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Plankton Community Structure in Jatigede Reservoir, West Java

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Plankton community is an important biotic component in the aquatic ecosystem of the Jatigede Reservoir. The presence of plankton in the water is a very important link in the life support of other organisms as a source of natural food. This research aims to determine the plankton community structure in Jatigede Reservoirs. The method used is field observation data capture using a purposive sampling method in the five research stations that are: Wado (St. 1), Sukamenak (St. 2), Leuwihideung (St. 3), Cipaku (St. 4) and Jemah (St. 5) with a sampling frequency of six times in April 2017 and October 2017. The results show the identification in the waters of the Reservoir Jatigede of 11 phylum of plankton which consist of 54 genera: 40 genera of phytoplankton and 14 genera of zooplankton. The abundance of plankton in the highest spatial and temporal zone is in Wado in April (phytoplankton 57,484,308 cell L-1, which dominates from genus Sta-nieria and zooplankton 233,374,536 ind L-1, which dominates from genus Brachionus). The structure of the phytoplankton community is suppressed to labile, low to moderate diversity ($0.80 \leq H \leq 1.90$), low to moderate uniformity ($0.22 \leq E \leq 0.51$) with low dominance ($0.20 \leq C \leq 0.50$). The community structure of zooplankton is suppressed, low to moderate diversity ($0.50 \leq H \leq 1.10$), low uniformity ($0.20 \leq E \leq 0.42$) and medium dominance ($0.41 \leq C \leq 0.70$).

Key words: *Abundance, community, diversity, Jatigede Reservoir, plankton.*

Introduction

Jatigede Reservoir is located in Sumedang Regency, West Java. This reservoir was purpose built as a 90.000 ha irrigation facility, hydropower (PLTA) generating electricity capability of 690 GWH per year with a 110 MW capacity, PDAM water supply provider with 3.500 litres capacity per second, flood control for 14.000 Ha area, tourism destination and fisheries (Balai Besar Wilayah Sungai Cimanuk-Cisanggarung (BBWS), 2009).

Water environment condition is a complex system and consists of various parameters that influence for one another. One of the organisms living in aquatic ecosystems and highly influential is plankton (Odum, 1971). Plankton are microorganisms that float in water, they do not move or move slightly and always follow the flow (Sachlan, 1982). Plankton abundance is an appropriate bioindicator to determine the condition of a waterway (Basmi, 2000). Plankton is a major component in the aquatic food chain (Mudjiman, 2008; Iwuchukwu, & Iwuchukwu, 2018). An inventory of plankton biodiversity data in Jatigede Reservoir is strongly needed. Therefore, research is required to obtain some information that will provide the plankton community structure conception in supporting the management and development of Jatigede Reservoir.

Materials and Methods

This study was conducted in April 2017 and October 2017. The method used is a survey with purposive sampling technique which collects data with certain considerations based on the Cimanuk River flow into the Jatigede Reservoir. It also represents the inlet, middle and outlet areas of the reservoirs namely Wado (St. 1), Sukamenak (St. 2), Leuwihideung (St. 3), Cipaku (St. 4) and Jemah (St. 5) (Figure 1 and Table 1 below) with the frequency of three times sampling each month through diurnal.

