WATER QUALITY STATUS IN INDUSTRIAL AREA AT SEMENYIH RIVER, SELANGOR

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WATER QUALITY STATUS IN INDUSTRIAL AREA AT SEMENYIH RIVER, SELANGOR

By

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DEDICATION

In the name of Allah, the most beneficent and merciful this thesis is dedicated specially to :

Beloved Family

My father Abd Satar Bin Che Nawang, my mother Zamnah Binti Che Kob@Yaacob, my siblings

Supervisor

Dr. Mohamad Roslan bin Mohamad Kasim

Academic Advisor

Dr. Mohamad Roslan Bin Mohamad Kasim

Examiners

Dr. Siti Nurhidayu Abu Bakar and Prof. Dr. Zaki Hamzah

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Nur Suhailah, Arif Asnami, Nadzirah Mazlan and other

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Mohd Faizal, Siti Fatimah and other

For the encouragement, inspirations, understanding and support throughout my study in

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May Allah bless them all

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ABSTRACT

River is the most important water resource for human and aquatic lives. The quality of the river has been deteriorated by human activities and this caused serious water pollution. This study was carried out to determine the Semenyih River water quality in industrial area based on the physicochemical and biological parameters. The sampling was conducted in dry season during 2017. Water samples were collected from three stations along the river. Sample was taken once a week for six weeks, beginning at the end of July until the middle of September 2017 at three stations selected. Six parameters were selected as indicators to assess water quality status based on DOE-WQI index. The parameters were in-situ analysis for dissolved oxygen (DO) and pH and ex-situ analysis for biological oxygen demand (BOD), chemical oxygen demand (COD), ammoniacal nitrogen (NH3N) and total suspended solid (TSS). Results showed that the river was slightly polluted with NH_3-N. Furthermore, the result pointed out that water quality deterioration in the river was associated with industrial activities. One Way Analysis of Variance (ANOVA) was used to compare the water quality index based on DOE-WQI index. The water quality index values at the study areas ranged from 47.87 to 72.09 or in Class III and IV. Therefore, the river water can be used for irrigation with precaution but extensive treatment needed before using for domestic purposes.

ABSTRAK

Sungai merupakan sumber air yang terbesar untuk manusia dan hidupan air. Segala kepentingan sungai telah dimusnahkan oleh ramai manusia yang tidak bertanggungjawab dan telah menyebabkan berlakunya pencemaran yang berleluasa. Kajian ini telah dilakukan untuk mengenalpasti tahap kualiti air di kawasan industry berdasarkan parameter yang telah ditetapkan. Sampel telah di ambil semasa waktu kemarau pada tahun 2017. Sampel air telah diambil di tiga stesen yang dipilih. Sampel juga telah diambil sekali seminggu selama enam minggu berturut-turut, bermula pada awal bulan Julai dan berakhir pada pertengahan bulan September di tiga stesen yang dipilih. Enam parameter telah dipilih sebagai penunjuk untuk mengenalpasti kualiti air berdasarkan DOE-WQI indeks. Nilai kualiti air di kawasan perindustrian sungai Semenyih adalah di antara 47.87-72.09 atau pada kelas III dan IV. Walaubagaimanapun, air pada sungai Semenyih di kawasan perindustrian masih boleh digunakan tetapi mestilah menjalani proses rawatan air terlebih dahulu.

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APPROVAL SHEET

I certify that this research project entitled “Water Quality Status in industrial Area at Semenyih River, Semenyih, Selangor” by Mohd Imtiaz Shahren Bin Abd Satar has been examined and approved as a fulfilment of the requirements for the degree of Bachelor of Forestry Science in the Faculty of Forestry, Universiti Putra Malaysia.

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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
DO	Dissolved Oxygen
DOE	Department of Environment
DOE-WQI	Department of Environment-Water Quality Index
NH3N	Ammonia-Cal Nitrogen
SIAN	Sub-index of Ammonia-Cal Nitrogen
SIBOD	Sub-index of Biochemical Oxygen Demand
SICOD	Sub-index of Chemical Oxygen Demand
SIDO	Sub-index of Dissolved Oxygen
SIpH	Sub-index of pH
SITSS	Sub-index of Total Suspended Solids
SPSS	Statistical Package for Social Sciences
TSS	Total Suspended Solids
WQI	Water Quality Index

CHAPTER I

INTRODUCTION

1.1 GENERAL BACKGROUND

Everyone knows that water is essential to continue normal life. We depend on water for more than just drinking, cooking and personal usage. Big amount of water are often required for industrial and commercial uses. Water quality status indicates the level of pollutant composition and thus relates to human activities (Anhar et al, 1988; Mohd Kamil et al, 1997a, 1997b).Water quality refers to the characteristics of a water body that will influence its suitability for a specific use and how well the water quality meets the needs of the user. The properties of water such as the one that lets is float when it is in the form of ice, can be explained by the structure of its molecule, of which there a trillion in an ounce of water (Hendricks, 1995).

