dry than in the wet season. Sixteen species of Bacillariophyta were reported during the all period of the sampling dominated quantitatively by *Achnanthes lanceolata, Cyclotella kützingiana*, *Cyclotella meneghiniana, Cyclotella stelligera*, *Cymbella grossestriata*, *Diatoma elongatum, Diatoma vulgare*, *Fragilaria crotonensis*, *Gomphonema brunii*, *Gomphocymbella brunii, Navicula cocconeiformis*, *Nitzschia acicularis* and *Nitzschia pelagica*. Seven species of Chlorophyta and five of Pyrrophyta were reported, but respectively dominated quantitatively by *Ankistrodesmus falcatus, Cladophora rupestris*, *Cosmarium austral*, *Staurastrum dickiei*, *Euglena granulate* and *Peridinum inconspicuum.* The paucity of phytoplankton composition in Nyamuhanga stream could be partly due to the poor light penetration into highly turbid water mostly in wet season.

Keywords: Phytoplankton species, Community structure, Nyamuhinga stream, Season, Lake Kivu basin.

1. INTRODUCTION

Phytoplanktons are microscopic organisms that are suspended in water. They constitute the bedrock or basis of grazing food chains and food webs in surface water systems (UNEP, 1998; SPDC, 2001; Herring, 2005). Phytoplankton, as primary producers, forms the vital energy source at the first trophic tier. As they also serve as food to many aquatic animals, they also have an important role in the material circulation in aquatic ecosystems by controlling the growth, reproductive capacity and population characteristics of aquatic biota. Furthermore, their standing crops exhibit variations that depend on several factors, including: (i) the supply of major nutrients (mainly phosphorus and nitrogen); (ii) light availability; (iii) grazing by zooplankton; (iv) water mixing regimes; and (v) basin morphology (Reynolds et al., 2001; Gurung et al., 2006).

Evaluation of phytoplankton community structure is essential, therefore, to evaluation of the water environment (Caljon, 1992; Lung'ayia et al., 2000; Onyema, 2008; Elijah et al., 2009; Bisimwa et al., 2013; Sarmento et al., 2006, 2007). Several studies on the pelagic algae of Lake Kivu were undertaken (e.g. Zanon, 1938; Damas, 1937; Kilham and Kilham, 1990; Haberyan and Hecky, 1987; Sarmento et al., 2006, 2007), but its tributaries remain without phycological information hence, such study remains important because majority of the riverine inhabitant most of the time depend on their water needs. For some published works on the aquatic algae of Lake Kivu effluents, we can quote those of Scaëtta (1928 in Sarmento et al. 2007), Bisimwa et al. (2009a, 2009b, 2013) and Bahati et al. (2015). This study aims to investigate the phytoplankton algae community of Nyamuhinga stream and hence document a checklist of encountered species for environmental biological monitoring.

2. MATERIALS AND METHODS

2.1. Study area

Nyamuhinga stream (17 Km long, of average depth 25 cm) is located, in South-West side of Lake Kivu (Eastern DR Congo), within latitudes 2°28'S and 2°27'S and longitudes 28°48'E and 28°50'E between 1469 and 1592 m asl (Irenge, 2013). Samples were collected from January to December 2014 on five stations selected from the upstream to the downstream to reflect the inputs of any other discharges to the stream that may influence water quality conditions (figure 1). Station 1 was a reference site located on upstream at Musigiko cemetery at about 1.3 Km of the spring between 2°28'46''S-28°48'44''E, 1728 m asl. Station 2 was close to Nyakavogo stadium between 2°28'40''S-28°49'48''E, 1607 m asl at 4.8 Km of the spring. Station 3 was situated at Quartier C, approximately at 9.6 Km from the spring between 2°28'00''S-28°49'34''E, 1542 m asl. It receives the sewage from Bagira. Station 4 was located at Nyaciduduma near the older sewage treatment of Bagira under the bridge which goes to Mbobero at 2°27'45''S-28°49'51''E, 1538 m asl. It is at about 13.2 Km from the spring. Station 5 was positioned on downstream at Kazingo near the Central Station of fuel tankers, approximately at 16.8 Km of the spring between 2°27'39''S-28°50'11''E, 1494 m asl.