Figure 1. Map research station

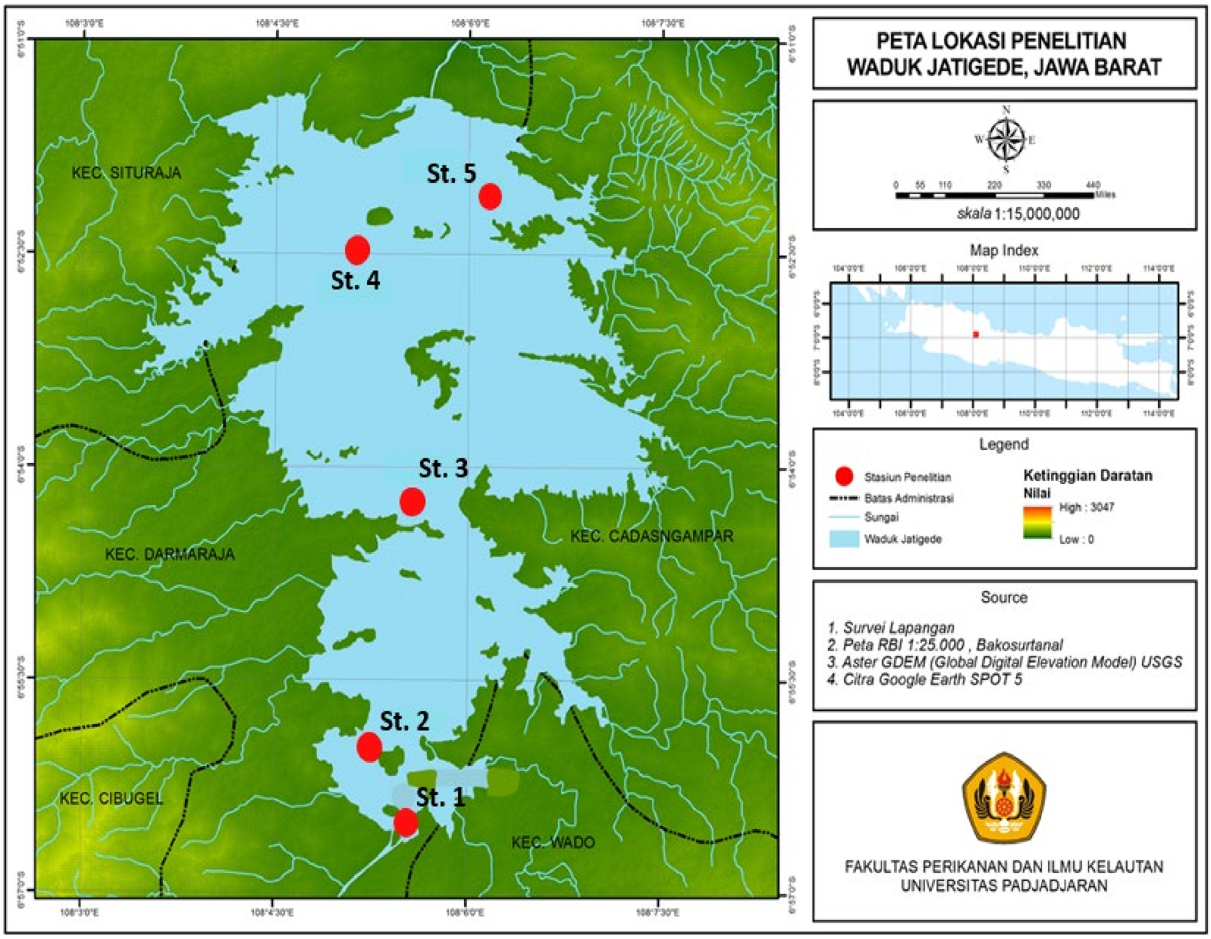

Table 1: Condition of the research station

Station	Location	Coordinate point	Inlet water
1	Wado	6°56'15.2'' LS 108°5'37.3'' BT	Cimanuk River
2	Sukamenak	6°55'36.9'' LS 108°5'25.6'' BT	Cimanuk River
			Cimuja River
			Cijajaway River
			Cibelah River
			Cialing River
3	Leuwi Hideung	6°55'8.4'' LS 108°5'42.0'' BT	Cihonje River
4	Cipaku	6°53'33.2'' LS 108°5'38.3'' BT	Cimanuk River
			Cihonje River
5	Jemah	6°53'16.9'' LS 108°5'32.9'' BT	Cinambo River

The tools used are a scoop size 1 L, plankton net no. 25 (mesh size 50 µm), bottle sample (100 mL), measuring cup (100 mL), pipette (1 mL), counting chamber (1 mL), cover glass, hand counter, binocular microscope (10x enlargement), identification books of plankton Whiple (1947) and Mizuno (1970). The materials used are lugol and aquades. Sampling of plankton refers to SNI no. 13-4717-1998 (Sampling Method of Plankton Pilot at General Water Agency) i.e. water sample taken as much as 30 L using scoop, filtered water sample using plankton net no. 25, sample collected into bottle sample, samples collected 1 mL lugol and inserted into the cool box. The identification of plankton samples was carried out at Ecology Laboratory of PPSDAL Universitas Padjadjaran and Plankton Laboratory of Fish Recovery Research Center (BRPSDI) Purwakarta. Plankton observations include species identification and cell count/ individual counts per species. The enumeration of phytoplankton and zooplankton was performed using Sedgewick Rafter Counting Cell (SRC) with volume of 1 mL. Samples were observed under a microscope with 10x10 magnification with a sweep method, which is to chop all types of plankton present in the sample water volume. The identification of plankton refers to Whipple (1947) and Mizuno (1970) identification books (Whipple, 1947); (Mizuno, 1970).

