Simulation of Pollution Load Capacity using QUAL2Kw in Babon River

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Abstract.- Babon River is one of the important rivers in Central Java through the Semarang Regency, Semarang City and Demak Regency. However, the amount of domestic, agricultural and industrial waste dumped into Babon River leads to increased pollution load and decrease in capacity. This study aimed to calculate the pollution load capacity using the Streeter Phelps method with appllied QUAL2Kw program to describing the quality of river water through the profiles of BOD, COD and TSS. And then it was compared with the standard stream due to Government Regulation No. 82/2001 about Management of Water Quality and Water Pollution Control. The study area includes Babon River from upstream to downstream that divided into 8 segments. The simulation BOD's curve, COD's curve and TSS's curve results that maximum pollution load capacity of the Babon River for BOD and COD parameters contained in the segment 8 and the TSS parameter is in segment 2, while for the minimum pollution load capacity for BOD parameter contained in segment 1, COD in segment 6 and TSS in segment 7. The result of simulation due to pollution load capacity uses minimum flow rate is compared with Government Regulation No. 82/ 2001, it indicate that in segment 8 has no capacity for water quality standard class I, II and III with pollution load capacity of BOD ranged 24, 5 kg / day – 54,2 kg / day, and then the pollution load capacity of COD has exceeded the water quality standard class I of 42,1 kg / day, while pollution load capacity of TSS parameter meet the capacity of all classes.

Keywords: Babon River, Pollution Load Capacity, Water Quality, QUAL2Kw

I. Introduction

Babon River ecosystem is one form of which is divided into upstream, midstream and downstream. Physically Babon River is the boundary region of the eastern city of Semarang with Demak Regency. Babon River is one of the rivers that have an important role in the three (3) regions in its path, namely the Semarang Regency, Semarang City and Demak Regency. In the flow of the river was constructed weir Pucang Gading that serves as a weir irrigation and flood control, but it is also used as a source of raw water (intake) taps the city, as well as utilization for domestic activities. Another utilization tends negative connotation is functioning as a Babon River effluent discharge both domestic and industrial.

The diversity of human activities around the Babon River will impact the water quality of the river from upstream to downstream. Domestic and agricultural activities that are in a watershed Babon s are a major source of pollutants along the river (BLH Semarang, 2013). The effect could be caused by pollution of the river is a decrease in the quality of water resources, health problems, and sedimentation downstream. It is necessary for river management as a basis for improvement of the environmental condition of the river through the control of the amount of pollution load and

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environmental damage control to maintain water quality in accordance with the class determined by means of calculating pollution load capacity.

River pollution load capacity is the ability of water to a source of water in this river, to receive input pollution load without causing the river water becomes blackened. Capacity Load of Pollution of the river is a complicated process because of the river water flowing continue and river water quality varies from upstream to downstream. The closer the distance the more sampling points can describe the actual water quality conditions. However, this will result in high cost of observation. Calculation of Pollution Load Capacity using modeling methods can minimize the cost of observation. One method of modeling that can be used is QUAL2Kw program, which is very efficient in simplifying an event and be able to model the water quality of the river from upstream to downstream (Rusnogroho, 2012). QUAL2Kw program also presented a stream based on the impact of the two sources is derived from a point source of pollution and non point source pollution (Pelletier, 2008).

This study was conducted to determine the water quality condition and the large amount of pollution load capacity of the Babon River by applying methods based on simulation QUAL2Kw with 3 scenarios.

2. Research Methods

2.1. Regional Scope

The study was conducted in Babon River, from upstream to downstream past the three (3) the regency / city, the Semarang Regency, Semarang City and Demak Regency.

2.2. Segmentation of Babon River

Determination of the segmentation is based on conditions and land use around the Babon Watershed, as well as the approximate location of the presence of pollutant sources in the form of point sources of pollution and non-point sources of pollution. The segment bounded by two (2) sampling points. In this study, Babon River is divided into 8 (eight) segment, the segment division as shown in Figure 1.

2.3. Sampling Location

River water sampling done by purposive sampling. Consider also the ease of access, cost, and time so determined point which is considered to represent the water quality of the river from upstream to downstream. Water sampling sites of Babon River totaling 17 sampling points. Sampling location is shown in Figure 1.

2.4. Data Collection

In general, data collection is divided into primary data and secondary data. Primary data is taken from water quality data with parameters include pH, DO, BOD, COD and TSS, the data hydraulics (discharge, flow velocity and depth) as well as point sources pollutant came from industry and non point source pollutant derived from domestic activities and agriculture. Secondary data include population data, agricultural area, Babon watershed map and climatological data (temperature, rainfall, wind speed and solar radiation).