Nyamuhinga takes its source in Kabare territory at Kakoma-Mulwa, and it is the boundary between the Kabare and Bagira Township. In his way, Nyamuhinga collects all the wastewater and sewage from Bagira and flowing into Lake Kivu near the Central Station of fuel tankers. It is therefore a continuous and worrying risk to the environment and the health of surrounding populations. Its catchment, favorable to agriculture and livestock, is located in an area whose climate is wet type two seasons: a rainy season from September to May and a dry season from June to August. The average temperature and annual rainfall of the area are respectively 19°C and 1403 mm (Bisimwa et al., 2014).

2.2. Phytoplankton Sampling

Samples were collected between 9.00 am and 11.00 am every month from five different points on the stream. Physicochemical properties (temperature, transparency, pH and dissolved oxygen) were measured on each sampling day. Phytoplankton samples were collected with a round silk cloth net of mesh size about 55 µm. The diameter of the net is 40 cm held open by a metal frame and attached to a wooden handle with a 150 mL bottle attached to the distal end. The net was towed through the water for qualitative phytoplankton sampling, 30 litres of water was poured into net to concentrate the sample. Samples were then transferred from the bottle attached to the end of the sampling net to sampling bottles and immediately preserved with 4% formalin. Phytoplankton was identified using keys from Hustedt (1971), Whitford and Schumacher (1973), Patrick and Reimer, (1975), Prescott (1982), Germain, (1981), Ricard, (1987), Krammer and Bertalot (2000).

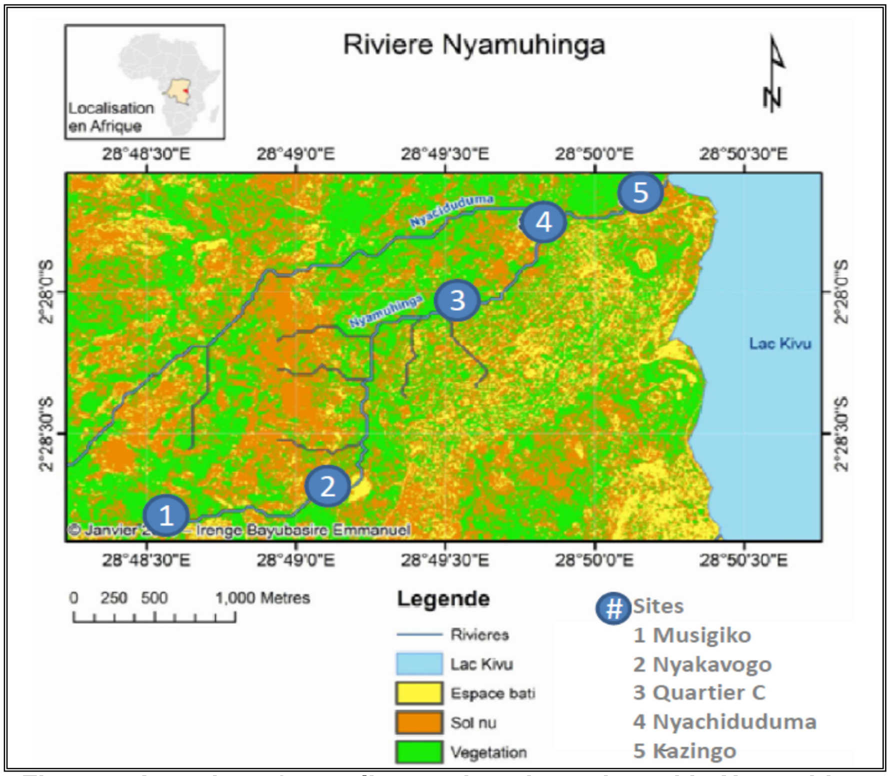

Figure 1. Location of sampling stations investigated in Nyamuhinga stream

2.3. Enumeration of Phytoplankton

The samples were concentrated to 10 mL by sedimentation processes, which enable phytoplankton to settle to the bottom of the transparent bottle. The bottle was agitated thoroughly before a drop (approximately 1 mL) sub sample was quickly taken with a wide-bore (3 mm of diameter) dropper. The sample was introduced carefully into a counting chamber and covered with a cover slid. Counts of various groups of organisms present were made with a compound microscope. Five sub samples were taken from each bottle and counted. The mean number of individuals per mL was computed from these sub samples. The number of organisms per litre was calculated from the following relationship:

$$A = \frac{B}{C} \text{ X } D$$

Where: ***A*** = Number of organism/Litre of water; ***B*** = Organism/mL of concentrate;
C = Volume of water filter; ***D*** = Volume of Concentrate