Plankton abundance was calculated using Lackey Drop Microtransect Counting method (APHA (American Public Health Association), 2005), with the formula:

$$N = n \times \frac{A}{B} \times \frac{C}{D} \times \frac{1}{E}. \qquad \textbf{(1)}$$

Remarks:

N	:	total plankton (cell L^{-1}, ind L^{-1})
n	:	total individuals average number per field of view
A	:	cover glass scale (mm^2)
B	:	field of view scale (mm^2)
C	:	concentrated water volume (mL)
D	:	one drop water volume under cover glass (mL)
E	:	filtered water volume (L).

Some factors of the formula are known in Lackey Drop Microtransect method, such as: n = 5 cell^{-1}, A = 484 mm, B = 2.405 mm, C = 30 mL, D = 0.05 mL and E = 30 liters.
Species diversity was analyzed using the Shannon-Wiener Diversity Index (Odum, 1971), with the following equation:

$$H' = -\sum_{i=0}^{N} P_i \ln n_i . \qquad \textbf{(2)}$$

Remarks:

H'	:	Shannon-Wiener Diversity Index
P_i	:	an opportunity function for each part roundly (n_i/ N_i)
n_i	:	number of individual types of-i
N	:	total number of individual.

The H' rating category is:

$H' \leq 1$	:	low diversity
$1 \leq H' \leq 3$	:	moderate diversity
$H' \geq 3$	:	high diversity.

The dominance index was analyzed using the Simpson Index (Odum, 1971):

$$C = \sum_{i=0}^{N} \left(\frac{n_i}{N} \right)^2 \quad \textbf{(3)}$$

Remarks:

C	:	Simpsons dominance index
n_i	:	number of individual types of-i
N	:	total individuals.

The C rating category is:

$0 \leq H' \leq 0.5$	:	low dominance
$0.5 \leq H' \leq 0.75$	:	moderate dominance
$0.75 \leq H' \geq 1$	:	high dominance.

Evenness index was used to determine the spread similarity from an individual number of each clan at the community level (Odum, 1971):

$$E = \frac{H'}{\ln S}. \quad \textbf{(4)}$$

Remarks:

E	:	Evennes index
H'	:	Shannon-Wiener Diversity Index
S	:	number of species.

The E rating category is:

$0 \leq E \leq 0.4$	:	low uniformity, depressed community
$0.4 \leq E \leq 0.6$	:	moderate uniformity, unstable community
$0.6 \leq E \geq 1$	:	high uniformity, stabilized community.

3. Results

Taxa richness, diversity, dominance and evenness indices plankton in Jatigede Reservoir can be seen in Table 2 below.

Table 2: Taxa richness, diversity, dominance and evenness indices plankton in Jatigede Reservoir

Phylum	Genera	Abundance (cell L^{-1}) (ind L^{-1})									
		St. 1		St. 2		St. 3		St. 4		St. 5	
		Apr	Oct	Apr	Oct	Apr	Oct	Apr	Oct	Apr	Oct
Phytoplankton											
I. Cyanophyta	*1. Oscillatoria*	0	0	0	281746	0	0	0	0	0	0
	2. Merismopedia	0	0	0	52324	0	0	0	20125	0	32200
	3. Microcystis	796940	20125	140873	60374	132823	20125	0	20125	0	20125
	4. Plectonema	0	0	4025	0	0	0	0	0	0	0
	5. Stanieria	21171227	0	933788	0	531293	0	398470	0	531293	0
	6. Phormidium	0	0	0	0	0	0	0	0	265647	0

