WATER QUALITY STATUS OF CIAMBULAWUNG RIVER, BANTEN PROVINCE, BASED ON POLLUTION INDEX AND NSF-WQI

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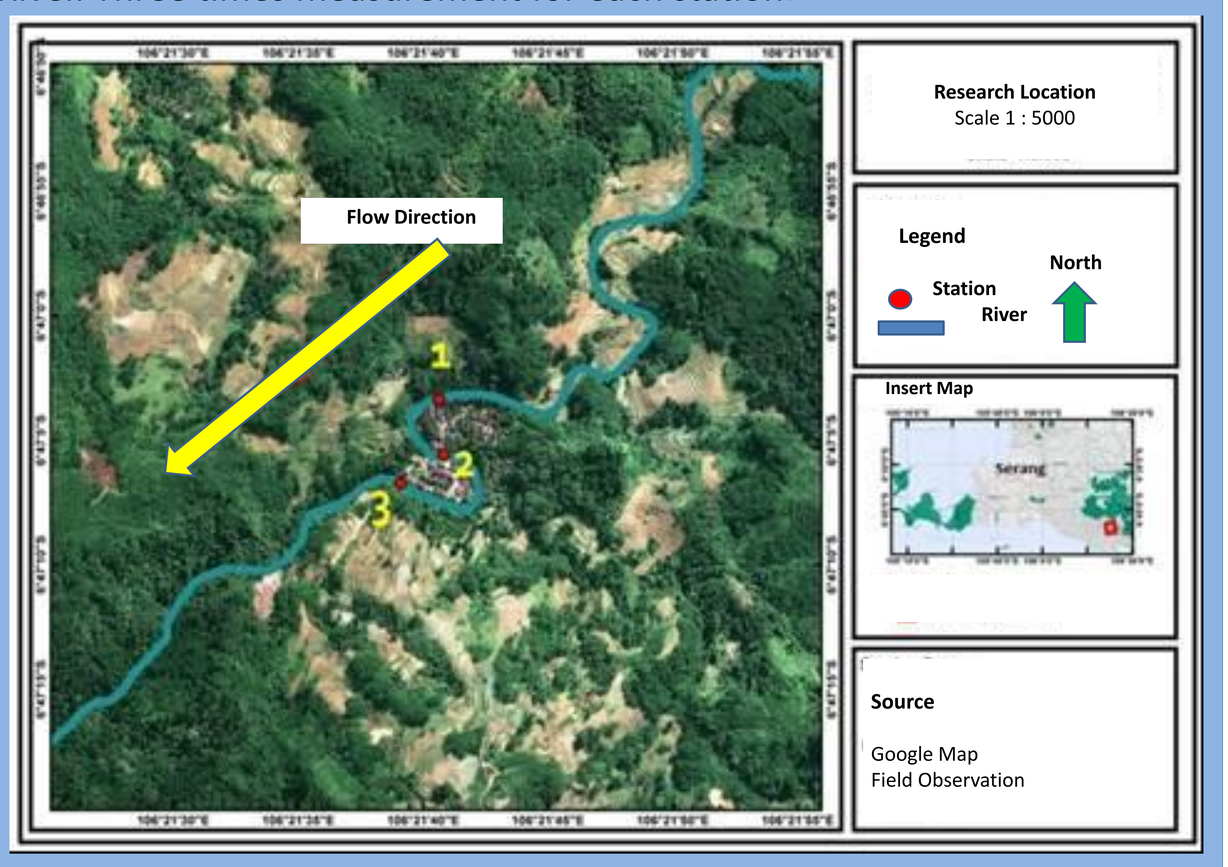
ABSTRACT

Ciambulawung River is used for micro-hydro power plant (capacity 10.000 Watt). The purpose of this study was to determine the water quality status of Ciambulawung River by applying Water Pollution Index and NSF-WQI. The pollution index ranged 0.56 – 0.78 and NSF WQI ranged 87 – 88. Hence the river water quality was considered good. Based on pollution index and NSF WQI index it is concluded that communities living along river bank and micro-hydro power plant do not negatively affect the water quality of Ciambulawung River.

METHODS

The research location is adjacent to the area of the Halimun Salak National Park between 6º19'– 6º47'S latitude and 106º21'–107º07'E longitude. Three sampling stations were established at Ciambulawung River. Three times measurement for each station.



Water quality analyzed included: Temperature, Turbidity, Velocity, TSS, TDS, Debit, pH, DO, BOD, COD, NO_3-N, NO_2-N, NH_3-N, and Total Phosphate (APHA, 2008).

Data Analysis

Data was analyzed by Pollution Index and NSF WQI with Government Regulation No. 82/2001 for water quality class II, water allocation can be used for infrastructure / water recreation facilities, freshwater fish farming, animal husbandry, crop irrigation, and/or other uses that require water quality equal to the usability.

Pollution Index

Pollution Index is applied to determine the level of contamination (Minister of Environment Decision No. 115 of 2003) with the criteria presented at Table 1.

NSF WQI

National Sanitation's Foundation Water Quality Index (NSF WQI) (Table 2) (Ott, 1997) was used to determine the level of water quality based on 8 parameters namely: BOD, DO, nitrate, total phosphate, temperature, turbidity, total solids, and pH.

Table 1. Pollution Index Criteria .