2.4. Community structure

To obtain the estimate of species diversity, three community structure indices were used. The species richness index (*D*) given by the equation (Margalef 1970):

$$D = \frac{S - 1}{\ln N}$$

Shannon-Weiner diversity index (*H*) using the following equation (Shannon and Weiner 1973):

$$H' = -\sum_{i=1}^{S} pi \ln pi$$

Species equitability (*J*) with the following equation (Piélou 1975):

$$J = \frac{H'}{ln\, S}$$

Where: ***pi*** = n_i/N; ***n_i*** = number of individuals of species i; ***S*** = total number of species;
N = total number of individuals in a sample

3. RESULTS

3.1. Physicochemical characteristics

Table 1: Ranges of some water quality parameters from Nyamuhinga stream

Parameters	Units	Season	
		Dry	Wet
Temperature	ºC	25.1±1.6	24.6±0.7
pH	-	6.98±0.5	6.98±0.6
Electrical Conductivity	µS/cm	630.0±74.0	642.6±99.0
Water flow	m^3/s	0.37±0.1	0.71±0.1
Nitrate	mg/L	0.04±0.0	0.26±0.4
Ammonium	mg/L	0.02±0.01	0.02±0.02
Dissolve Oxygen	mg/L	5.8±1.1	5.7±0.7
Biological Oxygen Demand	mg/L	1.3±1.2	4.1±0.8
Chemical Oxygen Demand	mg/L	5.7±1.3	21.2±16.5
Total Suspend Solids	mg/L	0.25±0.01	0.32±0.3
Transparency	Cm	11.3±1.7	7.8±0.3

The mean values of physicochemical parameters of water in Nyamuhinga stream are presented in Table 1. The surface water temperature varied between 23.4ºC-26.7ºC during the study period. Temperature had minimum mean value (24.6ºC) in the wet season while it peaked in the dry season, with a mean value of 25.1ºC. Hydrogen ion concentration (pH) ranged between 6.2 and 7.46 throughout the sampling period; it is essentially acid as pH mean value is 6.98. Electrical Conductivity had mean minimum value (630.0 µS/cm) in the dry season and the mean maximum (642.6 µS/cm) in the wet season. For the flow, mean value peaked and was least (0.71 m^3/s) in wet season. The Nitrate range between 0.02-1.11 mg/L with the least mean value (0.04 mg/L) recorded in dry season, while the Ammonium mean value does not significantly change in dry and wet season. In general, Dissolve Oxygen content with mean value (5.8 mg/L) was recorded in the two seasons. The Biological Oxygen Demand value ranged from 0.2-4.7 mg/L while Chemical Oxygen Demand values ranged from 6.0-37.6 mg/L for all period study. The Total Suspend Solids mean values recorded throughout the study period was generally low with the mean highest value (0.32 mg/L) recorded in the wet season.

3.2. Phytoplankton community structure

Four major algal groups were represented in the micro-flora of sampled areas of the Nyamuhinga stream. These were the Bacillariophyceae, Chlorophyceae, Cyanophyceae and Pyrrophyceae. A total of 135 species from 45 genera were recorded. Diatoms were the most abundant group making up 67 species from 20 genera. The green algae recorded 29 species from 13 genera, cyanobacteria with 28 species from 7 genera and euglenoids represented by 11 species from 5 genera (figure 2). Table 2 shows a checklist of Nyamuhinga phytoplankton species and their classification. Shannon-Wiener information (H') values were respectively 4.33 and 4.25 in dry and wet seasons while species equitability (J) value were 0.98 recorded in wet and 0.96 in dry season. Species richness (D) recorded its highest value (11.3) in dry season. Dominance of phytoplankton samples by a few species was reflected by low equitability (J) value recorded and since, Margalef's (D) value is influenced by the number of species and individuals, high (D) values recorded in dry season reflected high species number and relatively low numbers of individuals. Variations between community structure analysis in Nyamuhinga stream are shown in figure 3. In Nyamuhinga stream, higher H values observed could be attributed to high J value recorded (table 2).