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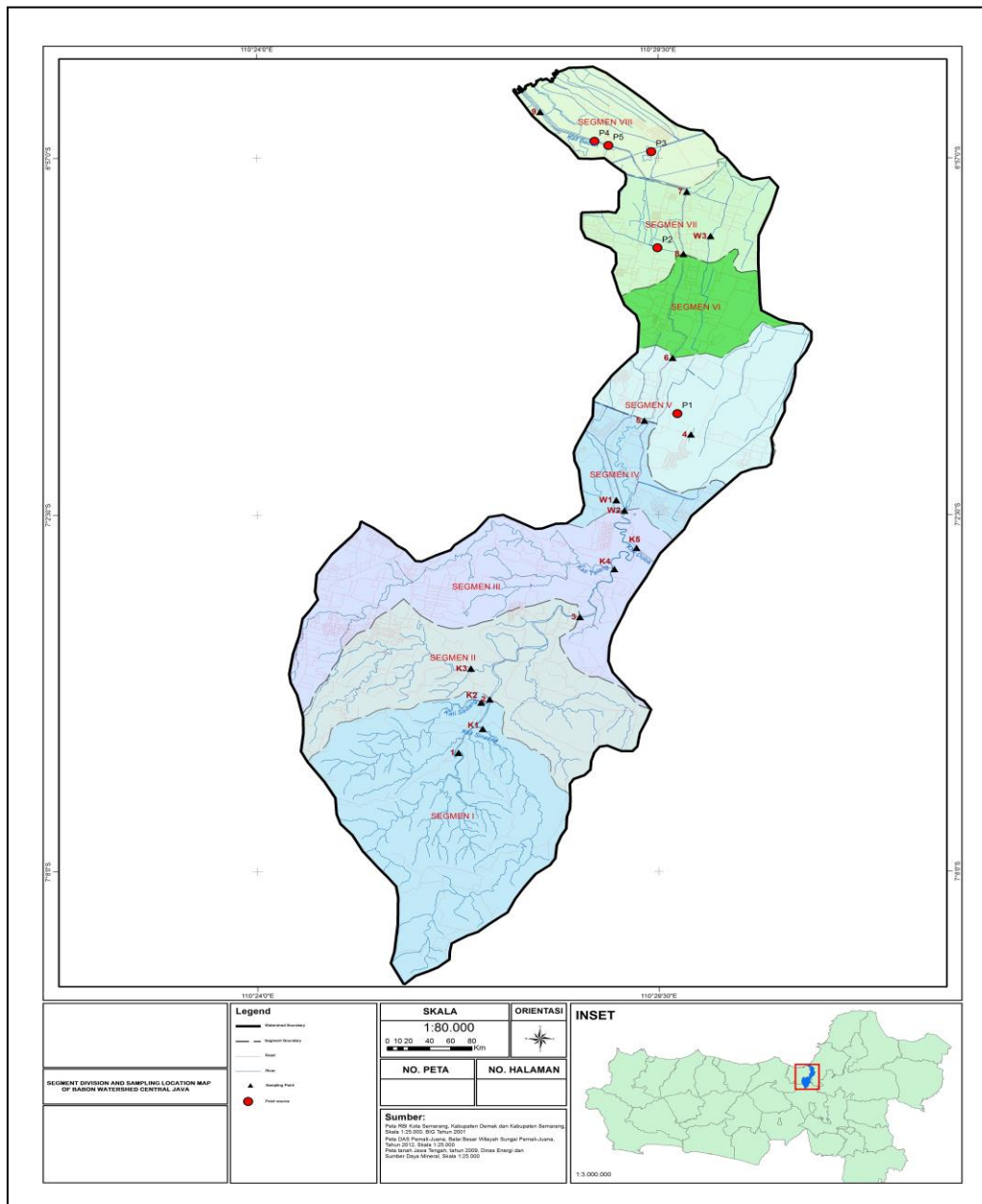*Semarang, Indonesia – November 19th, 2015*

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Figure 1. Segment Division and Sampling Location Map

2.5. Data Analysis

Load Capacity in principle is the ability of water bodies receive certain pollution load without being contaminated by the pollutant source. The pollution load is obtained from the results of water quality modeling by QUAL2Kw program based scenarios. Load the initial condition is a burden which is owned by a natural river. The maximum pollution load of the river water quality is under Government Regulation No. 82/ 2001. This capability will have a range of pollutant load to the maximum that can be tolerated by the receiving water bodies. In the data analysis, simulation techniques will be conducted to determine the pollution load capacity. This technique will be divided into several scenarios (see Table 1).

