Water Supply Treatment Sustainability of Semambu Water Supply Treatment Process - Water Footprint Approach

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Abstract, The Life Cycle Assessment (LCA) has long been used to assess the impact of products or services to the environment however recently Water Footprint Assessment (WFA) has been introduced. In this study, the assessment by using Water Footprint (WF) approach was conducted to assess water consumption within the water supply treatment process (WSTP) services of Semambu Water Treatment Plant (WTP). Identification of the type of WF at each stage of WSTP was carried out and later the WF accounting for the period 2010 – 2016 was calculated. Several factors that might influence the accounting such as population, and landuse. The increasing value of total WF per year was due to the increasing water demand from population and land use activities. However, the pattern of rainfall intensity from the monsoonal changes was not majorly affected the total amount of WF per year. As a conclusion, if the value of WF per year keeps increasing due to unregulated development in addition to the occurrences of climate changing, the intake river water will be insufficient and may lead to water scarcity. The findings in this study suggest actions to reduce the WF will likely have a great impact on freshwater resources availability and sustainability.

KEYWORDS *water footprint, water treatment plant, water supply treatment process, water scarcity, sustainability*

INTRODUCTION

In this study, water consumption of WSTP needs to be determined. WSTP is a process of water treatment through few steps begins with the water intake, aeration, mixing, flocculation, sedimentation, filtration and backwash. WF approach was used as a tool to assess the amount of overall water consumption for the WTP.

For years, Life Cycle Assessment (LCA) has been used to evaluate a wastewater treatment plant and all the impacts are evaluated from the construction process to operation and until the dismantling process (Corominas et al., 2013). There are four phases in LCA, firstly is setting goal and scope definition phase, secondly the inventory analysis phase, thirdly the impact assessment phase and lastly is the interpretation phase (The International Standards Organisation, 2006). In this assessment, the most importance phase that also an adapted method from LCA is the impact assessment phase. However, LCA is a broad impact assessment tool and in LCA, all environmental impacts those are connected with a product or service have to be assessed (Klöpffer, 1997). As for example, LCA of building sector must be assessed from the early stage which is before the construction begin until the demolishing and transportation of waste materials stage (Cabeza, Rincon, Vilarino, Perez, & Castell, 2014). Basically, LCA is used to estimate the broad environmental impact such as global warming, eutrophication, acidification, human toxicity, pollution and many more impacts based on standard methodology named ISO 14040 (The International Standards Organisation, 2006). As seen, LCA is not focusing on specific impact like the impact on water resources of particular development or service. However, the importance of water uses and impacts are being assessed in LCA but LCA does not quantify and map indirect water use that involved along the supply chain in water resources management (Boulay, Hoekstra, & Vionnet, 2013). In term of sustainability of water resources, it is not fare if not assessing on overall water resources.

Hence, the aim of this study is to introduce a WF approach in order to determine the sustainability of the services category through the WF accounting for WSTP. Therefore, the sustainability of WSTP will be able to be identified.

METHODOLOGY

Study Area