Table 2. Phytoplankton species mean abundance encountered in Nyamuhinga stream (Grp.=Group, Com.=Community)

	Season		Total	% in Grp.	% in Com.
	Dry	Wet			
Division: Bacillariophyta					
Class: Bacillariophyceae					
Order 1: Centrales					
Cyclotella kützingiana Thw.	46	27	73	3.1	1.7
C. meneghiniana Kütz.	24	38	62	2.6	1.4
C. ocellata Pant.	21		21	0.9	0.5
C. stelligera Clev.	12	71	83	3.5	1.9
Melosira nyassensis Müller	25		25	1.1	0.6
M. schroederi Wolosz.	15		15	0.6	0.3
M. varians Agar.	27		27	1.1	0.6
Order 2: Pennales					
Achnanthes exigua Grün.		37	37	1.6	0.8
A. hungarica Grün.	39		39	1.6	0.9
A. lanceolata (De Bréb.) Grün.	21	49	70	3.0	1.6
A. minutissima Kütz.	10	21	31	1.3	0.7
Amphora coffaeiformis (Agar.) Kütz.	47		47	2.0	1.1
A. veneta Kütz.	21		21	0.9	0.5
Cocconeis pediculus Ehr.	27		27	1.1	0.6
C. placentula Ehr.		6	6	0.3	01
Cymbella grossestriata Müller	39	29	68	2.9	1.5
C. placentula Hust.		36	36	1.5	0.8
C. prostata Berkel.	51		51	2.2	1.2
C. sinuata Greg.	3		3	0.1	0.1
Denticula tenuis Kütz.	40		40	1.7	0.9
Diatoma elongatum (Lyng.) Agar.	54	31	85	3.6	1.9
D. hiemale (Lyng.) Heib.	27		27	1.1	0.6
D. vulgare Bory	39	39	78	3.3	1.8
Eunotia lunaris Grün.	24		24	1.0	0.5
E. polydentula Brun	51		51	2.2	1.2
E. tenella (Grün.) Hust.		28	28	1.2	0.6
Fragilaria crotonensis Kit.	67	17	84	3.5	1.9
F. longissima Hust.		10	10	0.4	0.2
F. sublineata Hust.	24		24	1.0	0.5
Frustulia rhomboides (Ehr.) Cleve	15		15	0.6	0.3
F. vulgaris (Thw.) De Toni	30		30	1.3	0.7
Gomphonema aequatoriale Hust.		22	22	0.9	0.5
G. angustatum (Kütz.) Rabenh.	18	36	54	2.3	1.2
G. frickei Muller		38	38	1.6	0.9
G. gracile Ehr.	42		42	1.8	1.0
Gomphocymbella aschersonii Müller		24	24	1.0	0.5
G. brunii (Frick.) Müller	42	36	78	3.3	1.8
Gyrosigma attenuatum (Kütz.) Cleve	31		31	1.3	0.7
G. nodiferum West	27		27	1.1	0.6
Navicula cocconeiformis Greg.	21	51	72	3.0	1.6
N. cryptocephale Kütz.	9	18	27	1.1	0.6
N. cuspidata Kütz.		24	24	1.0	0.5
N. gracilis Ehr.	19		19	0.8	0.4
N. mutica Kütz.		28	28	1.2	0.6
N. muticoides Hust.	24		24	1.0	0.5
N. simplex Kras.		34	34	1.4	0.8
N. subcontenta Hust.	24		24	1.0	0.5
N. viridula Kütz.		24	24	1.0	0.5

