



Fuzzy MADM Method for Decision Support System based on Artificial Neural Network to Water Quality Assessment in Surabaya River

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Abstract

The pollution of the Surabaya River has increased along with the rapid development of the industry in Surabaya. This causes the water quality decreases Surabaya. Surabaya is expected to meet the quality standards of water quality class II. At this time most of the monitoring sites recorded that the quality of water in times of Surabaya exceed the quality standards of raw water quality class II. With details for parameter DO exceed 4 mg / l, BOD exceed 3 mg / l, and COD exceed 25 mg / l. The condition has not been met quality standards of water quality does not occur at any time, but occur at a specific time. However, from the data collected, the current frequency exceeds the quality standards of water quality are very common. Besides, we cannot determine the general conditions in times of Surabaya, because at a time for water quality parameters DO and BOD is to meet water quality standards, while the COD is not fulfilling. So we need a decision support system to see the general picture on 8 monitoring sites in Surabaya. In this study begins backpropagation algorithm for classification from the parameters DO, BOD, and COD. Then the results are followed by Fuzzy Multi-Attribute Decision Making (MADM) to get the most polluted sites in times of Surabaya. The results from the this study by using the Simple Additive Weighting Method (SAW), Weighted Product (WP) and TOPSIS showed that location is the 5th most polluted locations to produce value for each 32.2917, 0.1139, and 0.2753.

Keywords: Fuzzy Multi-Attribute Decision Making (MADM), Simple Additive Weighting Method (SAW), Weighted Product (WP), TOPSIS, Backpropagation, Water Quality

1. Introduction

Surabaya River is a tributary of the Brantas River located downstream of the watershed has an area of 630.7 km². Surabaya is then divided into two major rivers to the north with the name Kalimas and the river leading to the east coast called Wonokromo River. Surabaya River is an important source of water for the city of Surabaya. Water on Surabaya are used for various purposes, such as irrigation, drinking water and industrial water. As one of the sources of drinking water, according to the East Java Governor Regulation No. 61 Year 2010 on the Implementation Class Water in Water River, which states that the Surabaya River is expected to meet the quality standards of water quality class II. Ironically, in the several monitoring location on Surabaya River noted that for the parameter DO, BOD and COD are often on the condition exceeds the quality standards of water quality class II. (Syafi'i, 2011)

Before the management to achieve the level of water quality in accordance with established standards, it is

necessary to mapping the current conditions on each monitoring location. Data was collected from 2008 to 2013 originated in Perum Jasa Tirta I at monitoring sites on Surabaya River. It is expected from the such data can be done in order to obtain data management quality index of water quality. Following that can produce water quality classification based on parameters DO, BOD, and COD. To resolve these problems. Artificial neural networks are used to obtain the classification of water quality, research that has been done by Liu et al. (2009). In this study, backpropagation is used to determine the estimated grade index monitoring sites based on quality standards. So that the resulting classification of water quality. However, in this study the results of the classification has not been done to the process of decision support systems. So the addition of a decision support system in general is expected to show the sequence of the most polluted location to the location of the nicest in the monitoring sites on Surabaya River.

The research still relevant with this paper by applying artificial neural networks and decision support systems, among others: