Available online at www.sciencedirect.com

ScienceDirect

Procedia Environmental Sciences 33 (2016) 562 – 567

Procedia Environmental Sciences

The 2nd International Symposium on LAPAN-IPB Satellite for Food Security and Environmental Monitoring 2015, LISAT-FSEM 2015

River water quality preliminary rapid assessment using pollution index

Hefni Effendi*

Centre for Environmental Research, Bogor Agricultural University, Indonesia

Abstract

A rapid interpretation of river water quality is a compulsory since river is a dynamic ecosystem, influenced by various activities in the river bank. Hence a preliminary rapid river water quality status determination using pollution index on locations near IPB Dramaga Campus was simulated. Based on grab sampling on 5 sites in River Cihideung, River Ciapus, and Lake of PPLH, all water quality parameter met water quality standard class III for fisheries and animal husbandry as stipulated in Government Regulation No 82/2001. Application of water pollution index towards 5 sampling sites (selected by location map consideration) denotes good water quality status with water pollution index ranging from 0.728 to 0.892.

Peer-review under responsibility of the organizing committee of LISAT-FSEM2015

Keywords: water pollution index; rapid river water quality assessment; River Cihideung; River Ciapus.

1. Introduction

Water forms the chief constituent of ecosystem. Water sources may be mainly in the form of rivers, lakes, glaciers, rain water, ground water etc. Besides the need of water for drinking, water resources play a vital role in various sectors of economy such as agriculture, livestock production, forestry, industrial activities, hydropower generation, fisheries and other creative activities. The availability and quality of water either surface or ground, have been deteriorated due to some important factors such as increasing population, industrialization, urbanization etc.[1].

Water is the prime natural resource. Accepting this importance and short supply of means for biological needs and uphold for economic and growth activities of all kinds is a matter of highest concern [2].

* Corresponding author. Tel.: +6282114340924.
E-mail address: hefni_effendi@yahoo.com.

Peer-review under responsibility of the organizing committee of LISAT-FSEM2015
doi:10.1016/j.proenv.2016.03.108

In the case of rapid and urgency need for instance pollution occurs due to accident in a particular water body, rapid water quality assessment applying a tool that quickly determines the pollution level is a necessary. Hence the usage of water pollution index is beneficial for providing an initial quick assessment result of water quality status.

Water pollution index estimation endeavors single value which decrease the big quantity of parameters and represent data in a simple way [2]. This preliminary rapid water quality assessment must be followed by regular water quality monitoring of the water resources which is necessary to assess the quality of water for ecosystem health. Rivers and lakes are the most studied environments, as these are the environments where freshwater is more accessible for population [3].

Water pollution index is an approach which minimizes the data volume to a great extent and simplifies the expression of water quality status. Calculation of water quality index is based on number of physico-chemical and bacteriological parameters [2]. An important and widely used WQI was developed by the National Sanitation Foundation of the United States (NSF) in 1970, based on a survey that determined the nine most important parameters driving overall water quality [4].

As a campus that cares on the environment, Bogor Agricultural University (IPB) needs to assess all aspects of the environment both biotic and abiotic around Dramaga campus. One aspect studied is the condition of water quality around Dramaga campus. This study aimed to rapidly determine river and lake water quality status around Dramaga campus by applying water pollution index.

2. Materials And Methods

Water quality parameter determined referred to Government Regulation No 82/2001 on water quality and water pollution management, class III for fisheries and animal husbandry. Method of water quality analysis was based on [6]. Water quality sampling locations at IPB Dramaga Campus Bogor Indonesia, determined by considering map of location were visualized at Fig. 1.

Water quality status was assessed by water pollution index method referring to the Minister of Environment Decree No. 115/2003 on Guidelines for Determination of Water Quality Status. Water pollution index was calculated by the following measures. Formula in Excel was used for calculation:

- Selection of parameters that exist in the water quality standard.
- Calculation of Ci/Li for each parameter for each sampling location. Ci is measured water quality parameter. Li is standard water quality for each parameter.
- The usage of value $(Ci/Li)_{measurement}$ if the value is smaller than 1.0, and the use of $(Ci/Li)_{new}$ if the value of $(Ci/Li)_{measurement}$ greater than 1.0. $(Ci/Li)_{new} = 1.0 + P \log (Ci/Li)_{measurement}$
- Determination of the average value and the maximum value of the overall Ci/Li [(Ci/Li)R and (Ci/Li)M].
- Determination of water pollution index:

$$Pij = \sqrt{\frac{(\frac{Ci}{Lij})^2_M + (\frac{Ci}{Lij})^2_R}{2}} \quad (1)$$

Where Pij is pollution index for a specified water quality purpose (j), Ci is measured water quality parameters, Lij is standard water quality parameter for each parameter at specified water quality purpose (j), (Cij/Lij)M is Cij/Lij maximum, (Cij/Lij)R is Cij/Lij average.

- PiJ was then compared with the criteria shown at Table 1 [7].