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Table 1. Scenario Simulation Techniques

Scenario	Water Quality in the Upper River	Pollutant Sources	River Water Quality
1	Existing	Existing	Models
2	Quality standard Class II *	Without pollutant source	Models
3	Quality standard Class II *	Trial and Error	Quality standard Class II*

Remarks: * Water Quality Standard according to Government Regulation No. 82 of 2001

Load Capacity = maximum pollution load – initial condition load   ...... 1)

Calculation of pollution load capacity of Babon River will use the 2nd scenario and 3rd scenario. In 2nd scenario is the initial condition of the river without pollution load. At this scenario was conducted to determine the proccess of the river if there is no pollution load entering. The quality of waste from pollutant sources indeterminate considered to meet the quality standard of wastewater. The pollution load in the form of tributaries will be assumed to meet the water quality standard. The 3rd scenario is the condition in which the results of the model in accordance with water body quality standard of class II, because the Babon River has not been established designation. The sources of pollution from point sources and non point source at the trial an error until the data model of approaching the results of quality standard class II.

3. Results And Discussion

3.1. Segment Division of Babon River

Based on the results of the map and image processing using geographic information systems, Babon River has a length from upstream to downstream along the 44.679 km. Here is the segment distribution of Babon River (see Table 2 and Figure 2).

Table 2. Segment Distribution of Babon River

Reach		Reach length	Downstream location	Elevation		Downstream					
				Upstream	Downstream	Latitude			Longitude		
Label	Number	(km)	(km)	(m)	(m)	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
Headwater	0		44,68		87,00	7,00	6	10,00	110,00	26	45,40
Jleper village, East Ungaran Sub district	1	2,10	40,70	87,00	66,00	7,00	6	10,00	110,00	26	45,40
Kalikayen Village, East Ungaran Sub district	2	5,10	38,60	66,00	39,00	7,00	5	23,50	110,00	27	4,03
Meteseh Village, Tembalang Sub district	3	6,40	33,50	39,00	29,00	7,00	4	4,54	110,00	28	25,35
Pucang Gading Village, Pedurungan Kidul Sub district	4	4,20	27,10	29,00	20,00	7,00	1	15,77	110,00	29	56,72
Pedurungan village, Pedurungan Kidul Sub district	5	2,20	22,90	20,00	16,00	7,00	1	2,86	110,00	29	18,60
Penggaron Village, Pedurungan Kidul Sub district	6	1,70	20,70	16,00	11,00	6,00	0	4,87	110,00	29	41,75
Kudu Village, Genuk Sub district	7	5,50	19,00	11,00	9,00	6,00	58	28,74	110,00	29	50,79
Karangroto village, Genuk sub district	8	2,60	13,50	9,00	3,00	6,00	57	31,27	110,00	29	53,50
Trimulyo Village, Genuk sub district	9	10,90	10,90	3,00	0,00	6,00	56	17,30	110,00	27	53,10

Source : Analysis results, 2015

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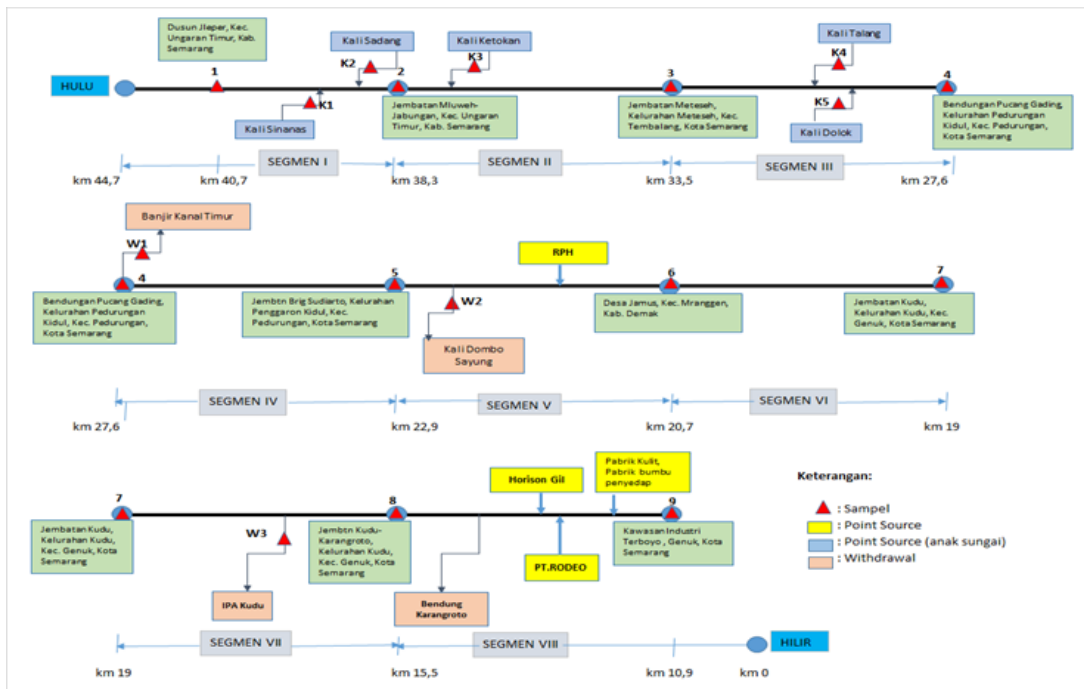*Semarang, Indonesia – November 19th, 2015*