Nitzschia acicularis Smith	31	33	64	2.7	1.5
N. amphibia Grün.	27		27	1.1	0.6
N. filiformis Hust.	3		3	0.1	0.1
N. frustulum (Kütz.) Grün.		28	28	1.2	0.6
N. linearis Smith		12	12	0.5	0.3
N. palea (Kütz.) Smith		6	6	0.3	0.1
N. pelagica Müller	67	25	92	3.9	2.1
N. stricta Hust.	3		3	0.1	0.1
Pinnularia brebissonii Cleve	9		9	0.4	0.2
P. gibba Ehr.	24		24	1.0	0.5
P. microstauron (Ehr.) Kütz.	18		18	0.8	0.4
Surirella biseriata De Bréb.		28	28	1.2	0.6
S. ovalis De Bréb.	38		38	1.6	0.9
S. tenera Greg.		24	24	1.0	0.5
Synedra cunningtonii West	21		21	0.9	0.5
S. pulchella Kütz.	39	9	48	2.0	1.1
S. ulna Ehr.	15		15	0.6	0.3
Tabellaria flocculosa Kütz.		22	22	0.9	0.5
T. fenestrata (Lyng.) Kütz.	58		58	2.4	1.3
Total	***1409***	***961***	***2370***	***100.0***	***54.0***
Division: Chlorophyta					
Class: Chlorophyceae					
Order 1: Chlorococcales					
Ankistrodesmus convolutus (Raben.) West		21	21	2.3	0.5
A. falcatus (Corda) Ralfs	30	39	69	7.5	1.6
A. nitzchioides West	6		6	0.7	0.1
Pediastrum bidentulum Braun	28		28	3.1	0.6
P. boryanum (Turpin) Menegh.		42	42	4.6	1.0
P. clathratum (Schröder) Lemm.	39		39	4.3	0.9
P. duplex Meyen		28	28	3.1	0.6
P. simplex (Meyen) Lemm.		15	15	1.6	0.3
Order 2: Siphonocladales					
Cladophora aeragrophila Raben.		24	24	2.6	0.5
C. rupestris Kütz.	52	35	87	9.5	2.0
Order 3: Desmidiales					
Cosmarium australe (Racib) Lütk	68	5	73	8.0	1.7
C. moniliferum (Turpin) Ralfs	24	21	45	4.9	1.0
Desmidium baileyi (Ralfs) Norst		30	30	3.3	0.7
D. grevellii (Kutz) De Bary	27		27	2.9	0.6
Docidium sp.		34	34	3.7	0.8
Micrasterias cunningtonii West	18	27	45	4.9	1.0
M. divisa (West) Krieger		24	24	2.6	0.5
Spirotaenia condensata De Bréb	13		13	1.4	0.3
Order 4: Ulothricales					
Microspora sp.	6		6	0.7	0.1
Spirogyra sp.		12	12	1.3	0.3
Order 5: Zygnematales					
Closterium abruptum West	34		34	3.7	0.8
C. aciculare West		28	28	3.1	0.6
C. leibleinii Kütz.		21	21	2.3	0.5
C. polystichum Nyg		15	15	1.6	0.3
Gonatozygon aculeatum Schmid	27	8	35	3.8	0.8
G. kinahani Raben.	21		21	2.3	0.5
Staurastrum dickiei Ralfs	33	32	65	7.1	1.5
S. paradoxum Meyen		6	6	0.7	0.1
S. tetracerum Ralfs		24	24	2.6	0.5
Total	***426***	***491***	***917***	***100.0***	***20.9***