II. Chlorophyta	*1. Chlorella*	0	0	0	603742	0	0	0	213322	0	16100
	2. Coelastrum	0	0	4025	20125	0	0	0	16100	0	0
	3. Cosmarium	0	8050	0	470919	0	76474	0	28175	76474	0
	4. Crucigenia	0	0	0	76474	0	0	0	201247	0	40249
	5. Eunotia	0	8050	0	0	0	0	0	0	0	0
	6. Pandorina	0	4025	0	386395	0	0	0	84524	0	0
	7. Pediastrum	0	0	4025	20125	0	0	0	20125	4025	0
	8. Scenedesmus	0	181123	0	64399	0	0	0	84524	4025	0
	9. Sphaerocystis	0	0	0	12075	0	0	0	0	0	0
	10. Staurastrum	0	12075	0	804990	0	169048	0	2443143	0	189173
	11. Spyrogira	0	0	3497680	205272	265647	0	0	0	4025	0
	12. Closterium	0	0	0	0	0	0	0	0	4025	0
	13. Tribonema	0	0	0	0	0	0	0	0	4025	0

	14. Ankistrodesmu	0	0	0	12075	0	0	0	0	0	0
	15.Eudorina sp.	0	0	0	52324	0	0	0	8050	0	0
	16. Raphidiopsis	0	0	0	0	0	0	0	8050	0	0
	17. Zygnema	0	0	0	132823	0	0	0	8050	0	0
III. Chrysophyta	*1. Cyclotella*	0	257597	0	8050	0	0	0	0	0	0
	2. Cymbella	265647	0	148923	350170	265647	0	132823	213322	72449	0
	3. Gomphonema	0	8050	0	4025	0	0	0	80499	4025	0
	4. Navicula	0	2596091	16100	7200632	265647	0	132823	9917472	941838	0
	4. Nitzschia	0	189173	0	8050	132823	0	0	88549	165023	0
	5. Synedra	0	1316158	277721	6001198	0	84524	0	6814237	2052572	507143
	6. Surirella	0	64399	4025	0	0	0	0	8050	0	0

	7. Bacillaria	0	24150	4025	0	0	0	0	0	0	0
	8. Fragilaria	0	32200	12075	0	0	0	0	0	0	0
	9. Pinnularia	0	148923	0	0	0	0	0	44274	0	0
	10. Neidium	0	12075	0	0	0	0	0	0	0	0
	11. Pleurosigma	0	462869	0	0	0	0	0	317971	0	0
	12. Melosira	0	80499	0	0	0	0	0	0	0	0
IV. Pyrrophyta	*1. Ceratium*	13282328	1364457	2789289	2523642	0	0	0	2410944	4025	0
	2. Peridinium	0	2753064	0	19722245	0	173073	0	4266445	0	804990
V. Euglenophyta	*1. Trachelomonas*	0	0	0	0	0	0	0	8050	0	0
	2. Euglena	0	0	0	0	0	0	0	0	4025	0
Zooplankton											
I. Copepoda	*1. Cyclops*	6641164	0	11994435	8050	0	0	132823	0	12075	0
II. Cladocera	*2. Moina*	265647	0	265647	0	0	0	0	0	0	0

	3. Nauplius	63755177	0	33608832	0	0	0	1062586	0	0	0
III. Rotifera	*4. Monostyla*	0	16100	16100	0	0	0	0	4025	24150	4025
	5. Tricoccerca	0	0	0	0	4025	0	0	8050	0	0
	6. Brachionus	159520765	0	11289979	0	132823	0	2125173	0	265647	0
	7. Notholca	0	0	0	0	0	0	0	4025	4025	0
	8. Asplancha	1859526	0	1859526	0	0	4025	0	4025	0	0
	9. Rotaria	0	0	0	0	0	0	0	0	20125	0
	10. Keratella	132823	0	0	0	0	12075	0	92574	0	8050
	11. Polyarthra	1062586	0	0	0	132823	0	265647	8050	0	0

	12. Lecane	132823	0	0	0	0	0	0	0	0	0
IV. Protozoa	*1. Arcella*	4025	4025	8050	0	0	0	0	0	8050	0
	2. Centropyxis	0	0	0	0	0	0	132823	0	12075	0
Phytoplankton											
Abundance (cell L^{-1})		35516141	9543152	7836574	39074195	1593879	523243	664116	27325372	2290195	1609979
Total species		4	20	13	25	6	5	3	25	15	7
***H'* (Diversity index)**		1.44		1.83		2.15		1.78		2.06	
***E* (Evennes index)**		1.33		0.24		0.13		0.23		0.16	
***D* (Dominance index)**		0.40		0.50		060		0.50		0.56	
Zooplankton											
Abundance (ind L^{-1})		233374536	20125	17999568	8050	269672	16100	3719052	120748	346146	12075
Total species		9	2	7	1	3	2	5	6	6	2
***H'* (Diversity index)**		0.80		1.09		0.80		1.23		0.93	
***E* (Evennes index)**		0.50		0.40		0.50		0.40		0.60	
***D* (Dominance index)**		0.30		0.41		0.30		0.50		0.35	

Water quality parameters include temperature, transparency, pH, dissolved oxygen (DO), nitrate and phosphate can be seen in Table 3 below.

