Evaluation of Gross Pollutant Wet Load in Sungai Sering, Malaysia

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Abstract: The gross pollutant wet load of Sungai Sering catchment, a tributary of Sungai Klang was evaluated. The catchment represents an urban catchment with rapid growth rate due to urbanization process. Urbanization frequently relates to drop of stormwater quality due to many factors such as uncontrolled pollution and improper waste disposal. The study aims to improve the understanding on the wet load trapped in 10 Gross Pollutant Traps (GPTs) in the study area. The amount of wet load analysed based on data collected in the duration from August to December 2015. There is a linear relationship between the amount of gross pollutant wet load and rainfall depth.

1. Introduction

Gross pollutants are the size of debris and litter which is greater than 5 mm and often targeted first for the removal with many structural measures with varying results. These accumulated pollutants are not only aesthetically unattractive, but also demonstrate environmentally threatening and devastating effect to the natural equilibrium, and impede hydraulic performance of the urban drainage system [1]. The rising awareness about the degradation of river water quality by gross pollutants has led to the implementation of gross pollutant management strategies as a holistic approach for water quality improvement [2]. The integration of both structural and non-structural measures is important to ensure the effectiveness of gross pollutant management. Structural measures are constructed in-transit treatments which separate and contain pollutants. The introduction of gross pollutant traps before entering the receiving water such as pond, wetland and river is based on the concept of “control-at-source” with the objective to control stormwater quantity and quality [2].

As a high density population area, Sungai Klang basin is exposed to severe environmental issues due to socio economic activities and rapid land development. Therefore, it is important to understand the factors causing accumulation of gross pollutants in order to manage them effectively, especially in urban waterways [2]. Sungai Sering is one of the main tributaries of Sungai Klang and it was surrounded mostly with residential area. In residential areas, a bulk volume of pollutant could be grass clippings with only small volumes of plastic, bottles and cans [3]. Studies have indicated that a significant proportion of gross pollutants discharged to waterways are generated by residential land, as this type of development constitutes a significant proportion of the land use in most catchments [4].
2. Study Area

The study area located in the state of Selangor and lies in north east of Kuala Lumpur. Sungai Sering is located at the upper stream of Sungai Klang (Figure 1). The total number of GPTs installed included in this study are 10 which has been divided into three types namely Continuous Deflective Separation (CDS), Downstream Defender (DD), and CleansAll (CA). The rainfall depth for this area is extracted from rainfall station 3114005, located at KM 10 Ulu Kelang, Ulu Kelang Height.

![Figure 1: Sungai Sering located in the state of Selangor (left) and the location of 10 GPTs in Sungai Sering catchment (right).](image)

3. Type of GPT and Wet Load Removal Mechanism

Generally, gross pollutant traps can be divided into two types; conventional and proprietary [5]. Conventional gross pollutant trap is a common trap that can be installed at any types of catchment area, while proprietary gross pollutant traps are usually manufactured according to specific site characteristic such as catchment area and rainfall intensity [5]. The type of GPT in Sungai Sering catchment is conventional [6]. Further classification of gross pollutant traps are based on its removal mechanism. It is necessary to identify the removal mechanism of GPTs in order to suit with the purpose of their installation at a particular site [6].

![Figure 2: Cross Section of DD [5]. Figure 3: Cross Section of CDS [5]. Figure 4: Cross Section of CA [5].](image)
4. Results and Discussion

Figure 5 indicated the wet load data for 10 units of GPTs installed in Sungai Sering. The highest wet load recorded was from GPT/SS/DD/23 in December with the weight of 65 kg meanwhile the lowest data recorded was from GPT/SS/CDS/17 in August with load of 11 kg. For cumulative wet load data in each month, December recorded the highest amount of wet load with the total of 354 kg meanwhile the lowest is in August with 204 kg. The reason of highest wet load recorded in December is because of rainy season. Therefore, the rainfall data was measured to evaluate the relationship between rainy season and incremental of wet load in that particular month.

![Figure 5: Wet load for GPTs in Sungai Sering catchment area from August to December 2015](image)

![Figure 6: Relationship of Gross pollutant wet load with rainfall depth.](image)
Figure 6 shows the rainy season that has started in November had contributed to higher wet load trapped in the GPT. This is because the higher flow rate of water has been channelled into the drainage line and eventually carried the wet load into the GPT.

Besides that, the reason for the apparent differences amount of wet load among the GPT could be due to other factors such as location and population. The GPTs located at downstream of the river and in high density residential area trapped higher wet load compared to the GPTs at upstream and low-density residential area. For example, GPT/SS/CDS/18 and GPT/SS/DD/19 recorded cumulative wet load of 134 kg and 144 kg respectively which are higher when compared to GPT/SS/CDS/25 and GPT/SS/DD/26 where the amount of wet load are only 133 kg and 113 kg respectively.

5. Conclusion

An analysis of wet load trapped in the 10 Gross Pollutant Traps (GPTs) that were installed in Sungai Sering has been conducted successfully. Overall, all GPTs have trapped 1233 kg of wet load in five months during the period from August to December 2015. It is vital to study on the performance of GPT to trap the wet load as it can reduce the wet load from being discharged into Sungai Klang; and thus able to improve water quality of the river. Moreover, the reasons of wet load is higher on particular month have been identified. The relationship between the rainfall depth and amount of wet load had proven that the higher rainfall depth contributed to the higher wet load trapped in the GPT. Furthermore, the reasons why higher wet load recorded were because location of GPT and high-density residential area. As a conclusion, the implementation of GPT in the main tributaries of Sungai Klang such as Sungai Sering should be broadened.

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