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Forest Conservation Education in Tlahap Agroforestry on The Slope of Mount Sindoro Central Java Indonesia

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***Abstract*---The system of intensive agriculture for generations has made the forest area on the slopes of Mount Sindoro in Central Java threatened its sustainability. The study was conducted in Tlahap village, Kledung Subdistrict, Temanggung Regency. The reason for choosing this area is because this area was the initiator of Tlahap agroforestry. A mixed-method approach with an exploratory sequential research design was used in this study. The objective of this study was to find out the implementation of Tlahap Agroforestry and its forest conservation education. The data used in this study were primary and secondary. Data collection was carried out through questionnaires, observations, interviews, and documentation with forty-five people as respondents and informants. Quantitative data were analyzed by quantitative descriptive methods, while qualitative data were analyzed by triangulation. Data collection, data reduction, data presentation, and conclusion or verification were carried out in this study as data analysis. The results showed that agroforestry has been a form of forest conservation education on the slopes of Mount Sindoro. Forest conservation education in Tlahap agroforestry covers three main things. Those are knowledge, attitudes, and conservation practices done by farmers. Conservation, diversification, and maximization are the principles of conservation education in Tlahap agroforestry.**

Keywords: education, forest conservation, stages of agroforestry, farmers

I. INTRODUCTION

According to the government of Temanggung Regency data, the erosion rate in Temanggung reaches 53.72 tons per hectare per year. The data from the Environment Agency Temanggung District, from 87 thousand total area of Temanggung Regency, 15 thousand hectares of land in the critical category. This critical land is caused by agricultural planting patterns that still rely on seasonal crops. The land on the slopes of Mount Sumbing Sindoro, formerly a forest, was forced to turn into a seasonal farm that passed erosion protection plants (Tempo Magazine, 2010).

Previous researches focused on the breakdown of forest land on the slopes of Mount Sumbing and Sindoro were carried out by Mulyani (2007) and Redjeki (2008). Those two revealed about the development of tobacco in Temanggung district which increasingly extended towards the top of Mount Sumbing and Sindoro which was steep. The development of tobacco continued to be improved to meet market needs, so farmers opened new land. This steep land was not only planted with tobacco, but also other plants without the application of soil conservation technology, so that there was high erosion rate. Cultivation of agricultural crops and plantations had been done by the community in the hereditary, but in the practice of cultivation in general had not been followed by the application of good conservation techniques. Consequently, decreased soil fertility caused the occurrence of critical land. The intensification pattern of agriculture has not been done entirely by the community because of the limited knowledge and financing ability so that soil fertility became not optimal.

The problem that arises as a result of land conversion is the decrease in the function and potential of the forest along with the more reduced extentness that can be sustained. Various human activities are conducted to convert ecological forest function to economical land utilization. There are several factors that cause forest damage, but generally these factors are closely related to development practices with unsustainable production systems. Forest damage is generally caused by massive logging and clearing of land for plantations, transmigration and mining. This of course raises a new phenomenon for the region that has been hanging on the existence of forests (Baiquni and Susilawardani, 2002).

Eroded land should be observed in land management and management of crop types to maintain land quality. Conservation is one of the solutions to overcome land erosion (Suharini, 2001). Forest conservation is one of the crucial issues because the forest sustainability is the needs of the surrounding community, but the efforts of forest destruction are carried out by communities around the forest itself. Therefore, the community participation in the forest conservation efforts is a necessity (Yanto, 2013).

Rachman (2012), explained that conservation is an effort to preserve the capacity of support, quality, function, and ability of the environment in a balanced. The purpose of

Conservation is: (1) to realize the sustainability of natural resources as well as the equilibrium of the ecosystem, so as to support the efforts to improve the welfare and quality of human life, (2) preserving the ability and utilization of natural resources and their ecosystem in a harmonious and balanced environment.

Based on the results of observations conducted by researchers on October 15, 2019, in the village of Tlahap has implemented a distinctive farming pattern known as tlahap patterns or tlahap agroforestry patterns. Tlahap agroforestry is an intercropping agriculture system between coffee crops, hard crops with seasonal plants aimed at reducing erosion while having a high economic value. Referring to some of the above, it is deemed necessary to conduct a study of conservation education in the Tlahap agroforestry.

II. METHODS

This research uses mixed method design. The data types in this study use primary data and secondary data. Data collection is conducted through questionnaire, observation, interview, and documentation with 45 people as respondents and informant. Quantitative data is analyzed by a quantitative descriptive method, while qualitative data is analyzed by triangulation. The data analysis Model used in this research is conducted using three panels. Those are data collection, data reduction, data presentation, and conclusion or verification.

III. RESULTS AND DISCUSSION

Tlahap Village is located on the slopes of Mount Sindoro, with an area of ± 400 Ha, is the administrative area of Kledung District, Temanggung regency of Central Java province. The village is divided into two hamlets, namely Tlahap Hamlet and Kalianggrung Hamlet. Tlahap Village Administration map can be seen in Figure 1.

