

The Water Quality Measurement Through PROKASIH Program as Water Environment Management Policy In Citarum River, West Java Province, Indonesia

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Abstract

Citarum River is the largest watershed in West Java Province with 6,540.32 km² width and 300 km length and become a source of life for people in West Java Province. The water is used for domestic, agriculture, animal husbandry, and industry. Thus, its functions brings greater impact toward water quality showed by the number of BOD (Biochemical Oxygen Demand) and COD (Chemical Oxygen Demand), such as BOD in 1990 is 10-35 mg/l, become 50-80 mg/l as well as COD in 1990 is 30-80 mg/l, become 100-160 mg/l in 2000. Furthermore, water quality become crucial case for water environment management because shows water threshold limit and water class of river. Thus, PROKASIH (Clean River Program) has been conducted to measure water quality in Citarum River. The purpose of water quality measurement through PROKASIH is to arrange Water Threshold Limit Academic Manuscript and Regional Regulation about Water Threshold Limit in Citarum River that necessary for water usage basis target, operational background of permission and allocation of discharging wastewater. Besides PROKASIH, Citarum Bergetar Program, a conservation program is also conducted to improve water quality. Therefore, the improvement of Citarum River needs an integrated water environment management such as supporting policy and program.

Keywords: Citarum River, Water Quality, Water Threshold Limit, PROKASIH, Citarum Bergetar

Introduction

Watershed is an integrated area with river and tributary rivers and has functioned for storing and flowing water derived from rainfall to the lake or sea naturally. The area covers the land border that is a topographical boundaries and sea border until waters area that is still influenced by land activities (Act No 7 Year 2004). One of the largest watersheds in West Java Province is Citarum River with 6,540.32 km² width and 300 km length. According to the water usage, Citarum River has been a source of life for people in West Java Province because the water is used for domestic, agriculture, animal husbandry, fishery and industry. This water usage is supported by the average number of 5,819.62 million m³/year water supply in normal condition and 3,440.19 million m³/year in dry condition or estimated from 184.54 m³/year average of flow rate in normal condition and 109.16 m³/year in dry condition. Detail information about surface water potential in West Java Province can be viewed from Figure 1.

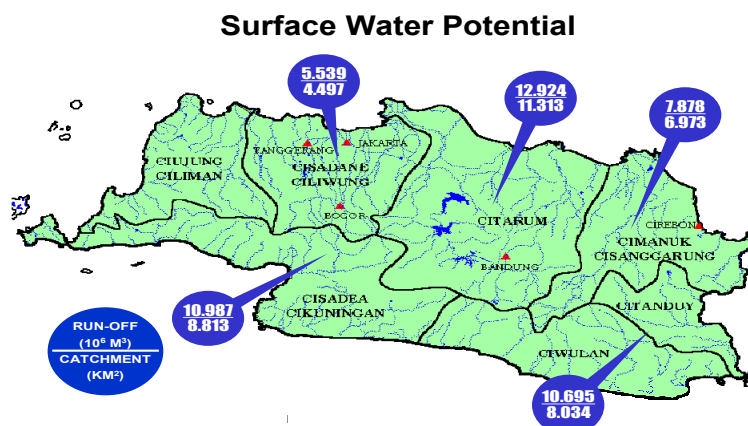


Figure 1. Surface Water Potential in West Java Province
Source: RENSTRA DPSDA Jabar, 2001

Based on Figure 1, it can be viewed that Citarum River has 12,924.43 million m³/year water potential with 11,313.4 km² width. Detail information about surface water potential in West Java Province can be viewed from Table 1.

Table 1. Surface Water Potential in West Java Province

Water Resources Management Association	Wide Area (Km ²)	Water Potential (million m ³ /year)		
		Province	Regency	Total
Ciliwung-Cisadane	4,496.9	5,376.27	162.36	5,538.63
Cisadea-Cimandiri	8,813.06	4,908.71	6,078.76	10,987.47
Citarum	11,313.4	10,990.79	1,933.63	12,924.43
Cimanuk-Cisanggarung	6,972.8	7,572.64	305.43	7,878.07
Citanduy-Ciwulan	8,033.70	7,069.50	3,625.68	10,695.19
Total Number	39,629.86	35,917.91	12,105.86	48,023.77

Source: West Java EPA, 2006

Citarum River Condition

Water quality depends on the substances that are contained in water. Thus, the human activities have also brought significant contribution toward river quality degradation as it has the role as pollution load receiver water bodies. Human activities have caused land conversion and became serious environmental problems in further. The land conversion in alongside of Citarum River especially in Citarum Upstream Area can be known from 1983 to 2002 data such as the land use changes for forest area has been decreasing by 54%, agriculture has been decreasing by 55% whereas the settlement area has been increasing by 233%, and industry has been increasing by 868%. Furthermore, the increasing number of settlements and industry development has made serious environmental problems because most pollutants are derived from domestic and industry. The condition of Citarum River can be viewed from Figure 2.