Table 3: Water quality in Jatigede Reservoir

Parameters	**Unit**	**Station**					**Optimum quality water for plankton**
		1	**2**	**3**	**4**	**5**	
Water temperature	°C	27.0-30.0	27.6-29.3	27.0-29.5	29.0-30.0	29.5-30.0	25-30[a]
Transparency	Cm	34.5-119.0	66.0-160	76.0-122	92.0-104	85.0-149	> 2[b]
pH	-	7.16-8.46	8.46-8.79	7.00-8.42	7.91-9.00	7.22-8.54	6.5-8.5[c]
Dissolved oxygen (DO)	mg L^{-1}	7.30-6.00	6.00-7.30	5.80-8.20	6.50-7.20	6.22-8.79	> 2[d]
Nitrate	mg L^{-1}	0.20-1.60	0.02-0.88	0.07-0.13	0.02-0.06	0.064-0.5	3.9-15.5[e]
Phospate	mg L^{-1}	0.20-0.30	0.10-0.20	0.10-0.19	0.10-0.13	0.14-0.15	0.27-5.51[e]

Remarks:
aRaymond (1980), bKordi & Tancung (2005), cRomimohtarto (2004), dEffendi (2003), eRumanti et al. (2014).

Discussion

Composition and Plankton Abundance

The identification results show there are 54 genus plankton consisting of 5 phytoplankton phylum, Cyanophyta (6 genera), Chlorophyta (17 genera), Chrysophyta (13 genera), Pyrrophyta (2 genera), Euglenophyta (2 genera) and 4 phylum zooplankton, Copepoda (1 genera), Cladocera (2 genera), Rotifera (9 genera), Protozoa (2 genera) (Table 2).

The presence of phytoplankton phylum Chlorophyta and Chrysophyta has the dominant genera composition. Chlorophyceae is the largest group of algae vegetation (Sachlan, 1982) and has a wide range of habitats (Bold and Wyne, 1985). This community mostly lives in fresh water (Garno, 2008). Chrysophyta is able to adapt to environmental conditions because it is cosmopolitan and has a high adaptability (Arinardi et al., 1994); (Yuliana et al., 2012); (Samsidar et al., 2013) so that the spread is quite wide. Phylum Chrysophyta can be an aquatic indicator as it is an accumulator of all changes in water quality, such as sedimentation and nutrients (Suthers and Rissik, 2009).

Phytoplankton abundance in Jatigede Reservoir ranged from 1,062,586 cells L-1 – 57,484,308 cells L-1 (Table 2). Genera Peridinium of Pyrrophyta phylum has the highest population abundance, of 27,719,817 L-1 cells (Table 2). Peridinium has the adapted ability toward a wide range of pH and light intensity, has a long life span, has a large size, has a defend ability from predators (zooplankton) and can save the phosphorus used in the event of phosphorus deficiency in aquatic environments (Gomes et al., 2010). Zooplankton abundance in Jatigede Reservoir ranged from 8,050 ind L-1 – 233,374,536 ind L-1 (Table 2). Genera Brachionus from the phylum of Rotifera has the highest population abundance of 173,334,387 ind L-1 (Table 2). Rotifera is one of the main groups of freshwater zooplankton besides Protozoa (Barus, 2004). The phylum of Rotifera has a reproductive strategy in the form of parthenogenesis which the egg develops without fertilization and all the eggs hatch into females (Stemberger and Gilbert, 1987), so its distribution in the waters is relatively broad.

The highest spatial and temporal abundance of plankton was found in St. 1 (Wado) in April, with phytoplankton abundance of 57,484,308 L-1 cells (dominated by the Stanieria) and zooplankton of 233,374,536 ind L-1 (dominated by Brachionus). This relates to the aquatic environmental characteristics that support plankton life. Plankton spreading patterns are strongly influenced by physical and chemical parameters of the waters (Amelia et al., 2012). Seasonal changes allegedly affect the distribution of plankton in the waters, April 2017 is the beginning of the dry season in Jatigede Reservoir. The change in height and low density of phytoplankton is temporally influenced by hydrographic factors (Gaytan-Herrera et al., 2011).