Score	Criteria
0.0 ≤ PIj ≤ 1.0	Good Water Quality
1.0 ≤ PIj ≤ 5.0	Moderately Polluted
5.0 ≤ PIj ≤ 10	Polluted
PIj > 10	Extremely Polluted

Table 2. NSF WQI Criteria.

Score	Criteria
0 – 25	Very Bad
26 – 50	Bad
51 – 70	Medium
71 – 90	Good
91 – 100	Excellent

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INTRODUCTIONS

Ciambulawung River is located on Halimun Mountain, Lebakpicung Kampong, Village of Hegarmanah, District of Cibeber, Lebak Regency, Banten Province.

This kampong is adjacent to Halimun Salak National Park Area and home for 52 households. Ciambulawung River is used for micro-hydro power plant (capacity 10.000 Watt) and used also by people who live in Lebakpicung Kampong for bathing and washing.

Micro-hydro power plant was built by the collaboration between Center for Environmental Research IPB, Indonesia State-owned Electric Company (PLN), and Halimun Salak National Park through the PLN CSR Program.

Lebakpicung kampong is a remote place and can not be reached by car. Traveling by motorcycle for 30 minutes from the end of the road where cars can pass. Elementary school and small mosque exist in this kampong.

This research aims to determine the water quality status of Ciambulawung River using Pollution Index and NSF WQI (National Sanitation's Foundation - Water Quality Index).

RESULT AND DISCUSSION

Water quality characteristic of each station is presented at Table 3.

Table 3. Water quality characteristic of each station of Ciambulawung river.

No	Pamareter	Unit	Threshold	Sampling 1			Sampling 2			Sampling 3		
				St 1	St 2	St 3	St 1	St 2	St 3	St 1	St 2	St 3
	Physics											
1	Temperature	(°C)	Deviation 3	25.0	25.0	26.0	24.3	23.7	24.3	23.0	22.0	23.0
2	Turbidity	(NTU)	-	2.00	3.70	1.50	2.00	3.00	2.00	1.50	3.00	2.00
3	TSS	(mg/L)	50	2.00	2.00	1.00	2.00	4.00	3.00	3.00	1.00	2.00
4	TDS	(mg/L)	1000	36.50	36.10	52.90	27.40	34.30	53.80	30.00	30.00	50.00
	Chemical											
5	pH		6 – 9	6.0	5.8*	6.5	6.5	6.5	6.5	6.5	6.5	6.5
6	DO	(mg/L)	4	7.67	7.93	6.91	7.16	6.91	6.91	9.21	9.21	9.98
7	BOD_5	(mg/L)	3	3.84*	2.30	2.24	1.58	1.54	1.54	3.06*	3.06*	2.30
8	NH_3-N	(mg/L)	0.02	0.0178	0.0156	0.0104	0.0059	0.0098	0.0092	0.0099	0.0167	0.0091
9	NO_2-N	(mg/L)	0.06	0.0094	0.0128	0.0178	0.0144	0.0246	0.0242	0.0132	0.0166	0.0223
10	NO_3-N	(mg/L)	10	0.29	0.21	0.17	0.0966	0.0819	0.0999	0.0852	0.1119	0.0497
11	Total Phosphate	(mg/L)	0.2	0.14	0.11	0.12	0.13	0.13	0.11	0.12	0.15	0.13
12	COD	(mg/L)	25	9.35	5.82	17.59	14.65	25.24*	8.18	13.47	6.41	9.94
	River Characteristic											
13	Velocity	(m/s)	-	0.78	0.43	0.63	0.66	0.55	0.46	0.85	0.76	0.62
14	Debit	(m^3/s)	-	2.45	1.05	5.68	2.40	1.36	6.20	3.22	1.88	6.53
15	Depth	(m)	-	0.28	0.15	0.15	0.28	0.15	0.15	0.28	0.15	0.15
16	Width	(m)	-	15.11	16.21	14.15	15.30	16.43	14.45	15.33	16.45	14.48

Based on the analysis using pollution index and NSF WQI, classification and evaluation of Ciambulawung River at each station during the observation was obtained (Table 4 and 5).

Table 4. Pollution Index Classification.

Station	PI Value	Classification
1	0.75	Good Condition
2	0.78	Good Condition
3	0.56	Good Condition

Table 5. NSF WQI Classification.

Station	NSF WQI Value	Classification
1	87	Good Condition
2	87	Good Condition
3	88	Good Condition

Both pollution index and NSF WQI showed that water quality in each station was classified into good condition, based on the parameter measured.

Parameters that do not meet Government Regulation No. 82/2001 for water quality class II are pH, BOD, and COD. These were due to decomposition process of organic matter such as falling leaves, by microbes. This process consumed relatively large amount of oxygen, dissolved in the water.

Based on biological parameters, water quality in Ciambulawung River also showed that the condition was good (Anzani, 2012).

CONCLUSION

Water quality conditions in Ciambulawung River was in general classified in good condition. However, there are some parameters out of the Government Regulation No. 82/2001 for water quality class II.

Those parameters are pH at station 2, BOD at Station 1 & 2, and COD at station 2. Based on the pollution index and NSF WQI, water quality in Ciambulawung River was categorized in good condition.

This condition denoted that the activities of the people and micro-hydro had no negative effect on the river water quality.

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