

I. INTRODUCTION

1.1 Background

Forests have benefits as a source of economy, social life, the environment, providing world oxygen sources, regulating water flow, preventing soil erosion, flood disasters, carbon stocks, maintaining nutrients and ecosystem balance (Rahmawati, 2004). Indonesia is in third place with a forest area of 120 million hectares out of 4.06 billion ha of forest in the world, consisting of nature stock, protected forests and production forests (FAO, 2020). Among the types of forest in Indonesia there are secondary forests, where secondary forests are forest areas that are in the growth phase from a disturbed state caused by natural or anthropogenic disasters until they become climax again (Irwanto, 2006).

From 2009 to 2014, the area of critical land in Indonesia decreased by 2.9 million hectares. According to the SLHD of West Sumatra Province in 2012, West Sumatra had 453,413.14 Ha of critical land and Sawahlunto City was ranked 6th with a critical land area of 11,011.00 Ha (Data from the Directorate General of PDASHL, 2018). The government's efforts to carry out Forest and Land Rehabilitation (RHL) are also increasing, in 2010 the government was able to carry out Forest and Land Rehabilitation (RHL) of 157,588 Ha in forest areas and 966,924 Ha for land outside forests (Directorate General of Watershed Management Development and Social Forestry, Forestry Statistics, 2011).

Based on the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number P.2/MENLHK/SETJEN/KUM.1/1/2020, critical

land is land located inside and outside forest areas that has declined in function as a production element and regulatory medium. watershed water. According to the Regulation of the Minister of Forestry of the Republic of Indonesia Number P.32 of 2009, covering land cover, slope slope, erosion hazard level, productivity and critical land management occurs due to changes in land use in Indonesia from agricultural land or forest land to non-agricultural land or built-up land so that The area that functions as a water absorption area is decreasing which can cause land degradation, drought or lack of clean water in the dry season, landslides and flood disasters in the rainy season (Ramayanti, et al., 2015).

Indonesia is one of the largest emitting countries after the United States and China. Therefore, efforts are needed to balance and reduce this, one of which is by improving the quality of forests without reducing their number and maintaining the ecological function of forests as a support for living systems (Sahuri, 2016). According to the Government of the Republic of Indonesia No. 18 of 1994, it is stated that the use of natural resources and ecosystems needs to be emphasized and utilized for the welfare of society through efforts to conserve diversity and ecosystems, so that a balance is achieved between protection, preservation and sustainable use.

The emergence of various problems due to increasing levels of CO₂ emissions released into the air has resulted in various problems related to the greenhouse effect and changes to forest function. This problem has an impact on the value of carbon absorption and the stored carbon stock will decrease. To overcome these environmental problems, it is necessary to control the amount of CO₂ in the air and

increase the amount of CO₂ absorbed by plants and reduce the release of CO₂ into the air as much as possible (Hairiah and Rahayu, 2007). Effective ways to increase the absorption of carbon stock include increasing forest biomass growth and planting fast-growing tree species (Sedjo and Salomon, 1998).

Indonesia has tourism potential at the international level with diversity in nature, culture, ethnicity, customs, language, art and other supporting factors, this makes Indonesia a tourist destination. The Rantih Tourism Village area, located in Sawahlunto City, West Sumatra Province, is one of the areas in Indonesia that has beautiful panoramas. In the forest area of Rantih village there are 4 waterfalls and in 2008 Rantih village was named a tourist village that has cultural and natural tourism and made this village a location for tourist visits (Devy and Soemanto, 2017).

Ecotourism is one of the sustainable development concepts that involves conservation activities and can bridge the interests of the government in terms of conservation and local communities in improving and developing the economy. Ecotourism is a combination of tourism and conservation, where the income obtained from tourism must basically be returned to the area to be used for the protection and preservation of biodiversity as well as for the socio-economic improvement of the surrounding community. In its implementation, ecotourism must pay attention to and consider the carrying capacity of the environment, such as involving local communities directly in its management, promoting environmental education, and providing economic benefits for the management of the area and surrounding communities (Sekartjakrarini, 2004).