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Figure 2. Scheme of Distribution Segment of Babon River and Point Location Sampling
(Source: Analysis results, 2015)

3.2. Pollutants Source

Estimated potential pollutant load of non-point source pollution is calculated based on data of population and agricultural area that is passed directly by the Babon River. The calculation results of each segment of the total population and the potential burden of domestic wastewater for each parameter in 2015 as shown in the following table (Table 2 and Table 3).

3.3. Babon River Discharge

The most minimal discharged of Babon River have occurred in August (0,08 m^3 / sec), and the maximum discharged was in March (2,17 m^3 / s). Smallest discharge experienced in August is the peak of the dry season is often the case in the Babon River.

Table 3. Estimated Discharge and Potential Burden of
Domestic Wastewater of Babon Watershed

Segment	Total Population	Discharge (m3/sec)	Potensial Burden of Wastewater (kg/day)		
			BOD	COD	TSS
I	91.825	0,06	3.673	5.050	3.489
II	137.733	0,08	5.509	7.575	5.234
III	244.540	0,15	9.782	13.450	9.293
IV	103.336	0,07	4.133	5.683	3.927
V	111.639	0,07	4.466	6.140	4.242
VI	63.074	0,04	2.523	3.469	2.397
VII	105.544	0,07	4.222	5.805	4.011
VIII	71.839	0,05	2.874	3.951	2.730
Total	929.530	0,59	37.182	51.123	35.323

Source : Calculation results, 2015

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Table 4. Potential Burden of Agricultural Wastewater in Babon Watershed in 2015

Segmen	Agricultural area (ha)	Potensial Burden of Wastewater (kg/day)	
		BOD	TSS
I	2.022,42	107.441	16,85
II	1.650,99	87.709	13,76
III	1.202,15	63.864	10,02
IV	250,43	13.304	2,09
V	841,63	44.712	7,01
VI	235,40	12.506	1,96
VII	370,07	19.660	3,08
VIII	353,58	18.784	2,95
Total	6.926,67	367.979	57,72

Source : Calculation results, 2015

3.4. Calibration Model

Model calibration is done with the aim of approaching the model data input on the program. First model is calibrated hydraulic model from Hydraulic Data streams on the worksheet. Hydraulic model calibration data can be seen in the following figure.
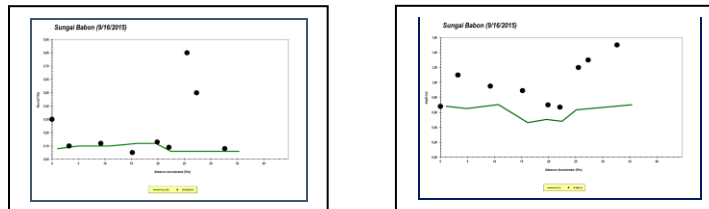

Figure 3. Comparison of Models and Data for Parameter Flow and Depth River

3.5. Simulation of Water Quality

Model parameters of water quality that has been generated and calibrated of the program can be used in scenarios that have been designed previously. The simulation process is intended to estimate the existing water quality in accordance with the scenario. Pollutant sources in 1st scenario uses the existing condition of the river when the Babon River model building was first performed. Based on the simulation of 1st scenario shows that the fluctuations increase and decrease of the Qual2Kw graphs models. It is due to the input of the sources of pollution (see Figure 4).
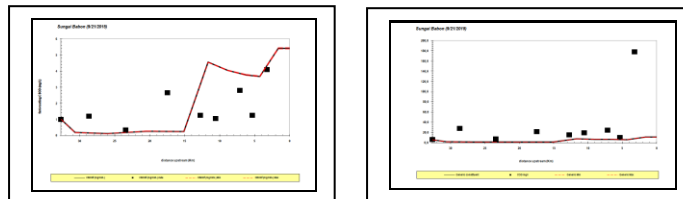
Figure 4. Example of BOD and COD Profile in Babon River under 1st Scenario

Simulation of the 2nd scenario is the quality of water bodies from upstream to downstream is conditioned not contaminated by pollution sources both point source and non-point source. Conditions in the upstream assumed to meet environmental quality standards and input from several tributaries adjusted to the water bodies quality standard of Class II.

