

# CHAPTER I

## INTRODUCTION

### 1.1 Background

In the fishery sector in West Sumatra, the loss of ranchers of floating net cages on Maninjau Lake reaches Rp39.254.000.000 which fish die suddenly from January to September 2016 [1]. This happened for almost a year and became a problem in Agam Regency Government for damaging the people's economic. Death on the lake can occur due to various factors. They are pollutants dispersed, the big amount of cages and low oxygen level in the lake.



Figure 1.1 Dead Fish on Maninjau Lake [1]

After having investigated by the government of Agam, it is known that oxygen levels in the water contained on the lake has reached the brink of crisis. It is known from the lake water that began to blackish. The blackish water can occur because the sulfur and nitrogen content of the lake water is higher than the oxygen level. This oxygen level greatly affects the survival of the organisms in the water (hypoxia) [2].

In this case, a very influential aspect is the level of nitrogen that exceeded the limit. Nitrogen is obtained from the content of ammonia ( $\text{NH}_4$ ) from fish feces and fish feed that founded in the lake. Basically, the ammonia contained in the water can be processed and become a benefit for the people around the lake. Ammonia can be used as a natural fertilizer for agriculture after processed.

The content of ammonia in water can be removed by chemical, physical, or biological processing. Until now, the biological process is the most economical process. In this case, ammonia can be converted to nitrite ( $\text{NO}_2$ ) and nitrate ( $\text{NO}_3$ ) with oxidation process and bacteria called nitrification process. The results of the nitrification process are nitric and nitrate, both of these substance are still water pollutants but, they are very useful in the agricultural sector, especially agricultural systems using hydrophobic methods [3].

## 1.2 Objective

The objective of implementation is:

1. To determine how far the effect of mass water flow rate and airflow rate on nitrification of biofilter for wastewater of food and feces of fish.
2. To determine the thermal characteristics of biofilter nitrification for wastewater of food and feces of fish.

## 1.3 Advantage

The Benefits from this final project is to get how far the effect of mass flow rate and fluid flow rate on nitrification of biofilter and get the thermal characteristic of nitrification of this biofilter.

## 1.4 Scope of Problem

This paper only discusses about the results of the nitrification process without considering the oxygen content required to perform the nitrification process.

### 1.5 Writing System

In the systematic section of this paper are Chapter I contains all the things that the background of topics, titles and set goals and benefits as well as providing restrictions on the problem. Chapter II contains the literature on all topics that support this thesis. In Chapter III contains the scheme of research, tool design, manufacture and testing tools.