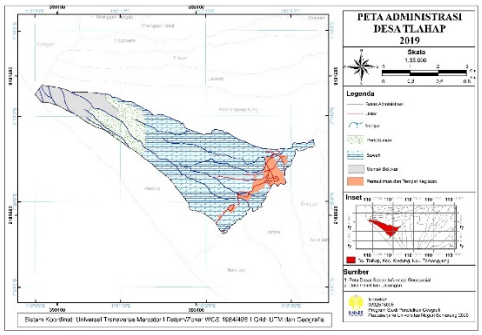

Figure 1. Tlahap Village Administration Map

A population of 4211 people with a family of 1251 and a farmer's livelihood. From Tlahap Village Office secondary data, the topographical state of the region is dominated by 15-40% slope with a height of 1200 meters from sea level. The land in this village is partly dominated by the kind of brown regosol and is mostly used for agricultural activities. The rainfall in the region is between 3000-3500 mm/year, with a wet number of six months in a row starting from October to March. With an average temperature of 18 °C, this area has cool air. Farmland in the village is managed with a typical agricultural system known for its overlapping farms, tlahap patterns, or the Tlahap agroforestry which has developed since 1999.

3.1 Conservation Knowledge Of Tlahap Agroforestry Farmers

Knowledge plays important role in managing the tlahap agroforestry farming activities. Knowledge of farming can change the way farmers think about agricultural systems that affect revenue and production. Tlahap farmers knowledge of agroforestry relates to forest conservation, one of them is the greening plants, in which there are 2 people (4%) farmers do not know, 9 (20%) farmers understand the plant to be increase for the production, 7 (16%) farmers understands the greening plant to be prevent the erosion, and 27 (60%) farmers understand that the greening plants are beneficial which the production can be increased and prevent erosion. Figure 2 presents the details of the farmer's knowledge about a greening plant.

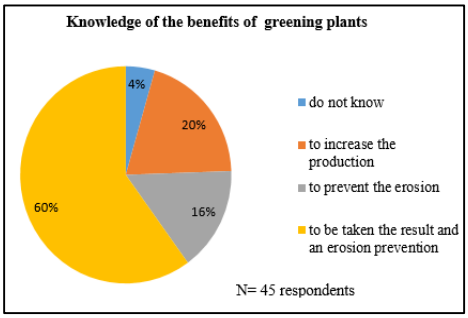

Figure 2. Knowledge Of The Farmer's Knowledge About A Greening Plant.

Other knowledge relates to the turn of the crop system, where 2 (4%) farmers do not know about the plant rotation system, 9 (20%) farmers understand the goal of crop rotation to increase the production, 5 (11%) farmers understand the goal of crop rotation to maintain soil fertility, and 29 (67%) farmers understand that crop rotation aims to improve the production and maintain soil fertility. The details of knowledge of farmers about the rotation of plants can be seen in Figure 3.

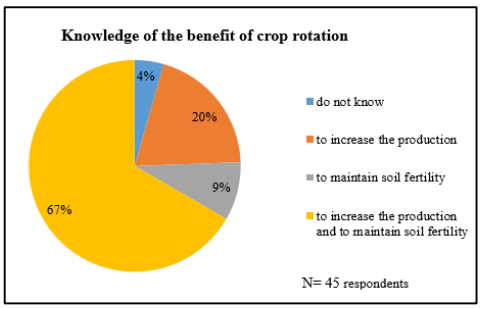

Figure 3. Knowledge Of Farmers About The Rotation Of Plants

Farmer's knowledge of the making of terraces relates to patio benefits understanding. Of the 45 respondents, there were 5 (11%) farmers who do not know the benefits of the patio, 4 (9%) farmers are know the benefits to prevent the erosion, 5 (11%) farmers know the benefits to prevent the landslide, and 31 (69%) farmers know the prevent the erosion and landslide.

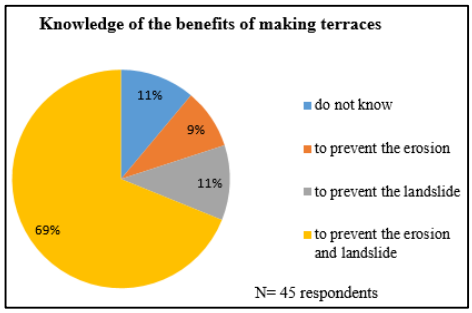

Figure 4. Knowledge Of The Benefits Of Making Terraces

The terrace is a mechanical conservation to reduce soil erosion. Based on the observation, the bench terrace is a form of terrace that is widely encountered in the Tlahap agroforestry land. The form of the terrace on Tlahap agroforestry area is as in Figure 5.