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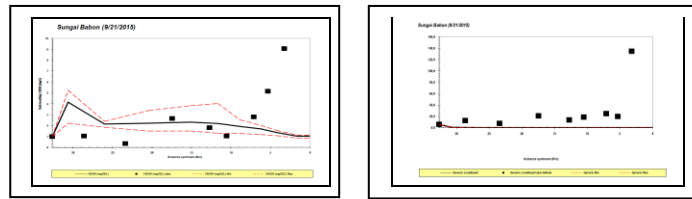*Semarang, Indonesia – November 19th, 2015*

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Figure 5. Example of BOD and COD Profile in Babon River Based on 2nd Scenario

Simulation of the 3rd scenario is the source of pollutants that enter the state has met the environmental quality standards in order to get the data model according to the quality standard class II. Furthermore, for water quality conditions in accordance with quality standards, is done by trial and error concentration of the parameters of the point source and non-point source.
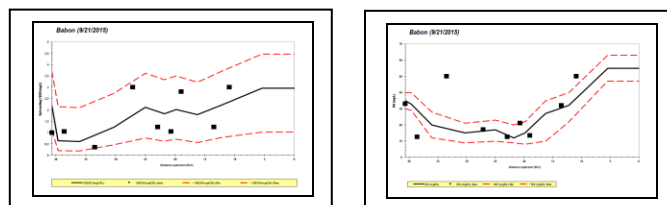

Figure 6. Example of BOD and TSS Profile in Babon River Based on 3rd Scenario
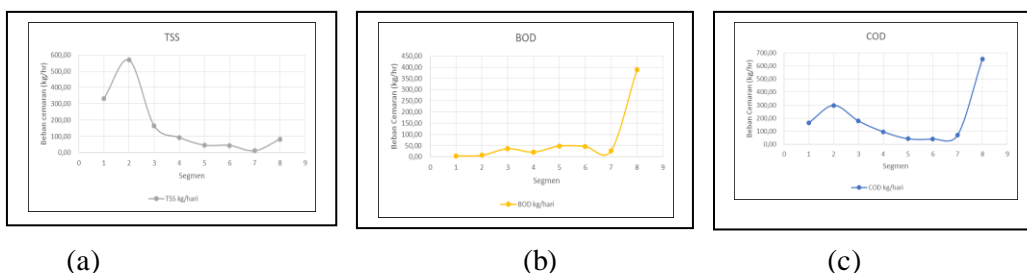
3.6. Pollution Load Calculation

Results of water quality simulation scenarios can be used to look for the calculation of pollution load capacity on the Babon River. Pollution load calculations using the 2nd and 3rd scenarios, when a body of water without pollution load and current pollution load in accordance with quality standard of Grade II water bodies.

QUAL2Kw of both simulation with the results obtained in the form of debit and magnitude of the concentration in each segment on the *source summary worksheet*, so that the pollution load capacity calculation is as follows:

Table 5. Pollutant Load Capacity Babon River

Segment	Distance (km)		TSS	BOD	COD
	Up	Down	kg/day	kg/day	kg/day
1	40,70	38,60	331,50	3,69	165,75
2	38,60	33,50	568,69	6,92	298,92
3	33,50	27,60	165,27	36,26	179,45
4	27,60	22,90	93,65	21,04	96,77
5	22,90	20,70	46,45	48,38	43,55
6	20,70	19,00	44,70	46,56	41,91
7	19,00	15,50	11,64	26,86	71,62
8	15,50	10,90	82,86	388,36	653,97

Source : Calculation results, 2015

| (a) | (b) | (c) |

Figure 7. Pollutant Load Capacity Parameter TSS (a), BOD (b) and COD (c)

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3.7. Decrease Pollution Load

According to the existing condition of 1st scenario, is necessary to decrease the pollution load of the river so that the water quality of Babon River can still qualified the quality standard requirement of Class II. Based on the difference between the pollution load in scenario 1 and 3, obtained the results as shown in the following table.