Most of the part of the earth is covered by water. Estimated that about 71% of the earth is covered by sea with 1370 million km^3 volume of water. But with that amount of water only about 3% of water is consumptive (Jerry, 1986). Water quality of rivers is characterized by a high level of heterogeneity in time and space, because of the distinction of cover-land around. This often creates difficulties to identify water conditions and pollution sources, which is necessary to control effectively pollution in addition to construct successful strategies for minimizing of contamination resources. Anthropogenic pollutants related to land use result in drastic deterioration of aquatic systems in watersheds.

Additionally, the rivers play an important role in assimilating municipal and industrial effluent as well as runoff from agricultural land and the surrounding area in a watershed. On the other hand, rivers comprise the most important water resources for irrigation, domestic water supply, industrial, and other purposes in a watershed, thereby tending to stimulate serious hygienic and ecological problems. Consequently, prevention and controlling of river pollution and reliable evaluation of water quality are an imperative stipulation for effective management.

According to DOE, Water Quality Index. Department of Environment. Ministry of Science, Technology and Environment Malaysia, Kuala Lumpur, Malaysia, 2006, human activities in particular husbandry livestock and agriculture play an important role in contributing contamination of river water among others pollutants. Wastewater of livestock contains high concentrations of ammonia nitrogen, organic and inorganic nitrogen compound, and pathogenic bacteria. Study of surface water pollution of the river is important due to effluents from municipal sewage, livestock wastewater, industries, agricultural activities, and urban runoff which discharge into the river resulting in extensive variations in the water quality (M. Shuhaimi-Othman, E. C. Lim, and I. Mushrifah, 2007).

The river is classified as polluted when there is degradation in water quality status due to changes in their composition and condition that make it less suitable for any subjective and function (Azizi et al, 1997 ; Mohd Kamil et al,

2001a). Due to the scarcity of freshwater such as river, water pollution has become a global concerns; furthermore, water quality depletion will lead to unhealthy natural resources and affect the overall environment (Ujang et al. 2008).

A parallel increase between the human population and water demand is one of the many concerns related to water quality and quantity. Malaysia is one of the renowned ongoing developing countries in South East Asia and the major water demand comes from agriculture, industry as well as domestic sector (DOE 2007). Although the growth in these sectors has undoubtedly generated economic benefit to the society, it has led to deterioration in water quality and quantity (Muyibi et al.2008). A water quality monitoring program is necessary to protect the continuity of freshwater resources (Fulazzaky et al. 2010; Mokhtar et al. 2009). In order to protect the valuable water resource, understanding of the natural evolution of water chemistry under the natural water circulation process combined with knowledge about the background of the study area are necessary (Mokhtar et al. 2009). Hence, a holistic approach for water quality monitoring and resources management is crucial in order to find adequate supplies and maintaining water quality to maintain a high quality of freshwater in the required quantity at selected places (Radojević & Bashkin 2007).

Hydrologic cycle describes the continuous movement of water on, above and below the surface of the earth. According to the American Water Works Association (2002), water or hydrologic cycle is a continuous cycle where

water evaporates, travels into the air and becomes part of a cloud, falls down to earth as precipitation, and then evaporates again. This process repeats in a never-ending cycle. A fundamental characteristic of the hydrologic cycle is that it has no beginning and no ending. It can be studied by starting at any of the following process which are evaporation, condensation, precipitation, interception, infiltration, percolation, transpiration, runoff and also storage.

In this study, Semenyih river, Selangor, Malaysia, was chosen, which is this area surrounded by an estuary exposed to pollution issue posed by human interference. Moreover, like most parts of Malaysia, in recent decades, human activities, such as excessive forest cutting, crop cultivation and waste dumping, have had a considerable impact on Semenyih rivers. Thus, the water quality is an issue of great concern since river water is an important source for the citizens nearby the Semenyih River.

1.2 Problem Statement

The Semenyih River has been selected as the study of water quality, because of it is importance and function of the community. Hydrologic impacts due to factory's activity are reported to cause water quality problems such as furniture, metal, plastics, textile manufacturing and the loss of fish populations. Water pollution caused by factories and other industries can be the most serious problem in a given environment. These types of pollution can lead to serious human and animal health problems as well as widespread destruction of the natural world. This is a big problem, and

sometimes it can be so serious it's impossible to completely clean up. Industrial, commercial, and domestic activities resulting in severe pollution and flood problems in urban areas (Ali and Zarina, 2000).

Astro Awani online on 23 October 2016 reported that "the operation of the Sungai Semenyih water treatment plant has temporary halted again due to odour pollution detected in the Semenyih River". This incidence which is the pollution of Semenyih River would consequently affect the quality of water supply to the community surrounding.

The water qualities of river are one of the world most common problems. The public and the government have concerned about the future of the Semenyih River. Semenyih River is very important to natural resource, and also the people living around the area. This research were carry out to know the current water quality status in industrial area at Semenyih River.

1.3 Objectives

This study was conducted:

1. To determine the current status of the water quality from industrial area at Semenyih River using DOE-WQI Index.
2. To determine whether the pollutant in waste water from the industry area was under the Standard A of Environment Quality (Sewage and Industrial Effluents) Regulations 1978.

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