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PAPER • **OPEN ACCESS**

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To cite this article: Yulfiah 2019 *IOP Conf. Ser.: Mater. Sci. Eng.* **462** 012007

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Formulating a Plan Model for Controlling Water Pollution in Kali Surabaya Based on Obedience Analysis of IPLC Implementation

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Abstract. Indication of pollution is worrisome occurring in the water of Kali Surabaya which becomes the main source of Perusahaan Daerah Air Minum (PDAM) or Municipal Waterworks. Therefore, research on it is necessarily conducted by (a) analyzing the obedience of IPLC (Ijin Pembuangan Limbah Cair or Liquid Waste Disposal Permit) implementation, (b) identifying the obstacles to employ IPLC, and (c) formulating a plan model for controlling pollution and recovering the water quality of Kali Surabaya based on the results of both analysis and identification. A comparative descriptive method was used in this research as it gave systematical, factual, and accurate description about facts and research object characteristics. Comparative study was then carried out to investigate the relationship among the existing facts. This research formulated the plan model for controlling pollution and recovering the water quality of Kali Surabaya by using active participation from industrial community.

1. Introduction

Ijin Pembuangan Limbah Cair (IPLC) or Liquid Waste Disposal Permit is a set of environmental regulation that must be owned by every activity involving liquid waste disposal into water. Every industry must meet the requirements of *IPLC* before disposing liquid waste into water. It must have adequate *Instalasi Pengolahan Air Limbah (IPAL)* or Liquid Waste Management Instalation and standardized waste water quality[4].

Kali Surabaya is part of Brantas watershed which supplies the main water for *PDAM* Gresik and Surabaya. It serves more than 5 millions people. However, along the river bank of Kali Surabaya becomes a disposal place of liquid and solid wastes resulted from people and industrial activities. There are more than 300 industries along Kali Surabaya. Industrial waste disposal has caused serious water pollution at some parts of Kali Surabaya river bank including Driyorejo and Warugunung Districts. Therefore, controlling pollution resulted from industrial activities is required as it serves as an effort for improving the water quality of Kali Surabaya.

The initial phases of polution control program of Kali Surabaya were (a) analyzing the obedience during IPLC implementation, (b) identifying the obstacles to implement IPLC, and (c) designing a plan model for controlling pollution and recovering the water quality of Kali Surabaya based on the results of analysis and identification.

2. Theoritical Review

River water pollutant can be classified in three things: (1) different locations of pollutant sources namely spot source and non-spot source; (2) history of river water formation; and (3) pollutant types such as pollutants of organic, pesticide, volatile, neutral, and acid [5].

The dispersion of river water pollutant from the spot source will decrease along with the movement of pollutant away from the spot source [6-8]. It will keep going until its content level becomes very low or harmless due to the ability of river self-purification. Self-purification will continue as long as it does not exceed the limit of river water ability in *swapentahiran* or natural water purification process. The purification process depends on time, distance, pollutant type, and river physical condition [2]. Meanwhile, Hammer (1986) argues that self-purification is determined by factors of flow quantity, time, movement to downstream, water temperature, and aeration [3]. Purification process involves the mechanisms of filtration, sorption, chemical process, decomposition, and dilution [9-10].

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3. Method

Comparative descriptive method was employed in this research. It can give systematical, factual, and accurate description on facts and research object characteristics. Comparative study was then carried out for investigating the relationship among the existing facts.

Research variables included: (a) the qualities of river water and waste water, (b) the arrangement of IPLC conduct, (c) the obstacles encountered by industry during IPLC conduct, and (d) factors needed in controlling pollution and recovering the water quality of Kali Surabaya.

The target of this research were industrial areas of Driyorejo Warugunung at Driyorejo District in Gresik Regency and Waru Gunung District in Surabaya city. The industries which became the target were selected based on the data analysis of IPLC ownership, industrial waste quality monitoring, and environmental cases. In other words, the targeted industries were classified into Group I (industries with IPLC in good environmental performance), Group II (industries with IPLC in bad environmental performance), and Group III (industries without IPLC).