Dominance and Evennes Indices

The phytoplankton diversity at each station is 1.44 (St. 1); 1.83 (St. 2); 2.15 (St. 3); 1.78 (St. 4); 2.06 (St. 5) and zooplankton diversity of 0.8 (St. 1); 1.09 (St. 2); 0.8 (St. 3); 1.23 (St. 4); 0.93 (St. 5). The value indicates that the phytoplankton diversity in Jatigede Reservoir is moderate and the community tends to be stable ($1 \leq H' < 3$), whereas the zooplankton diversity is low and the community is unstable ($H' < 1$). The relatively low diversity of zooplankton is thought to be influenced by its uneven distribution at each station. Odum (1971) states that species diversity is influenced by an individual distribution of each species, because of a community, even if the species is large but when the unity is uneven, then the diversity is low (Odum, 1971). Water quality criteria can be determined based on the modified diversity index by Wilhm and Doris (Dahuri, 1995) which mentions if the diversity index of $H' > 3$ includes unfractionated waters, H' in the range of 1-3 is moderately polluted and $H' < 1$ is heavily polluted and based on these criteria, Jatigede Reservoir was included into the medium contaminated category.

The dominant value of phytoplankton obtained was 1.33 (St. 1); 0.24 (St. 2); 0.13 (St. 3); 0.23 (St. 4); 0.16 (St. 5) and zooplankton of 0.5 (St. 1); 0.4 (St. 2); 0.5 (St. 3); 0.4 (St. 4); 0.6 (St. 5). These results indicate that there is a dominant phytoplankton community, which at St. 1. The dominant plankton community is thought to base from the phylum Cyanophyta (genus Stanieria) due to its relatively high abundance in St. 1 (Table 2). According to Issa et al. (2014) the majority of Cyanobacteria are aerobics photoautotrophs, where the life processes require only water, carbon dioxide, inorganic substances and transparency (Issa et al., 2014). Cyanobacteria has long been a problem of water quality in lakes and reservoirs resulting from their potential to produce toxins and demonstrate tolerance to keep growing despite nutrient concentrations fluctuating, due to their ability to store phosphorus (Von Sperling et al., 2008). Basmi (2000) states that the value of plankton dominance ranges from 0-1, if the index approaches 0 then there is no dominant plankton community in the waters (Basmi, 2000). The dominant index is closely related to diversity, the higher the dominance index is, the lower the biodiversity (Odum, 1971).

The evennes value of phytoplankton obtained is 0.40 (St. 1); 0.50 (St. 2); 0.60 (St. 3); 0.50 (St. 4); 0.56 (St. 5) and zooplankton of 0.30 (St. 1); 0.41 (St. 2); 0.30 (St. 3); 0.50 (St. 4); 0.35 (St. 5), indicating that the distribution of phytoplankton in the Jatigede Reservoir tends to be equitable with unstable communities and the distribution of zooplankton is less prevalent with distressed communities. Krebs (1989) states that the criteria of Evennes index values when assessed from a community perspective are categorized as follows: $0 < E \leq 0.5$ is a depressed community; $0.5 < E \leq 0.75$ is an unstable community; and $0.75 < E \leq 1$ is a stable community (Krebs, 1989).

Water Quality

The water temperature measured in Jatigede Reservoir ranges from 27˚C to 30˚C. Effendi (2003) states that the optimum temperature range for the growth of waters organisms is 20˚C to 30˚C (Effendi, 2003). The optimum temperature for phytoplankton growth is 25˚C-30˚C (Raymond, 1980). Yeanny (2005) states that the temperature which supports plankton life is from 28°C to 30°C (Yeanny, 2005). The measured temperature is still within the optimum range for plankton growth. Water temperature is an abiotic factor that has an important role for the life of aquatic organisms.

The measured transparency in Jatigede Reservoir ranges from 34.5 cm to 190 cm. Kordi & Tancung (2005) states that a transparency value of less than 25 cm would be harmful to plankton organisms (Kordi and Tancung, 2005). Boyd (1979) states that the optimal transparency of plankton life ranges from 30 cm to 50 cm (Boyd, 1979). The value of transparency in Jatigede Reservoir is still in the optimum range for plankton life. According to Barus (2004) transparency will be different in each location (Barus, 2004). The value of transparency is influenced by weather, water color and turbidity of suspended solids (turbidity) (Effendi, 2003).