Division: Cyanophyta					
Class: Cyanophyceae					
Order 1: Chroococcales					
Chroococcus sp.	16	27	43	6.3	1.0
Merismopedia elegans Braun	21	22	43	6.3	1.0
M. glauca (Ehr.) Nägeli		33	33	4.8	0.8
M. glanulata Skuja	28		28	4.1	0.6
M. punctata Mayen	10		10	1.5	0.2
Microcystis aeruginosa Kütz.		9	9	1.3	0.2
M. elachista West	30		30	4.4	0.7
M. hansgirgiana Elenk.		20	20	2.9	0.5
M. robusta (Clarke) Nygaard	24		24	3.5	0.5
Order 2: Nostocales					
Anabaena circinalis Raben		9	9	1.3	0.2
A. flos-aquae (Lyng.) De Bréb.	9		9	1.3	0.2
Anabaenopsis tanganikae (West) Wol.	32		32	4.7	0.7
Lyngbya brachyneuta Skuja		19	19	2.8	0.4
L. nigra Agard		27	27	3.9	0.6
L. pseudospirulina (Uterm.) Pasch.		31	31	4.5	0.7
L. spiralis Geitler	30		30	4.4	0.7
Oscillatoria acuminata Gomont		18	18	2.6	0.4
O. agardhii Gomont		27	27	3.9	0.6
O. chalybae (Mertens) Gomont	28		28	4.1	0.6
O. formosa Bory	15		15	2.2	0.3
O. geminata Meneg	9	22	31	4.5	0.7
O. lemmermannii Woloszyn.		24	24	3.5	0.5
O. maior Vauch.	16		16	2.3	0.4
O. okenii Agard		27	27	3.9	0.6
O. quadripunctulata Bruhl.	21		21	3.1	0.5
O. rubescens Gomont		25	25	3.6	0.6
O. sancta (Kütz) Gomont	27		27	3.9	0.6
O. setigera Aptekari		29	29	4.2	0.7
Total	***316***	***369***	***685***	***100.0***	***15.6***
Division: Pyrrophyta					
Class: Dinophyceae					
Order: Peridiniales					
Ceratium hirundinella Bergh	15	25	40	10.2	0.9
Peridinum africanum Lemm	28		28	7.1	0.6
P. cinetum Bergh		5	5	1.3	0.1
P. inconspicuum Lemm	44	16	60	15.3	1.4
Class: Euglenophyceae					
Order: Euglenales					
Euglena acus Ehr.	21	23	44	11.2	1.0
E. caudata Hubner	6	34	40	10.2	0.9
E. gracillis CKebs.	16		16	4.1	0.4
E. granulata (Klebs) Schmitz	69	27	96	24.5	2.2
E. polymorpha Dang	18		18	4.6	0.4
Phacus longicauda Ehr	5		5	1.3	0.1
P. orbicularis Hub	40		40	10.2	0.9
Total	***262***	***130***	***392***	***100.0***	***8.9***
Total number of species (S)	***89***	***77***	***166***		
Total number of individuals (N)	***2413***	***1977***	***4390***		
Species richness index (D)	***11.3***	***10.0***			
Shannon-Wiener diversity index (H)	***4.33***	***4.25***			
Species equitability (J)	***0.96***	***0.98***			

Bacillariophyceae

The occurrence of diatoms was more in the dry season than in the wet season. The bacillariophyceae were the predominant groups at all stations for the duration of the study in terms of phytoplankton species diversity. Eighteen diatom species were recorded with the pennate forms being more diverse than the centric forms. *Cyclotella* kützingiana, *Cyclotella meneghiniana* and *Cyclotella stelligera* were the more abundant and frequently occurring centric species recorded. More frequently occurring pennate diatoms included *Achnanthes lanceolata, Cymbella grossestriata, Diatoma elongatum, Diatoma vulgare*, *Fragilaria crotonensis*, *Gomphocymbella brunii, Navicula cocconeiformis*, *Nitzschia acicularis* and *Nitzschia pelagica.*

Chlorophyceae

A total of twenty-nine species were recorded for the green algae with fifteen in the dry season and twenty-one in wet season. *Ankistrodesmus falcatus, Cladophora rupestris*, *Cosmarium austral* and *Staurastrum dickiei* were the more abundant and frequently occurring species recorded during the study period.

Cyanophyceae

The cyanobacteria recorded twenty-eight with fifteen in the dry season and sixteen in wet season. No one was abundant, but three species namely *Chroococcus sp., Merismopedia elegans* and *Oscillatoria geminate* were frequently occurring during the study period.

Pyrrophyceae

The euglenoids were represented by eleven species, ten in the dry season and six in the wet season. Only *Euglena granulates* and *Peridinum inconspicuum* were the more abundant and frequently occurring species.