Table 6. Decrease Pollution Charges

Segment	Distance (km)		TSS		BOD		COD	
	up	down	kg/day	%	kg/day	%	kg/day	%
I	40,70	38,60	209,94	39	0,69	16	30,06	15
II	38,60	33,50	355,56	38	1,37	17	50,93	15
III	33,50	27,60	28,04	15	7,55	17	5,2	3
IV	27,60	22,90	260,59	74	44,28	69	485,2	83
V	22,90	20,70	674,8	94	685,21	93	1456,79	97
VI	20,70	19,00	416,82	90	534,27	92	925,53	96
VII	19,00	15,50	1,70	13	4,27	14	11,1	13
VIII	15,50	10,90	5,91	7	184,52	32	892,66	58

Source : Calculation results, 2015

3.8. Babon River Load Capacity on Minimum and Maximum Discharge

Table 7. Babon River Load Capacity After Decrease Pollution Load of BOD Simulation for Target Class I, II, III, IV at the Minimum Discharge

Q min = 0,08 m3/s

Parameter	Unit	Class of Quality Standard			
		I	II	III	IV
Discharge	m3/s	0,08	0,08	0,08	0,08
BOD	mg/l	2	3	6	12
Allowable pollution load	kg/day	13,82	20,74	41,47	82,94

Segment	Distance (km)		BOD Concentration (mg/l)		Discharge (m3/sec)	Pollution Load of BOD (kg/day)	Pollution Load Capacity of BOD for Class I (kg/day)	Pollution Load Capacity of BOD for Class II (kg/day)	Pollution Load Capacity of BOD for Class III (kg/day)	Pollution Load Capacity of BOD for Class IV (kg/day)
	Up	down	before	after						
I	40,70	38,60	0,05	0,04	0,08	0,3	13,5	20,5	41,2	82,7
II	38,60	33,50	0,06	0,05	0,08	0,3	13,5	20,4	41,1	82,6
III	33,50	27,60	0,37	0,30	0,08	2,1	11,8	18,7	39,4	80,9
IV	27,60	22,90	0,84	0,30	0,08	2,1	11,8	18,7	39,4	80,9
V	22,90	20,70	13,88	1,05	0,08	7,3	6,6	13,5	34,2	75,7
VI	20,70	19,00	13,40	1,05	0,08	7,3	6,6	13,5	34,2	75,7
VII	19,00	15,50	1,15	0,97	0,08	6,7	7,1	14,0	34,8	76,2
VIII	15,50	10,90	14,4	9,55	0,08	66,0	-52,2	-45,3	-24,5	16,9

Based on the table 7 above, it appears that the segment VIII of Babon River can not meet the pollution load capacity of BOD to the quality standard of class I, II and III, whereas for other segments (VII until I was able to meet). As for the pollution load capacity of BOD to the quality standards requirement of class IV, in all segments are still meet.

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Table 8. Babon River Load Capacity After Decrease Pollution Load of COD Simulation for Target Class I, II, III, IV at the Minimum Discharge

Q min = 0,08 m3/s

Parameter	Unit	Class of Quality Standard			
		I	II	III	IV
Discharge	m3/s	0,08	0,08	0,08	0,08
COD	mg/l	10	25	50	100
Allowable pollution load	kg/day	69,12	172,80	345,60	691,20

Segment	Distance (km)		COD Concentration (mg/l)		Discharge (m3/sec)	Pollution Load of COD (kg/day)	Pollution Load Capacity of COD for Class I (kg/day)	Pollution Load Capacity of COD for Class II (kg/day)	Pollution Load Capacity of COD for Class III (kg/day)	Pollution Load Capacity of COD for Class IV (kg/day)
	Up	down	before	after						
I	40,70	38,60	2,28	1,92	0,08	13,3	55,8	159,5	332,3	677,9
II	38,60	33,50	2,41	2,04	0,08	14,1	55,0	158,7	331,5	677,1
III	33,50	27,60	1,54	1,48	0,08	10,2	58,9	162,6	335,4	681,0
IV	27,60	22,90	7,48	1,36	0,08	9,4	59,7	163,4	336,2	681,8
V	22,90	20,70	28,4	0,95	0,08	6,6	62,6	166,2	339,0	684,6
VI	20,70	19,00	22,33	0,95	0,08	6,6	62,6	166,2	339,0	684,6
VII	19,00	15,50	3,07	2,57	0,08	17,8	51,4	155,0	327,8	673,4
VIII	15,50	10,90	38,87	16,09	0,08	111,2	*-42,1*	61,6	234,4	580,0

Based on the table 8 shows that the highest COD load of contamination exist in the VIII segment in the amount of 111,2 kg / hr. If seen Babon River pollution capacity after the simulation decrease pollution load at minimum discharge, only segment VIII can not meet the quality standard requirement of class I, for other segments still meet quality standards class I. For Class II, III and IV all segments still meet the standard quality.