The pH values obtained in Jatigede Reservoir range from 7.0 to 9.0 and this is within the optimum range. The ideal limit of pH value for the life of aquatic organisms (phytoplankton) it is between 6.5 to 8.5 (Romimohtarto, 2004). According to Kordi & Andi (2009) the optimum pH for waters is in the range of 7.5 to 8.7 (Kordi and Andi, 2009). According to Indriani (2016), waters with pH less than 6.0 will cause plankton organisms won't live well (Indriani et al., 2016). Effendi (2003) states that a low pH value (6.0-6.5) will cause the plankton diversity decreased (Effendi, 2003).

The dissolved oxygen (DO) measured in the Jatigede Reservoir ranged from 5.8 mg L-1 – 7.9 mg L-1. Those value still in the optimum range for plankton life. Effendi (2003) states, DO levels less than 2 mg L-1 can cause death of aquatic organisms (Effendi, 2003). Dissolved oxygen content in waters is influenced by water body size, stratification temperature, vegetation closure, phytoplankton growth and wind movement. Plankton can live well at DO concentrations bigger than 3 mg L-1 (Prasetyaningsih et al., 2012). Dissolved Oxygen is an indicator of water quality, productivity, ecological status and health of a water body (Mustapha, 2008).

The measured nitrate in Jatigede Reservoir is in the range of 0.02 mg L-1 to 1.60 mg L-1. The content of nitrate in Jatigede Reservoir is still feasible for plankton life. The optimal nitrate concentration for phytoplankton growth is between 3.9 mg L-1 to 15.5 mg L-1 (Amelia et al., 2012). Effendi (2003) states that waters with nitrate levels ranging from 0 mg L-1 to 1 mg L-1 belong to oligtrophic waters (Effendi, 2003). Based on those data, Jatigede Reservoir is included into the oligotrophic waters.

The measured phosphates in the Jatigede Reservoir range from 0.10 mg L-1 to 0.30 mg L-1. Phosphate content in Jatigede Reservoir is still within the optimum range for plankton life. The optimal phosphate content for phytoplankton growth is in the range of 0.27 mg L-1 to 5.51 mg L-1, whereas phosphate content of less than 0.02 mg L-1 will indicate a limiting factor (Rumanti et al., 2014). Edward & Tarigan (2003) state that the high phosphate content is due to the decomposition of sediments and organic compounds derived from dead bodies of flora and fauna (Edward and Tarigan, 2003). According to Effendi (2003), the excessive presence of phosphate accompanied by the presence of nitrogen can stimulate the explosion of algae growth in the waters (Effendi, 2003). Phosphate and nitrates are the nutrients needed and have an effect on the growth and development of living organisms in the waters and one of these is phytoplankton (Nybakken, 1988).

Conclusion

Based on the results of the study, it can be concluded as follows:

a) Plankton identified in the Jatigede Reservoir comprised 54 genera of 11 phylum, consisting of 40 genus of phytoplankton and 14 genus of zooplankton.
b) Phytoplankton abundance in the Jatigede Reservoir ranges from 1,062,586 cells L-1 – 57,484,308 cells L-1. The abundance of zooplankton in Jatigede Reservoir ranges from 8,050 ind L-1 – 233,374,536 ind L-1. The highest spatial and temporal abundance of plankton was found in St. 1 (Wado) in April, with phytoplankton abundance of 57,484,308 L-1 cells (dominated by the genus Stanieria) and zooplankton of 233,374,536 ind L-1 (dominated by genus Brachionus).
c) Plankton diversity fluctuates from low to moderate with values ranging from 1.44 to 2.15 (phytoplankton) and (0.693 to 1.406) for zooplankton.
d) The dominant index ranges from 0.13 to 1.33 (phytoplankton) and 0.40 to 0.60 (zooplankton) and there is dominance in the phytoplankton type.
e) The level of Evennes between populations tends to be depressed to unstable, with an Evennes index ranging from 0. 40 to 0. 60 (phytoplankton) and 0.30 to 0.50 (zooplankton).
f) The result of water quality measurement in Jatigede Reservoir indicates that the water is still good for plankton life.

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