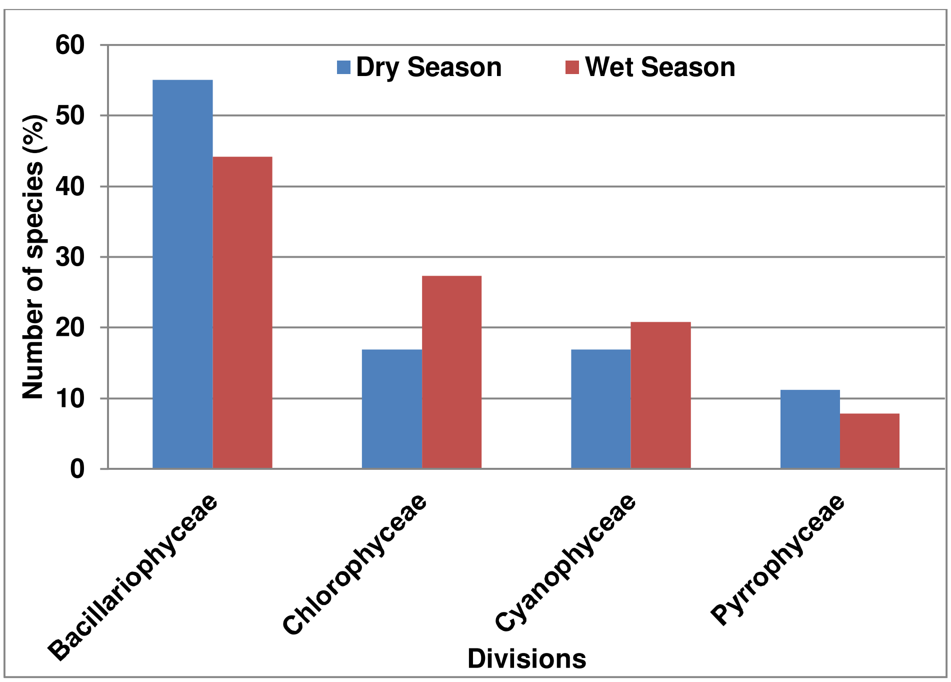

Figure 2. Percentage composition of different divisions in Nyamuhinga stream

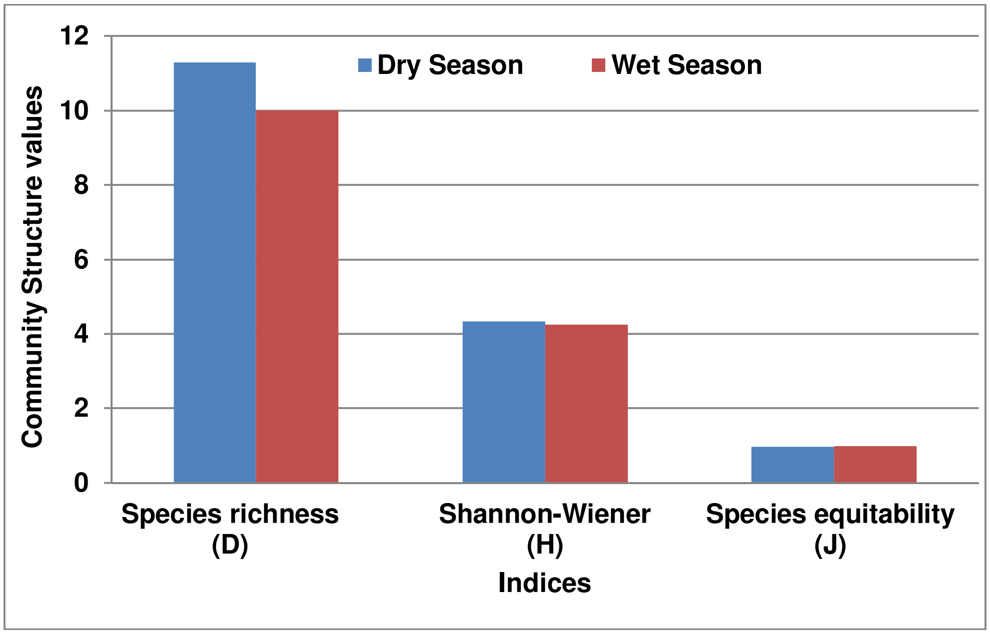

Figure 3. Variations between community structure analysis in Nyamuhinga stream

DISCUSSION AND CONCLUSION

In Nyamuhinga stream, phytoplankton diversity was higher in the dry (89 species) than the wet season (77 species) and diatoms were the more important group among the phytoplankton categories recorded. Egborge and Sagay (1979), Chindah and Pudo (1991) and Adesalu (2010) have reported that phytoplankton production in Nigeria's river was high and principally dominated by diatoms. Similar dominance of diatoms among phytoplankton assemblages have been reported by other researchers in the pelagic zone of Lakes Kivu and Tanganyika (Damas, 1937; Kilham and Kilham, 1990; Haberyan and Hecky, 1987; Caljon, 1992 and Sarmanto et al., 2006, 2007). Similarly, Bisimwa et al. (2009b, 2013) and Bahati et al. (2015) reported diatoms dominating the epibenthic algae of Kahuzi-Biega National Park's streams and the epilithic periphytons of Lwiro region's rivers.

The pennate diatoms (60 species) of Nyamuhinga stream were more in number than the centric diatoms (7 species) attributed to the numerous pennate forms recorded to the effect of tidal mixing that probably scours up the phytobenthic forms into the plankton of Lake Kivu affluents. The reduced phytoplankton diversity in the wet season may be linked to the low water clarity which reduces the amount of light available to the planktonic algal component for photosynthesis. Sarmanto et al. (2006, 2007) have also reported similar inferences for the pelagic algae of Lake Kivu, Bisimwa et al. (2013) and Bahati et al. (2015) reported the epibenthic algae of Kahuzi-Biega National Park's streams and Bisimwa et al. (2009b) reported the epilithic periphytons of Lwiro region's rivers.