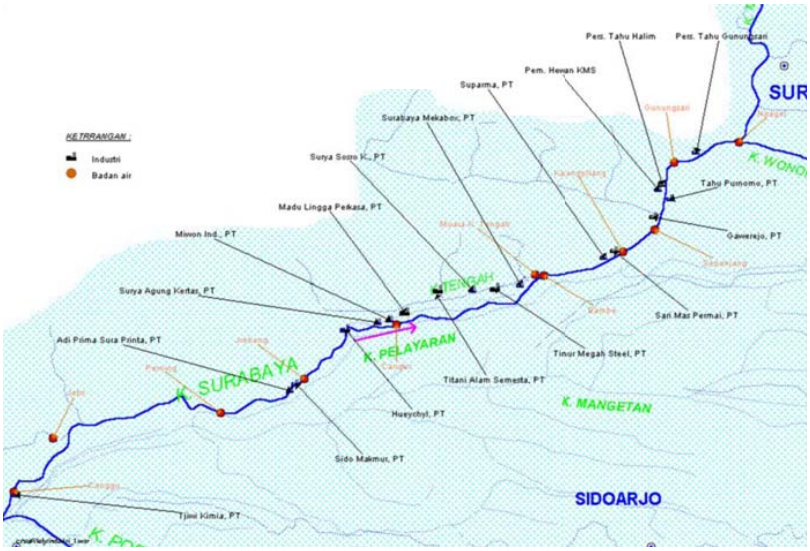


Figure 1. Sampling Point for Waste Water and River Water

4. Result and Discussion

The result of analysis on waste water quality, particularly in the targeted industries of Groups I and II showed that all tested parameters did not exceed standardized waste water quality. In short, all targeted industries in Groups I and II had obeyed IPLC implementation. Meanwhile, the result of analysis in Group III reported that there were 3 industries obeyed IPLC provisions but 1 industry disobeyed. All tested water parameters of the three industries in Group III exceeded standardized waste water quality. Only one industry met the threshold of waste water quality standard. Obstacles encountered by industries during IPLC implementation were as follows:

1. Institution giving business permit did not give sufficient monitoring.
2. The caretakers of business had low awareness in controlling pollution resulted from their industrial waste (self control).
3. People had low participation and care in monitoring industrial waste or in other words, they much depended on the government in terms of monitoring.
4. The implementation of material delict article of UU No. 23 in 1997 was weak as there was found many obstacles in the field justification
5. The caretakers of business had missperception as they thought that the cost of waste management and control/environmental pollution burdened the production cost.
6. Industries did not give transparancy in environmental management information.

The strategical assumption in the plan model for controlling pollution and recovering water quality of Kali Surabaya is that all components of community must have standardized environmental management activity. Therefore, information transparency in environmental management activity, fund allocation, and socialization to build people's awareness to actively participate in environmental management are required. The key element in the program of controlling pollution and recovering water quality of Kali Surabaya is

the empowerment program through partnership, awareness and attitude development, monitoring and controlling. The strategy modeling is illustrated in Figure 2.

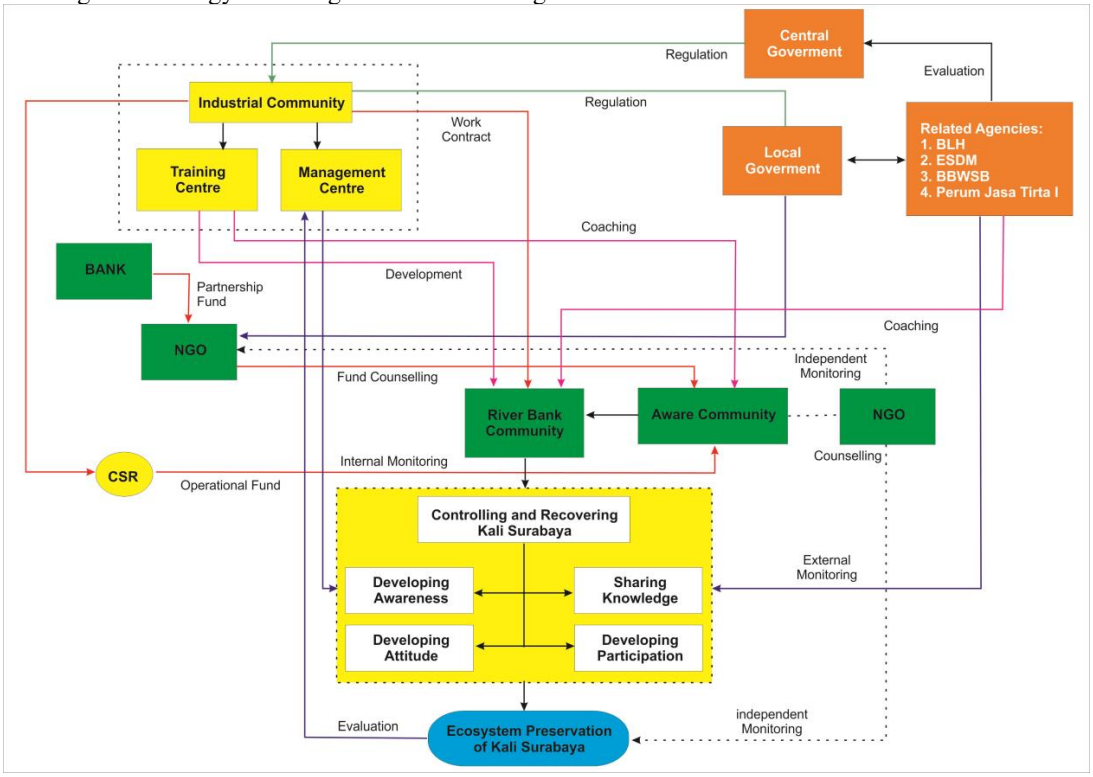


Figure 2. Plan Model for Pollution Control and Water Quality Recovery of Kali Surabaya Based on Active Participation of Industrial Community

5. Conclusion

The conceptual plan model for controlling pollution and recovering water quality of Kali Surabaya consists of two sub-models i.e. a partnership model on environmental management and a model for controlling pollution and recovering water quality of Kali Surabaya. Both models are supported by people empowerment. The implications of policy are deciding task and responsibility through local regulation supported by community empowerment in environmental management and optimizing fund for environmental management by creating stipulation based on the agreement among parties who give special attention to problems of Kali Surabaya.

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