

## Impacts of Pig Farming on the Water Quality of Serin River, Sarawak (Kesan Ternakan Khinzir terhadap Kualiti Air di Sungai Serin, Sarawak)

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### ABSTRACT

*In Sarawak, pig farm operators are required to treat the wastewater containing pig waste and spilt food in oxidation ponds before discharge. However, information on the impact of this industry on surface water quality is lacking. Therefore, the objective of this study is to determine the impact of pig farm effluent on the water quality of Serin River and its tributaries. Results of analysis show that the tributary that received pond effluent has significantly higher mean of total suspended solids (TSS), biochemical oxygen demand ( $BOD_5$ ), chemical oxygen demand (COD), ammonia-nitrogen ( $NH_3-N$ ), reactive phosphorus (SRP) and Escherichia coli (E. coli) concentrations when compared to those of the tributary that did not receive pond effluent. Comparisons between the stations upstream and downstream of the discharge point indicated that  $BOD_5$  and COD were significantly higher at the downstream station that received pond effluent. Dissolved oxygen (DO) was the lowest at the tributary receiving effluent from pig farms with a mean of 2.40 mg/l. According to the Interim Water Quality Standard of the Department of Environment, water quality at the tributary that received pig farm effluent falls into Class III whereas that of the other stations falls into Class II. It is recommended that further studies be conducted on the management of waste to explore the possibility of turning the waste into a resource so that water quality of rivers can remain pristine for drinking and recreation.*

**Keywords:** water quality, animal farming, pig farming, Sarawak, E. coli

### ABSTRAK

*Di negeri Sarawak, pengusaha ladang khinzir dikehendaki merawat air buangan mengandungi najis khinzir dan sisa-sisa makanan di dalam kolam pengoksidaan sebelum ianya dialirkan ke dalam sungai. Walau bagaimanapun maklumat mengenai impaknya ke atas kualiti air masih berkurangan. Maka kajian ini bertujuan untuk menentukan impak efluen ladang khinzir terhadap kualiti air Sungai Serin dan anak-anak sungainya. Kajian ini mendapati bahawa anak sungai yang menerima efluen daripada kolam ladang khinzir mempunyai jumlah pepejal terampai (TSS), permintaan oksigen biokimia ( $BOD_5$ ), permintaan oksigen kimia (COD), nitrogen-ammonia ( $NH_3-N$ ), fosforus reaktif (SRP) dan kepekatan Escherichia coli (E. coli) yang lebih tinggi secara signifikan apabila dibandingkan dengan anak sungai yang tidak menerima efluen kolam. Kajian stesen yang terletak di hulu sungai mempunyai nilai  $BOD_5$  dan COD yang lebih tinggi jika dibandingkan dengan stesen di hilir sungai. Nilai oksigen terlarut (DO) adalah paling rendah pada anak sungai yang menerima efluen dengan nilai purata sebanyak 2.40 mg/l. Menurut Piawai Kualiti Air Kebangsaan Interim Malaysia, kualiti air pada anak sungai yang menerima efluen daripada kolam ladang khinzir telah dikelaskan pada Kelas III manakala stesen-stesen yang lain jatuh pada kelas II. Adalah dicadangkan supaya kajian lanjutan dijalankan berkaitan dengan pengurusan sisa itu terutamanya dari segi kemungkinan ianya dijadikan sumber supaya kualiti air di sungai-sungai kekal bersih untuk minum dan rekreasi.*

**Kata kunci:** kualiti air, ladang haiwan, ladang khinzir, Sarawak, E. coli

### INTRODUCTION

Environmental pollution due to intensive livestock farming has been reported in UK and Korea (Rutt et al. 1993; Cho et al. 2000). Discharge of nutrients-rich wastewater into river could cause aquatic eutrophication (Levine & Schindler 1989). Eutrophication and the associated ecological effects can result in a decline in water quality, restricting its use in drinking and general purposes. Furthermore, the microbiological quality of surface waters also determine their acceptability for drinking and recreational purposes as livestock waste can carry a variety of bacterial and protozoan pathogens (Hooda et al. 2000).

In Malaysia, pig farming is an important livestock industry. Based on the statistics of pig population reported by the Department of Agriculture Sarawak (DOA 2002), 22% of the country's pig population was in Sarawak generating estimated revenue of RM 55 million a year. In this industry, water used to bathe the pigs and clean the concrete pens are channelled into two oxidation ponds according to the requirement of Natural Resource and Environment Board (NREB). However, not much was known about the impact of the effluent on the rivers.

From the studies carried out in two farms in West Malaysia, the total wastewater flow was found to range