Table 9. Babon River Load Capacity After Decrease Pollution Load of TSS Simulation for Target Class I, II, III, IV at the Minimum Discharge

Q min = 0,08 m3/s

Parameter	Unit	Class of Quality Standard			
		I	II	III	IV
Discharge	m3/s	0,08	0,08	0,08	0,08
TSS	mg/l	50	50	400	400
Allowable	kg/day	345,60	345,60	2764,80	2764,80

Segment	Distance (km)		TSS Concentration (mg/l)		Discharge (m3/sec)	Pollution Load of TSS (kg/day)	Pollution Load Capacity of TSS for Class I (kg/day)	Pollution Load Capacity of TSS for Class II (kg/day)	Pollution Load Capacity of TSS for Class III (kg/day)	Pollution Load Capacity of TSS for Class IV (kg/day)
	Up	down	before	after						
I	40,70	38,60	6,30	3,84	0,08	26,5	319,1	319,1	2.738,3	2.738,3
II	38,60	33,50	6,36	3,89	0,08	26,9	318,7	318,7	2.737,9	2.737,9
III	33,50	27,60	1,62	1,37	0,08	9,5	336,1	336,1	2.755,3	2.755,3
IV	27,60	22,90	4,56	1,31	0,08	9,1	336,5	336,5	2.755,7	2.755,7
V	22,90	20,70	13,65	1,01	0,08	7,0	338,6	338,6	2.757,8	2.757,8
VI	20,70	19,00	10,65	1,01	0,08	7,0	338,6	338,6	2.757,8	2.757,8
VII	19,00	15,50	0,49	0,42	0,08	2,9	342,7	342,7	2.761,9	2.761,9
VIII	15,50	10,90	2,23	2,04	0,08	14,1	331,5	331,5	2.750,7	2.750,7

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Based on the table 9, it appears that thr pollution load capacity of TSS at minimum discharge of all segmen in Babon River meet the quality standards for all classes.

Table 10. Babon River Load Capacity After Decrease Pollution Load of BOD Simulation for Target Class I, II, III, IV at the Maximum Discharge

Q maks = 2,17 m3/s						
Parameter	Unit	Class of Quality Standard				
		I	II	III	IV	
Discharge	m3/s	2,17	2,17	2,17	2,17	
BOD	mg/l	2	3	6	12	
Allowable pollution	kg/day	374,98	562,46	1124,93	2249,86	

Segment	Distance (km)		BOD Concentration (mg/l)		Discharge (m3/sec)	Pollution Load of BOD (kg/day)	Pollution Load Capacity of BOD for Class I (kg/day)	Pollution Load Capacity of BOD for Class II (kg/day)	Pollution Load Capacity of BOD for Class III (kg/day)	Pollution Load Capacity of BOD for Class IV (kg/day)
	Up	down	before	after						
I	40,70	38,60	0,05	0,04	2,17	7,5	367,5	555,0	1.117,4	2.242,4
II	38,60	33,50	0,06	0,05	2,17	9,4	365,6	553,1	1.115,6	2.240,5
III	33,50	27,60	0,37	0,30	2,17	56,2	318,7	506,2	1.068,7	2.193,6
IV	27,60	22,90	0,84	0,30	2,17	56,2	318,7	506,2	1.068,7	2.193,6
V	22,90	20,70	13,88	1,05	2,17	196,9	178,1	365,6	928,1	2.053,0
VI	20,70	19,00	13,40	1,05	2,17	196,9	178,1	365,6	928,1	2.053,0
VII	19,00	15,50	1,15	0,97	2,17	181,9	193,1	380,6	943,1	2.068,0
VIII	15,50	10,90	14,4	9,55	2,17	1.790,5	*-1.415,5*	*-1.228,0*	*-665,6*	459,3

The amount of pollution load of BOD is highest in the segment VIII. Pollution load capacity in the segment VIII does not meet the quality standard of the target class I, II and III, and just meets the fourth grade. For other segments meet the target of the quality standards of all classes.

