CURRENT WATER QUALITY STATUS AT COMPARTMENT 13 WATERFALL IN AYER HITAM FOREST RESERVE, PUCHONG SELANGOR

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CURRENT WATER QUALITY STATUS AT COMPARTMENT 13 WATERFALL IN AYER HITAM FOREST RESERVE, PUCHONG SELANGOR

By

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DEDICATION

In the name of Allah, this thesis is dedicate to the most fondness

My beloved parent,

Ahmad Bin Kolomok (Father), Zaidah Binti Atan (Mother)

My beloved brothers' sisters,

Nor Mellissah and her family, Aidy Azhar and Nor Shuhadah.

My colleagues,

Siti Nadzirah Mazlan, Asmaq Fikriyah Zulbahrin, Ros Shuhada Mohamad Yusofff, Mohamad Zawawi Ab Rahman, Nadzira Huda Julijam, Natasya Amira Amirudin, Arif Nasir, Mazlin Malek and my entire friends especially students of forestry.

Thank you so much for all your kindness and courage.

ABSTRACT

Ayer Hitam Forest Reserve (AHFR) is a secondary forest which has logging operation history. Logging activities have caused deterioration in Water Quality Index (WQI) in the forest. A study was carried out at the waterfall in AHFR, Puchong Selangor. The main objective of this study was to determine the current water quality status at Waterfall in AHFR by using DOE-WQI index with six water quality parameters that are Dissolved Oxygen (DO), pH, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Ammonia-cal Nitrogen (NH_3N) and Total Suspended Solid (TSS). The study involved four stations along from the upper stream to the lower stream. Station 1 was located at the cliff of the upper stream, followed by Station 2 and 3 was located at middle stream which Station 3 is the second cliff on the middle stream and Station 4 at the river branch of the waterfall where the river was connected with Sungai Rasau. The sampling was conducted once a week in the period of six weeks. One Way Analysis of Variance (ANOVA) was used to make comparisons of parameters and WQI among stations. WQI result showed the range of mean value was from 79.15 to 86.46 and p value was 0.54 which means that was no significant differences among stations. The water quality status at the waterfall in AHFR Puchong, Selangor is under class II which indicates it suitability for recreational activities but provided water is being implemented.

ABSTRAK

Hutan Simpan Ayer Hitam (HSAH) adalah hutan sekunder yang mempunyai sejarah operasi pembalakan. Operasi pembalakan ini telah menyebabkan kemerosotan Indeks Kualiti Air di dalam hutan. Satu kajian telah dijalankan di air terjun HSAH Puchong, Selangor. Objektif utama kajian ini dijalankan adalah untuk menilai status semasa kualiti air di air terjun HSAH dengan menggunakan indeks DOE-WQI dengan enam parameter kualiti air iaitu Oksigen Terlarut (DO), pH, Permintaan Oksigen secara Biokimia (BOD), Permintaan Oksigen secara Kimia (COD), Ammonia-cal Nitrogen (NH_3N) dan Jumlah Pepejal Terampai (TSS). Kajian ini melibatkan empat stesen yang mana terletak diantara aliran atas ke aliran bawah. Stesen 1 terletak di tebing aliran atas, diikuti oleh Stesen 2 dan 3 di aliran tengah yang dimana Stesen 3 terletak di tebing aliran tengah dan Stesen 4 di cabang sungai air terjun yang berhubung dengan Sungai Rasau. Persampelan ini dijalankan sekali dalam masa seminggu untuk sepanjang tempoh enam minggu. Analisis Varian Satu Hala (ANOVA) telah digunakan untuk membuat perbandingan parameter dan Indeks Kualiti Air antara stesen. Hasil WQI menunjukkan julat nilai purata adalah daripada 79.15 ke 86.46 dan nilai p adalah 0.54 dimana ia bermaksud tiada perbezaan ketara antara stesen. Status kualiti air di air terjun HSAH Puchong, Selangor berada dibawah kelas II dimana ia bermaksud sebagai sesuai untuk aktiviti rekreasi tetapi memerlukan proses rawatan sebagai bekalan air.

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APPROVAL SHEET

I certify that this research project entitled “Current Water Quality Status at Compartment 13 Waterfall in Ayer Hitam Forest Reserve, Puchong Selangor” by Arif Asnami Bin Ahmad, has been examined and approved as a partial fulfilment of the requirement for the degree of Bachelor of Forestry Science in Faculty of Forestry, University Putra Malaysia.