Whereas diatoms were prominent in both seasons, the green algae and the cyanobacteria were important in terms of diversity in the wet season. A good number of the species encountered for this study have been recorded before now in Lakes Kivu and Tanganyika region (Damas, 1937; Caljon, 1992; Sarmanto et al., 2006, 2007; Bisimwa et al., 2009b, 2013 and Bahati et al., 2015). Notable encountered genera for the study were *Achnanthes* (4 species), *Cyclotella* (4 species), *Cymbella* (4 species), *Gomphonema* (4 species), *Closterium* (4 species), *Merismopedia* (4 species), *Navicula* (9 species), *Nitzschia* (8 species), *Pediastrum* (5 species), *Euglena* (5 species), *Microcystis* (4 species), *Lyngbya* (4 species) and *Oscillatoria* (12 species). These species have been reported as prominent in other studies (Egborge and Sagay, 1979; Chindah and Pudo, 1991; Adesalu, 2010; Bisimwa et al., 2009b, 2013 and Bahati et al., 2015).

In this study, the Euglenophyceae had a wider distribution and two of the organic pollution indicators species observed were *Euglena acus* and *Phacus orbicularis* (Adesalu, 2010). The observation of more diatoms than green algae and cyanobacteria in this study conformed to typical trend in tropical water bodies (Chindah and Pudo, 1991; Adesalu, 2010; Bisimwa et al., 2009b, 2013 and Bahati et al., 2015). Wetzel (1983) and Adesalu (2010) reported that chlorococcales inhabit water of differing salinity and alkalinity. The low desmids recorded could be a pointer that the stream is poor in its ionic composition (Nwankwo, 1996; Adesalu, 2010) because, high diversity of desmids is an indication that the water body is largely unpolluted (Egborge and Sagay, 1979; Adesalu, 2010) and this is supported with the presence of *Euglena acus*. According to Caljon (1987), Conforti (1991) and Adesalu (2010) this group is characteristic of eutrophic or nutrient rich water bodies and these abundance is a pointer that probably, Nyamuhinga stream is organically polluted, which could be due to the wastewater and the sewage discharged into and to intense anthropogenic activities in its catchment. So far, no work has been done on the algal flora of Nyamuhinga stream, hence all these forms constitute new records and this study has provided baseline data for the Nyamuhinga stream and more work needs to be done.

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