Figure 2. The Citarum River Condition

The environmental problems that caused by the increasing number of settlements occupied by $\pm 11,255$ million people are mostly not supported by good sanitation and health system such as clean water supply, disposal waste facility, etc. The condition leads to high water pollution in Citarum River. Thus, the increasing number of industry has also brought significant impacts toward environmental degradation in Citarum River. It is because there are more than 1,000 factories located in Citarum Watershed Area and 400 factories in Upstream Citarum Watershed that consists of 74.5% textile companies and 25.5% metal producing companies, pharmacy companies, food and drink companies. Furthermore, these activities affect the water quality in Citarum River. It is can be shown from the number of BOD (Biochemical Oxygen Demand) and COD (Chemical Oxygen Demand). For instance, BOD in 1990 is 10-35 mg/l, become 50-80 mg/l in 2000 as well as COD in 1990 is 30-80 mg/l, become 100-160 mg/l in 2000. Detail information about the pollutant contributor from the activities in Citarum River can be viewed from Figure 3.

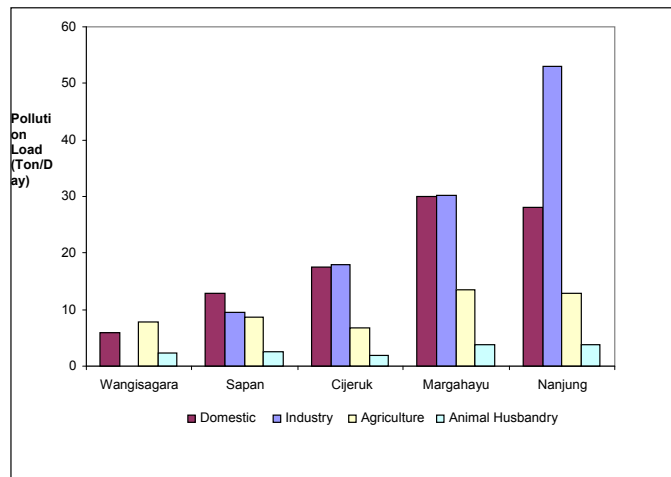


Figure 3. The Pollution Load in Upstream Citarum River In 2000
Source: S.Wangsaatmaja, 2001

The Water Quality Measurement through PROKASIH

Based on Government Act No 82 Year 2001 about water quality management and water pollution control, the water quality become a crucial case for water environment management because shows water threshold limit and water class of the river. The importance of water

threshold limit because it become water pollution controlling structure component as one of water quality management. In order to control the water pollution, PROKASIH (Clean River Program) is conducted to measure the water quality in Citarum River. The water quality measurement based on physic, chemistry, and biology parameters and depends on the existing water threshold limit policy that used BCD classification and water class based on Government Act No 82 Year 2001. The parameters that are used to measure the water quality are TDS (Total Dissolved Solids), TSS (Total Suspended Solids), pH, BOD₅ (Biochemical Oxygen Demand), COD (Chemical Oxygen Demand), DO (Dissolved Oxygen), Detergent, Nitrogen, Phosphat, Fecal Coli. Thus, the others aspects for the water quality measurement based on water usage, water pollution load and water resources characteristic. Afterwards, the purpose of water quality measurement through PROKASIH is to arrange Water Threshold Limit Academic Manuscript and Regional Regulation about Water Threshold Limit in Citarum River that is necessary for water usage basis target, operational background of permission and allocation of discharging wastewater.

Furthermore, The PROKASIH Program is conducted on 11 (eleven) locations in Citarum River such as Wangisagara, Majalaya, Bendung Sapan, Cijeruk, Dayeuh Kolot, Burujul, Nanjung, Bendung Curug, Bendung Walahar, Tanjung Pura and Sasakbeusi. The water quality state is assessed using Storet Method and Pollution Index based on Government Act No 82 Year 2001 that mentioned about the criteria of water quality state. More detail information about the monitoring locations can be viewed in Figure 4.