Table 11. Babon River Load Capacity After Decrease Pollution Load of COD Simulation for Target Class I, II, III, IV at the Maximum Discharge

Q maks = 2,17 m3/s						
Parameter	Unit	Class of Quality Standard				
		I	II	III	IV	
Discharge	m3/s	2,17	2,17	2,17	2,17	
COD	mg/l	10	25	50	100	
Allowable	kg/day	1874,88	4687,20	9374,40	18748,80	

Segment	Distance (km)		COD Concentration (mg/l)		Discharge (m3/sec)	Pollution Load of COD (kg/day)	Pollution Load Capacity of COD for Class I (kg/day)	Pollution Load Capacity of COD for Class II (kg/day)	Pollution Load Capacity of COD for Class III (kg/day)	Pollution Load Capacity of COD for Class IV (kg/day)
	Up	down	before	after						
I	40,70	38,60	2,28	1,92	2,17	360,0	1.514,9	4.327,2	9.014,4	18.388,8
II	38,60	33,50	2,41	2,04	2,17	382,5	1.492,4	4.304,7	8.991,9	18.366,3
III	33,50	27,60	1,54	1,48	2,17	277,5	1.597,4	4.409,7	9.096,9	18.471,3
IV	27,60	22,90	7,48	1,36	2,17	255,0	1.619,9	4.432,2	9.119,4	18.493,8
V	22,90	20,70	28,4	0,95	2,17	178,1	1.696,8	4.509,1	9.196,3	18.570,7
VI	20,70	19,00	22,33	0,95	2,17	178,1	1.696,8	4.509,1	9.196,3	18.570,7
VII	19,00	15,50	3,07	2,57	2,17	481,8	1.393,0	4.205,4	8.892,6	18.267,0
VIII	15,50	10,90	38,87	16,09	2,17	3.016,7	*-1.141,8*	1.670,5	6.357,7	15.732,1

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Pollution load capacity in the segment VIII does not meet the quality standard of the target class I, whereas for other segments meet the quality standard of the target class I. For the target class II, III and IV, in all segments of the river still meet quality standards.

Table 12. Babon River Load Capacity After Decrease Pollution Load of TSS Simulation for Target Class I, II, III, IV at the Maximum Discharge

Q maks = 2,17 m3/s

Parameter	Unit	Class of Quality Standard			
		I	II	III	IV
Discharge	m3/s	2,17	2,17	2,17	2,17
TSS	mg/l	50	50	400	400
Allowable	kg/day	9374,40	9374,40	74995,20	74995,20

Segment	Distance (km)		TSS Concentration (mg/l)		Discharge (m3/sec)	Pollution Load of TSS (kg/day)	Pollution Load Capacity of TSS for Class I (kg/day)	Pollution Load Capacity of TSS for Class II (kg/day)	Pollution Load Capacity of TSS for Class III (kg/day)	Pollution Load Capacity of TSS for Class IV (kg/day)
	Up	down	before	after						
I	40,70	38,60	6,30	3,84	2,17	720,0	8.654,4	8.654,4	74.275,2	74.275,2
II	38,60	33,50	6,36	3,89	2,17	729,3	8.645,1	8.645,1	74.265,9	74.265,9
III	33,50	27,60	1,62	1,37	2,17	256,9	9.117,5	9.117,5	74.738,3	74.738,3
IV	27,60	22,90	4,56	1,31	2,17	245,6	9.128,8	9.128,8	74.749,6	74.749,6
V	22,90	20,70	13,65	1,01	2,17	189,4	9.185,0	9.185,0	74.805,8	74.805,8
VI	20,70	19,00	10,65	1,01	2,17	189,4	9.185,0	9.185,0	74.805,8	74.805,8
VII	19,00	15,50	0,49	0,42	2,17	78,7	9.295,7	9.295,7	74.916,5	74.916,5
VIII	15,50	10,90	2,23	2,04	2,17	382,5	8.991,9	8.991,9	74.612,7	74.612,7

From the table it appears that the pollution load capacity of TSS are below the quality standard TSS pollution load class I to IV for segment I to VIII, which means it can meet capacity of Babon River at maximum discharge to the quality standard class.

4. Conclusions

1. The status of the existing Water Quality in Babon River for samples taken in May and July is included in the light class to moderate class.
2. The capacity of river pollution load Babon s to test parameters of TSS, BOD and COD is divided into maximum and minimum capacity as follows:
   a. Parameter TSS maximum capacity of 568.9 kg / day in the second segment and a minimum of 11.64 kg / day in segment VII;
   b. Parameter BOD maximum capacity of 388.36 kg / day in the segment VIII dan minimum of 3.69 kg / day in the first segment;
   c. COD parameter maximum capacity of 653.97 kg / day in segments VIII and a minimum of 41.91 kg / day in the segment VI.
3. The result of simulation due to pollution load capacity uses minimum flow rate is compared with Government Regulation No. 82/ 2001, it indicate that in segment 8 has no capacity for water quality standard class I, II and III with pollution load capacity of BOD ranged 24, 5 kg / day – 54,2 kg / day, and then the pollution load capacity of COD has exceeded the water quality standard class I of 42,1 kg / day, while pollution load capacity of TSS parameter meet the capacity of all classes.

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