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LIST OF ABBREVIATIONS

Anova	Analysis of Variance
%	Percentage
BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
DO	Dissolved Oxygen
DOE	Department of Environment
INWQS	Interim National Water Quality Standard
NH_3-N	Ammonia-cal Nitrogen
SISS	Sub-Index of Total Suspended Solid
SIAN	Sub-Index of Ammonia-cal Nitrogen
SIBOD	Sub-Index of Oxygen Requirement for Biochemical Process
SICOD	Sub-Index of Oxygen Requirement for Chemical Process
SIDO	Sub-Index of Dissolved Oxygen
SIpH	Sub-Index of pH value
TSS	Total Suspended Solid
WHO	World Health Organisation
WQI	Water Quality Index

CHAPTER I

INTRODUCTION

1.1 General Background

Hutan Simpan Ayer Hitam or Ayer Hitam Forest Reserve (AHFR) is one of the precious tracts of remaining forest in Klang Valley. Originally, AHFR was gazetted as a forest reserve way back in 1906, which at that present its area covering approximately 4,270 hectares. Yet, as urbanization starting occurs intensely in Klang Valley, it has suffered number of series de-gazetted by the local authorities and now its area covering about 1,248 hectares. AHFR was given out to University Putra Malaysia specifically to Faculty of Forestry as a caretaker of the forest. AHFR will be used as 'living' laboratory for students and also its staff to conduct research and also any social activities there.

AHFR has its unique value and also biodiversity species and habitat there. AHFR is classified as a lowland dipterocarp forest. On 1960, AHFR was logged and lots of biodiversity was loss and disturbed by the logging activities and eventually became the secondary forest. The logging activities in the past has reduced the diversity of riparian zones in AHFR (Azliza *et al.*, 2012). Nowadays, it has been 56 years since the last logging activities and the forest has started too rehabilitated by itself. Lots of large trees started to build multi-layered canopy and also its biodiversity healing by itself. AHFR is a regenerating forest (Azliza *et al.*, 2012) although it may takes long period of time.

Although the forest has been logged in the past, it still manages to retain its original rainforest character within the small area for example its river basin. These streams are perhaps are the only strongest elements that present on the conservation value of Ayer Hitam Forest Reserve. Basically, there are 3 main streams that channelling around which are Rasau, Biring and also Nasih rivers.

1.2 Research Background

Water is an important element in of all forms of life. Mostly, living organisms can survive only for short periods without water. This fact has resulted in the development of direct relationship between abundance of water population density and also quality of life. Nowadays, it is hard to define 'water quality' terms, as the understanding and perspective of water quality definition varies and depends on the expansions of water use and also the ability to measure and interpret water qualities. According to Chapman (1996) water quality can be defined as set of concentrations, speciation and physical partitions of inorganic or organic substance. In the meantime, water quality also can be defined as the overall process of evaluation of the physical, chemical and biological nature of water in relation to natural quality, human effects and intended uses, particularly uses may affect human health and the health of aquatic system itself (Bartam and Ballance, 1996).

Water covers 71% of earth surface but which seems that the most relative fact is that only 1% of that water are drinkable or usable by human. Water in the earth moves continuously through the water cycle of evaporation,

transpiration, condensation, precipitation and also may consider runoff under it. Yet all these fundamental elements are useless if it can't be supply for human needs. Water demand already exceeds supply in many part of the world, and many more areas are expected to experience this imbalance in the near future. For the last past 50 years ago, freshwater withdrawals have increasingly tripled by 64 million cubic meters a year. This is because the world population are growing by approximately 80 million people each year and in addition, nowadays trend changes in lifestyle and eating habits in recent years are requiring more water consumption per capita.

Waterfalls or falls is a river or other body of water's steep fall over a rocky ledge into a plunge pool. Waterfalls commonly form where water rushes down steep hillsides and quickly erodes the rocks. The height and number of waterfalls along a stream or river depends upon the type of rocks that are being eroded by the water. Some types of rocks for example shale wear away more easily than others such as limestone and sandstone. As the river or stream wears away the weak rocks, they travel across the surface of stronger rocks. These more resistant rocks become the capstones to waterfalls. The number and thickness of these stronger rock units in a vertical sequence of rocks controls how many water falls there are and how much vertical drop there is on each waterfall.

1.3 Problem Statement

Ayer Hitam Forest Reserve, Puchong are known of because of its location in the middle of modern urbanization in the Klang Valley. AHFR are designated

for purpose – education, research & recreation, which are open for all students and staff of University Putra Malaysia.

Logging operations history has caused water quality become deteriorate (Brown, 1973). These activities have eventually affect the forest biodiversity which are the main cause of water deterioration. The last research recorded water quality at AHFR waterfall were in class II (Nazri, 2010) which needed water treatment for water supply although it is suitable for recreation which it main parameter that deteriorate are pH. This research are conducted to determine whether the forest have positive self-purification water quality after seven years the water quality index properties as self-purification process at the waterfall from the effect of past logging are still unknown. Besides that, this study are conducted to determine its suitability for any programs or recreational events which then lead to valid information for University Putra Malaysia particularly Faculty of Forestry itself. This study may provide useful information and understanding to determine the water quality at waterfall in AHFR.

1.4 Objectives

The objectives of the study were:

I. To determine the current water quality status at waterfall in Ayer Hitam Forest Reserve using DOE-WQI index.

II. To determine the suitability of water quality for recreational purposes.

III. To assess the improvement of the self-purification process after seven years the water quality index properties.

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