Rantih Village is located in Talawi District, 12 km from the center of Sawahlunto City. This village has a hilly topography which is crossed by the Batang Ombilin River and Bukit Barisan (Sawahlunto City Tourism Office). The area of Rantih Village is approximately 1,981.74 Ha, with coordinates 000 38' 08'5" South Latitude and 1000 46'04.8" East Longitude and located at an altitude of between 197 meters above sea level (Yulianis, 2018).

According to the Decree of the Minister of Environment and Forestry Number SK.866/Menhut-II/2023 Bukit Barisan has great potential in providing environmental services, such as clean water sources, carbon absorption, natural tourism, research and education centers. One of the potentials of Bukit Barisan is a waterfall and forest area in Rantih Village, Sawahlunto City.

Research on carbon stocks has been carried out in various places and different types of forests, such as research conducted by Rahmawati (2021) on Estimating Carbon Stocks above Ground Surface in the Ngalau Indah Tourism Area Forest, Payakumbuh City. The results obtained showed that the amount of biomass in the forest area was 92.440 ton/ha, of which 91.313 ton/ha biomass at tree level 1.012 ton/ha at sapling level, 0.53 ton/ha in undergrowth and 0.062 ton/ha in litter. Meanwhile, the overall carbon stock results were 43.446 ton/ha, including 42.917 ton/ha at the tree level, 0.476 ton/ha at the sapling level, 0.024 ton/ha of undergrowth, and 0.029 ton/ha of litter.

In (2018) Nasyrah's research regarding the potential for above-ground carbon stock in the Community-Based Forest Management (PHBM) area in Nagari Gunung Selasih, Pulau Punjung District, Dharmasraya Regency had 25.87 ton/ha

of carbon stock at tree level, 0.339 ton/ha. ha at the large pole level, 0.0372 ton/ha at the sapling level, 0.00152 ton/ha in the undergrowth, and 0.00028 ton/ha in the litter. Based on this, the amount of carbon stock in the Nagari Gunung Selasih PHBM area is 55,852.26 kg/ha or 55.85 ton/ha.

On(2015) Azham's research on the estimation of carbon stocks in secondary forest land cover, shrubs and shrubs in Samarinda City, based on this research, it was found that the highest amount of biomass in secondary forest land cover was 203.826 ton/ha, 56.06 ton/ha in bushes, and 74.180 ton/ha on shrubs. And the highest carbon stock was 95,789 ton/ha in secondary forests, 42,667 ton/ha in shrubs, and 26.464 ton/ha in bushes. The highest carbon stock content is in secondary forests at 63.93 ton/ha, 3.14 ton/ha in bushes and 19.32 ton/ha in thickets.

In connection with the absence of research regarding the estimation of carbon stock at tree level in the Sigaluik Forest in the Rantih tourist area, Sawahlunto City, West Sumatra Province, it is necessary to carry out research related to this topic to determine the biomass and carbon stock in the area, as a support for tourist attraction and as a collection of data for related agencies in forest conservation efforts and protecting the vegetation in them.

1.2 Research Question

From the background above, the problem formulation can be made as follows:

1. What is the biomass at tree level in the Sigaluik Forest in the Rantih tourist area, Sawahlunto City, West Sumatra Province?

2. What are the carbon stock at the level of the Sigaluik Forest in the Rantih tourist area, Sawahlunto City, West Sumatra Province?

1.3 Research Objectives

The aims of this research are as follows:

1. To determine biomass at tree level in the Sigaluik Forest in the Rantih tourist area, Sawahlunto City, West Sumatra Province.
2. To determine carbon stock at tree level in the Sigaluik Forest in the Rantih tourist area, Sawahlunto City, West Sumatra Province.

1.4 Research Benefit

The benefit of conducting this research is to provide data information related to biomass and carbon stock at tree level in the Sigaluik Forest in the Rantih tourist area, Sawahlunto City, West Sumatra Province and as a reference for readers and researchers in the field of Plant Ecology.

