WATER QUALITY ASSESSMENT OF EFFLUENTS FROM SHRIMP PONDS FARMING

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Bachelor of Occupational Safety And Health With Honors

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SUPERVISOR'S DECLARATION

I hereby that I have checked this thesis and my opinion, this thesis is adequate in terms of scope and quality for the award of degree of Bachelor of Occupational Safety and Health with Honour's.

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I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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ABSTRACT

Shrimp aquaculture has become lucrative venture in many of countries in Asia. Water from the shrimp farm contained various substances which can contaminate the water that is resulting from overfeeding to the shrimp, antibiotics or other medicine used to protect shrimp, nutrients and suspended solids. Therefore, the objective of this study is to characterize the water quality of effluent and to be compared with the standard. Water sample were collected from at the point where the water was discharged from the ponds. Analysis of parameters include water temperature, pH, dissolved oxygen, turbidity, total dissolved solids, total suspended solids, biological oxygen demand, chemical oxygen demand, and ammoniacal nitrogen. The result shows all the parameters analysed were below the standard limit.

ABSTRAK

Akuakultur udang telah menjadi usaha yang menguntungkan di banyak negara di Asia. Air dari ladang udang mengandungi pelbagai bahan yang boleh mencemari air yang disebabkan oleh terlalu berlebihan kepada udang, antibiotik atau ubat lain yang digunakan untuk melindungi udang, nutrien dan pepejal terampai. Oleh itu, objektif kajian ini adalah untuk mencirikan kualiti air efluen dan dibandingkan dengan standard. Sampel air dikumpulkan dari titik di mana air dibuang dari kolam. Analisis parameter termasuk suhu air, pH, oksigen terlarut, kekeruhan, pepejal terlarut, pepejal terampai total, permintaan oksigen biologi, permintaan oksigen kimia, dan nitrogen ammonia. Hasilnya menunjukkan semua parameter yang dianalisis berada di bawah had standard.

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LIST OF ABBREVIATIONS

AN	Ammonia Nitrogen
APHA	American Public Health Association
BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
DO	Dissolved Oxygen
TDS	Total Dissolved Solid
TSS	Total Suspended Solid

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Shrimp aquaculture has been known long time ago. Aquaculture of shrimp throughout the world has laid a very exponential growth, reaching 2.3 billion annual amount of annual shrimp production since the 1970s and generate good social and economic that benefits in areas where it is developed. Shrimp farming has been practiced from 15th century among Asian people. Shrimps farming at that time were practice among Asian people. Since milkfish used low densities for traditional farms, shrimps were existed at the same time with it and the other species of the aquatic life. The shrimp production has become one of the large-scale industrial operations nowadays (Páez-Osuna, 2001)(Cardoso-Mohedano et al., 2016).

Shrimp farms are usually built near brackish, mangrove or seawater sources, the water will pumped from these sources for shrimp culture to fill and maintain the ponds (C. E. and B. W. G. Boyd, 2002). The mangrove area is chosen due to the natural supply of shrimp post larvae and the exchange of tidal water (Ashton, 2008). Mostly, the production of the shrimp is carried out in the ponds. The inlands pond that are the most common used for the aquaculture systems are usually near to the coast. Water is released from the shrimp pond into the coastal ecosystem for water exchanged when the pond is drained. The components of shrimp farming effluent are in organic and inorganic forms, and suspended solids (Barraza-Guardado et al., 2013).

Shrimp farming has various systems in their size, management and people involved. The classification of the shrimp farm can be in various ways such as extensive

or intensive, semi-extensive and traditional. These categories are classified by the increased of stocking rates, yields, inputs of the water management and feed. These categories will be updated as the technology improved. Extensive farm are stilled contribute to employment as a production for global shrimp farm especially in Asia even new super-extensive are introduced. However, extensive farm are one of the contributor to the loss of the mangrove habitat due to the need of the large area for exchanging water and their large size (Ashton, 2008).

Shrimp production has become lucrative venture in many of countries in Asia. However, the environment of these countries has harmed because of the shrimp productions, especially those built for plentiful shrimp production that actually damaging the coastal ecosystem extremely. Coastal mangroves are one of the prominent habitats where these habitats provide a variety of marine species and have been destructed because of the shrimp production just to make way for shrimp ponds. Shrimp production is the reason for the loss of 5 to 10 percent of mangrove habitats worldwide and could be up to 20 percent of the loss of mangrove habitat in some others areas (Na nakorn, Chevakidagarn, & Danteravanich, 2017).

In some cases, the disease in the shrimp pond can be rampant with millions of full shrimp together in the pool. The disease can be severe enough for shrimp in the entire pond as well as the entire shrimp industry to be killed when the disease widespread in the pond. Basically, operations for intensive shrimp can only last for at least 7 years before pollution and pathogens in the shrimp pond reached a peak point which can affect the shrimps where they could not survive anymore**.** In order to ward off disease, shrimp in many foreign fields are given daily dose of antibiotics, whether mixed with food pellets, thrown directly into the pool water or both (Hannesson, 2008).

Moreover, shrimp production can be make sure to run smoothly by using variety of chemicals that can give benefit to the shrimp production. Fertilizer is one of the chemicals that used in shrimp production where it is used to help the growth of plankton for shrimp to eat. The acidity of the water and soil can be adjusted with lime and calcium. Zeolites used in shrimp production to remove ammonia. Pests and pathogens also killed with other compound such as calcium hypochlorite, formalin and chlorine.

In other hand, the chemicals used for this shrimp production also give adverse effect towards ecosystem by shrimp pond’s effluents. As mention before, shrimp pond was polluted with the pellet used to feed shrimps and also the antibiotic used to prevent

from any disease related. That is mean that the effluent of the shrimp pond filled with all sorts of antibiotics, chemicals and other pollutants that have adverse effects on the shrimp production (Nachman, 2010).

1.2 PROBLEM STATEMENT

Shrimp pond's effluent is the issue that is the most important thing that need to be taken care in shrimp production system. The varieties of chemical that used to maintain the production of the shrimp affected the quality of the effluents from shrimp pond. Their major components that are the greatest concern to have a potential impact of effluents include suspended solids, and other parameter that affect the water quality of the shrimp pond's effluent. Feed is the major source of the chemical in effluents where feed is used for shrimp's growth especially when it is overfeeding because of the characteristic of the shrimp that is a type of bottom feeding (Chowdhury, 2013).

Unconsumed feed generate waste causing the organic waste and metabolites of degraded organic matter accumulate in water ("Water quality and Water quality Management in Aquaculture," 1986). Some of the organic waste in the water was removed from the pond immediately after organic matter has been degraded but some of it was not. The waters environment will have an adverse effect from the water that is flows directly through the natural waterways. In turn, this water that has not been treated will affect the aquatics or other species of wild animals and human health as a result of water quality deterioration. Species of wild fish cannot survive in degraded waters (Kasnir, Harlina, & Rosmiati, 2014).

Recently, the production of the shrimp and its value has increased day by day due to the demand from all over the world. Shrimp farming generates benefits socially and economically especially in the developed area. However, several of the environmental effect such as destruction of the mangrove, pollutants discharge, and the connection between lagoons and creeks are disrupted was caused by the shrimp farming. Effluents of the shrimp farming are the main contributor for the environmental effect that tends to the severe impacts if the water quality of the effluents is not monitored (Cardoso-Mohedano et al., 2016).

In Malaysia, we still lacked of focus in research on the aquaculture especially for the shrimp production system. Roughly, shrimp production caused pollution toward

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