

CHAPTER I

INTRODUCTION

1.1. Background

Floods are the most frequent natural disaster that happened in Indonesia. Floods may cause by rain, storm surges, lack of drainage system, overflows of dams or other water systems. In some cases, flooding may lead to inundation. Semarang is one of the cities in Indonesia that suffering from inundation.

Semarang located in the north of Java island and bordered with Java sea. Figure 1 shows the location of Semarang. Semarang has relatively flat contour, forty-three percent of the area ranging from 0 to 2.45 meters above sea level (Pemerintah Kota Semarang, 2017). According to this condition, the drainage system hardly to drain water, moreover when sea level rising (Ramadhany, Ds, & Subardjo, 2012). The inundation in Semarang exacerbated by sea level rise (Marfai & King, 2008a, 2008b). Figure 2 shows inundation in Semarang.

On February 2018, Kaligawe street in Semarang suffering from enormous inundation. The inundation reach 40-60 centimetres high caused by heavy rainfall combined with Super Blue Blood Moon phenomenon effect that causing high tide (Ige, 2018). The inundation sank Kaligawe street for two weeks (Nurdin, 2018).

Semarang also suffering from land subsidence, which believed worsen the inundation. According to Marfai & King, (2007), land subsidence is a movement of a surface downwards relative to a datum. Damage on existing building, roads,

bridges, industrial estates is results of land subsidence. It is caused by groundwater withdrawal and load of building and structure.

Kaligawe area accommodate industrial area, schools, hospital, bus station, and residential area. Transportation access in Kaligawe street jammed as a result of inundation (Figure 3). Therefore, this research is proposed to analyse the inundation on Kaligawe street. Then, it could be used to predict and find solution for the inundation.

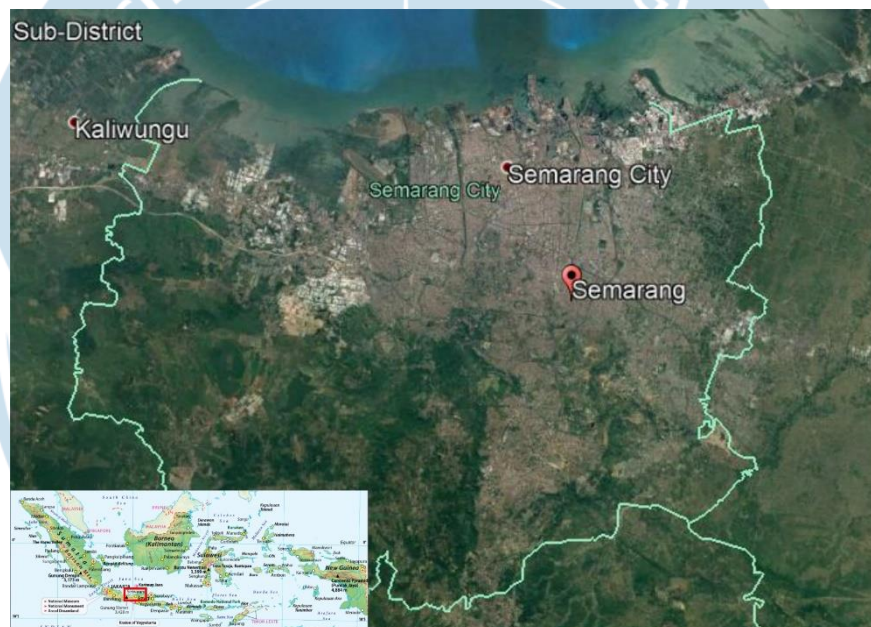


Figure 1. Location of Semarang. Source: Google Earth.



Figure 2. Inundation in Kaligawe street, Semarang.



Figure 3. Observation Area. Source: Google Earth.

1.2. Problem Statement

The following research questions were formulated to further examine the problem statement:

1. How big is inundation that happen along Kaligawe street? Did the canal capacity adequate to accommodate the discharge?

2. What is the impact of sea level rise and land subsidence on the inundation along observation area?
3. How big the inundation in Kaligawe street on 2, 5, 10,25 years forecasting under sea level rising and land subsidence scenarios?

1.3. Research Objectives

This research aimed to:

1. Identify whether the canal capacity adequate to accommodate the discharge and the inundation discharge that need to be accommodated.
2. Observe and analyse impact of sea level rising and land subsidence on inundation along observation area.
3. Analyse inundation on future 2, 5, 10, 25 years if there are no action taken.

1.4. Limitations

Before starting the research, limitations should be made in order to accomplish the main objectives. These are the limitations for this research:

1. The observation area limited to Kaligawe street between Babon River and Banjir Kanal Timur (BKT) river.
2. Observation factor limited to rainfall, Sea level, land subsidence, and drainage system.
3. Hydraulics analysis using HEC-RAS software.

4. River that included on the analysis are Sringin river and Tenggang river.
5. Sedimentation, detention, and hydraulics structure along river are neglected.
6. Land subsidence data collected from previous observation and assumed increase constantly.
7. Research limited to verify the canal capacity whether the canal adequate to accommodate discharge or not.

1.5. Research Benefits

The result of this study is expected to be useful for various parties, among others:

1. For the government: This research can be as reference to help government on planning or design drainage system to overcome the inundation.
2. For academicians/readers: This research can give information about inundation analysis in Kaligawe street Semarang.

1.6. Originality of Final Project

Previous researchers found the result that canal capacity in Semarang did not adequate to accommodate 10 years return period of flood (Indrawan, Hana, Zulfan, & Bachtiar, 2011). Whereas the inundation in Semarang happened annually. Thus, further observation in canal capacity needed. Moreover, sea level

rise has tight relation with rising of inundation (Wahyudi SI, 2007). Ramadhany et al., 2012 had been identified total area that inundated, and the result shown the largest affected area is North Semarang. Thus, this research focused on inundation happened in Kaligawe street which is include in North Semarang area. Sea level rise rate in Semarang had been observed (Cahyadi, Jaelani, & Dewantoro, 2016; Indrawan et al., 2011). Indrawan et al., (2011) stated that increasing rate of sea level is 6 mm/year. While, Cahyadi et al., (2016) stated that sea level rising in Semarang is 12.83 mm/year. Therefore, the increase rate of sea level requires further observation, considering the effect on coastal inundation. Yearly rate of land subsidence and the area that affected had been observed (Abidin, Andreas, Gumilar, Sidiq, & Fukuda, 2013; Marfai & King, 2007, 2008c). however, there are no research yet to observe the impact of land subsidence, combine with sea level rise on coastal inundation.