

# CHAPTER I

## INTRODUCTION

### **1.1 Background**

Merapi is the volcano that located in Yogyakarta, in fact mentioned as the most active volcanoes in the world. With a height of 2968 m. DML (situation in 2001) or 3079 meters above the city of Yogyakarta, Mount Merapi is located 7°32.5' South Latitude and 110°26.5' East Longitude administratively included in Sleman, Magelang, Boyolali, and Klaten. Merapi volcano is one of the most active volcanoes in Indonesia. It has erupted regularly and the eruption has been more active in the last 20 years. The eruptions have produced huge sediment and caused pyroclastic flows and debris flows, threatening people live and assets in the downstream area. However, sediment disaster mitigation has been implemented and sabo facilities have been constructed to mitigate the sediment disasters (Ikshan Jazaul 2010). Besides that, the volume of sediments in the area around Mount Merapi increasing significantly, in addition to the eruption and avalanches of pyroclastic flow occur almost every day and landslides on the river also caused damages.

From the field observations, potential of debris flow is big enough, because it generally river basins suffered shallowing due to sedimentation. Hence, it raises concerns that need for treatment immediately. To improve these conditions so that the process aggrades downstream could be maintained it is need a management and watershed management in the region. One of the efforts to reduce sedimentation is handling the sediment control system, that can provide benefit both directly and

indirectly to the public. Therefore, based on several facts above by knowing the potential amount of sediment we are able to plan for disaster management debris easily. Includes identification of material accumulation of sediment in the upstream river around the top of Merapi. Hence, considering the difficulty of estimating the lava flood to prevent debris flow, then built a control system which is called building sediment control in this final project called (Sabo). The location of the building sediment control structures is Krasak river, Batang river, Putih river, Senowo river, Blongkeng river, Woro river, Gendol river, Boyong river, Lamat river, Kuning river, and Pabelan river.

## **1.2 Location**

The selected research area is Gendol river. Gendol river is a name of river that located at Cangkringan, Sleman Yogyakarta. The length of the river is  $\pm 22$  km from the upstream to the downstream. From figure 3.1 Research Area below show the red line was the Gendol river.

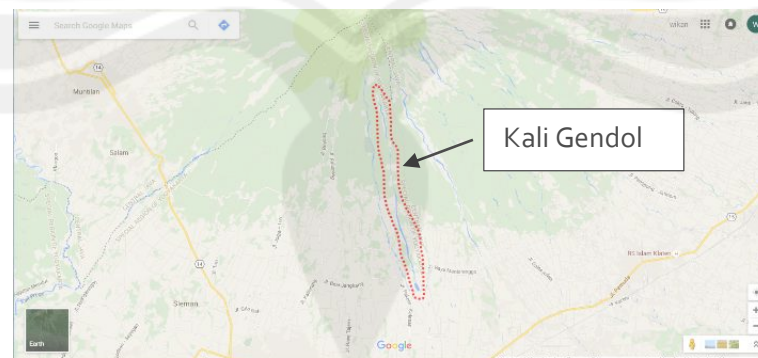


Figure 3.1 Research Area

### **1.3 Problem Statement**

Estimation of the volume of sediment capacity in Gendol river become the topic of this study. Gendol river has about 22 km of length and 14.86 km<sup>2</sup> of catchment area the river, the south east of Mount Merapi is the origin of Gendol river. In order to anticipate and control sediment disaster, 22 sediment control structure called as sabo dams have been built. In fact, Kaliadem be the most upstream dam and the most downstream dam is consolidation dam of GE-C0 located near on Jalan Tulung Taman Martani, Sleman. Gendol river has high risk receive the damage of debris flow of Merapi. As mentioned above this research is based on sediment balance. This research conducted the analysis of transportable sediment volume (VS) using empirical formula of Takahashi (1991) and Mizuyama (1977). Sediment balance was investigated based on maximum daily rainfall with 25 years return period or known as (R24). Empirical equation of Shimoda (1995) used for analyzing (VE) over flow sediment volume.

### **1.4 Final Project Originality**

The work contained in this final project with the topic “Capacity of Sediment Control Structure in Gendol River” has never been used on any other final project for a degree or diploma at any other education institution before. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due the references are made.

### **1.5 Scope of Project**

The discussion can be focused on the existing conditions at the site of the study, then in order to achieve optimal results need to set limitations and assumptions. Limitations and assumptions referred to:

- a. Discussion based on existing measurement data in the field
- b. The rainfall data only for minimum 10 years of rainfall intensity in this case assume the rainfall is 50mm/hour based on Mukhlisin analysis on 1998.
- c. The sediment control structure assumes in empty condition.
- d. Analysis only 22 sediment control structure located along Gendol river
- e. The resources calculated sediment is sediment around the potential the summit Merapi, from upstream which flows into the downstream at Gendol river only
- f. The structure data only looking for height of the structure and width of structure
- g. Sediment analysis only for debris flow
- h. Limited to points / selected segment, or location to be reviewed.

### **1.6 Objective of The Final Project**

The objective of this project is to estimating the volume of sediment in Gendol river to obtain a design plan to control debris flow on the river and plans to mitigate the non-physical in order to attempt to control sediment disasters and mitigate losses due to sediment. It is expected the information obtained concluded

this study will be useful effort to improve a method or system of control and management the negative impact of sediments in the river channel in the area of active volcanoes in a comprehensive.

### **1.7 Benefit of The Final Project**

The main idea in Estimating the volume of sediment in Gendol river, is to conserve the environment in addition to the maintenance of buildings sabo, it is necessary to study the management of sediment (sediment management) associated with a proportion of sediment (sediment balance). Sediment balance based on the production of upstream sediments that enter the building as well as the reduction of sediment production with existence sediment control building.

The creating of this final project has pretty big benefits for the author. There are some benefits of this thesis. By doing this study, the author as Civil Engineer student that will work in civil engineering world directly can get more knowledge about the importance of sabo system and sediment control structure. Beside that it will give the information to the people about the importance of Sediment control structure in order to prevent the debris flow

### **1.8 The Systematic of Report**

In this research report there are 5 (five) chapters, there are introduction, literature review, research methodology, data analysis, and discussion. The explanation of each chapter will be provided below.

Chapter I is introduction in this chapter consists of problem background, the problem statement, the originality of final project, scope of project, the objective of final project, and the systematic of report.

Chapter II is a literature review in this chapter will consists of explanation of any theories that become a base for the problem that want to be solved and other thing that can be used as base theory.

Chapter III is methodology of research in this chapter consists of phases of the research or the method that is used during this research in order to solve the problem and expected result of the research.

Chapter IV is data analysis and the explanations that consist of the explanation about collected data also some analysis to analyze the data in order to get the expected result and solve the problem.

Chapter V is conclusion and suggestion in this chapter will consists of conclusion of whole research that is already done, and also provide suggestion.