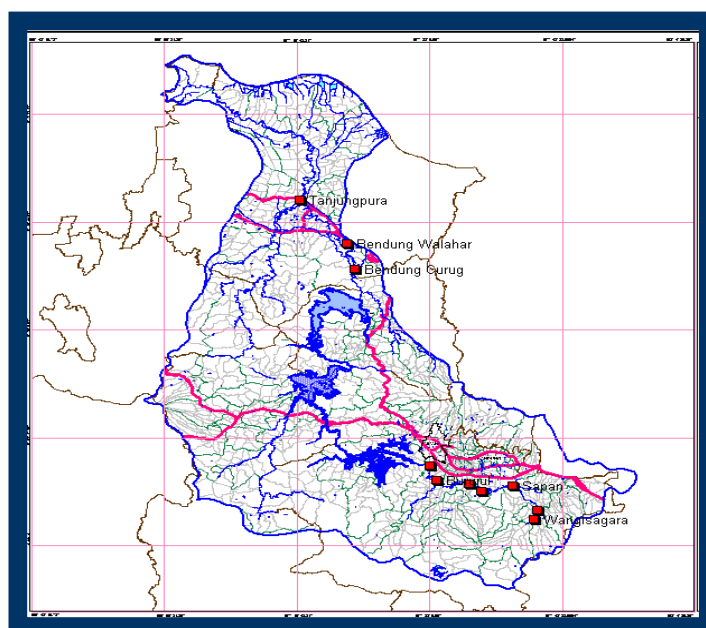


Figure 4. Monitoring Location Area

Source: West Java Environmental Protection Agency, 2006

Based on the result of water quality measurement, it is known the three monitoring activities that were conducted in 11 (eleven) locations shows some of parameters which always exceed the water quality state criteria in Class 2. Thus, based on Government Act No 82 Year 2001, these parameters are BOD, COD, Fecal Coli, Total Coli and H₂S and except in Majalaya there is no COD parameter that exceed the water quality state criteria in Class 2. Furthermore, from the first monitoring result there is also a metal parameter that exceed the water quality state

whereas in second monitoring there are physic parameters that exceed the water quality state such as TSS and TDS. Therefore, the water quality evaluation used by Storet and Water Pollution Index shows most locations in Citarum River are highly polluted and are categorized to D classification of water quality state.

The Water Quality as Basis of Water Environment Management Policy

The result of water quality through PROKASIH Program has shown that Citarum River and most of its tributaries in upstream part are highly polluted by the domestic wastewater, industrial discharge, agriculture and animal husbandry. The importance of water quality measurement is to show the existing of water threshold limit and water class. Furthermore, the result of water quality is functioned to be a basis of water threshold limit in order to manage water quality by reducing the pollution load based on Citarum River as the target basis of water use. Thus, based on wastewater threshold limit, it is necessary to be the operational background of permission and allocation of discharging wastewater. Besides, to be the water usage basis target and operational background of permission and allocation of discharging wastewater, the water threshold limit is necessary to be a basic of infrastructure constructions such as for sewerage system, drainage, wastewater treatment plant, etc.

Finally, the measurement of water quality will have significant contribution toward water environment management policy in West Java Province. It is because one of its purposes from the water quality measurement through PROKASIH is to arrange The Regional Regulation about Water Threshold Limit in Citarum River. Thus, policy making is supported by PROKASIH Program in Province level that have program to collect data of river quality in main watershed and to coordinate with the regency or municipality which conduct PROKASIH Program so that it will support the water quality management and water pollution controlling inter regency and municipality. Afterwards, another program that has conducted to improve the water quality in Citarum River is Citarum Bergetar Program, a conservation program in Citarum River that being realization from *one river basin, one plan and one integrated management*. Thus, the improvement and development aspects that becomes the main agenda in Citarum Bergetar are:

1. Policy and laws by arranging Citarum Natural Resources Development Policy, reviewing regulations, complementing regulations and optimizing the existing regulations.
2. Conservation by achieving 45% target of conservation area in West Java Province including Citarum, conserving the critical lands like conducted reforestation in Province and National Level.
3. Pollution Controlling by grouping pollutant contributors (which located in 7 industry cluster in Upstream Citarum), building communal wastewater treatment plant both in domestic and industry.
4. Community participation by improving and facilitating participation process in Citarum Watershed Management.

Conclusion

Citarum River is the largest watershed in West Java Province and become a source of life for people in West Java Province. Thus, with rapid development and population growth has caused land conversion in alongside of Citarum River such as settlements, industry, agriculture and animal husbandry. These activities have brought greater impacts toward water

quality in Citarum River. The water quality becomes a crucial case for water environment management because shows water threshold limit and water class of the river. Thus, the result of water quality is functioned to be a basis of water threshold limit in order to manage water quality by reducing the pollution load based on Citarum River as the target basis of water use. In order to control the water pollution, PROKASIH Program is conducted to measure the water quality in Citarum River with the result is Highly Polluted (D) with the outcomes is to arrange Water Threshold Limit Academic Manuscript and Regional Regulation about Water Threshold Limit in Citarum River. Afterwards, another program to improve water quality in Citarum River is by Citarum Bergetar Program which consists of policy and laws, conservation, pollution controlling and community participation. Therefore, the improvement of Citarum River condition needs an integrated water environment management such as supporting policy and program in order to promote the sustainable water management.

Acknowledgement

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