Figure 5. The Form Of The Terrace On Tlahap Agroforestry Area

3.2 The conservation practices of Tlahap agroforestry farmers

Tlahap agroforestry is a combination of agricultural and forestry systems, the plants developed in Tlahap agroforestry are coffee, seasonal cultivation plants, and forestry plants that use the alley cropping model as in Figure 6.

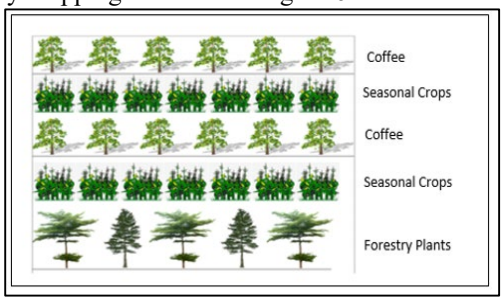

Figure 6. Alley Cropping System In Tlahap Agroforestry

Besides coffee there are also hard plants or forestry plants planted on land. From 45 farmers, data obtained that all farmers planted forestry crops or hard crops between the 1-4 species of trees. Figure 7 explains the types of forestry plants planted by respondents farmer on land. There are 19 people or 42% of respondents planted one type of forestry plant, 20 people or 45% planted two types of forestry plants, and six people or 13% planted more than two types of forestry plants.

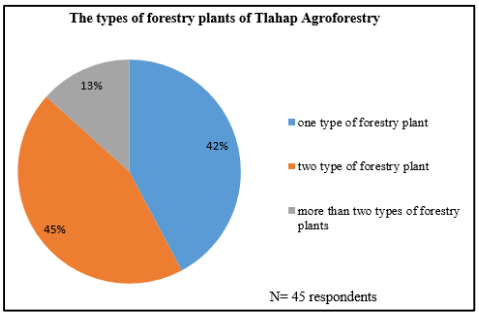

Figure 7. The Types Of Forestry Plants Of Tlahap Agroforestry

The Tlahap agroforestry farmers also carried out forest conservation practices with the arrangement of crop cycles and crop rotation in an annual period. The planting cycle in agroforestry Tlahap uses the standard of dry and rainy seasons in principle. This activity starts from the selection of crop types and planting cycles, setting planting distances, adjusting planting time while maintaining the aspect of silviculture without compromising the function and benefits of existing land resources. The development of planting patterns in Tlahap agroforestry is carried out by farmers themselves as needed, because the land that is cultivated is self-owned land. In a year, in the rainy season and drought are developed different types of plants. There are three planting time in one year, where farmers will usually cultivate the land to be cultivated with various plants. The practice of planting cycles and crop rotation can be seen in Figure 8.

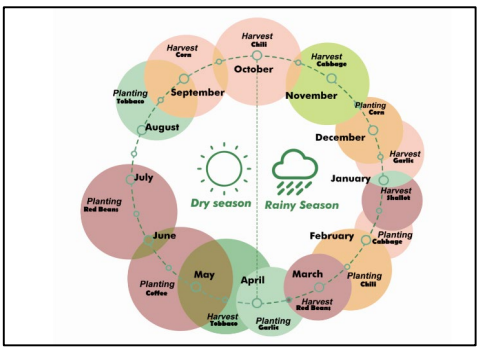

Figure 8. Cycles Of Planting And Crop Rotation In Tlahap Agroforestry

3.3 The Attitude Of Tlahap Agroforestry Farmers

Attitudes become an important part in the implementation of conservation in the agroforestry Tlahap. Attitudes can be embodied in actions if conditions support. Based on the results of the study, data that there is 1 (2%) farmers who disagree with agroforestry Tlahap, 2 (5%) hesitant, and 42 (93%) farmers agree with agroforestry Tlahap. The attitude of Tlahap agroforestry farmers to forest conservation is depicted in Figure 9.

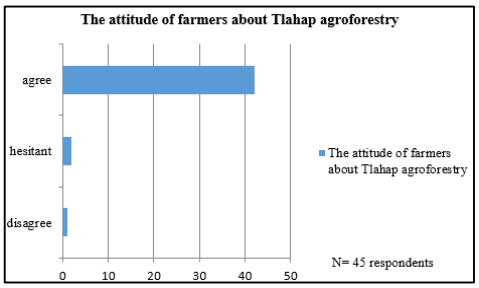

Figure 9. The Attitude Of Tlahap Agroforestry Farmers To Forest Conservation

In the implementation, farmers in Tlahap agroforestry have already implemented a method of forest conservation. These conservation methods include vegetative, mechanical, and chemical conservation. Forest conservation education by farmers in Tlahap agroforestry refers to three principles, namely:

a. Conservation

Conservation becomes the most important part of the implementation of the agroforestry Tlahap, because the idea of agroforestry Tlahap is the destruction of forest land on the slopes of Mount Sindoro. Forest conservation can be realized through the farming based conservation approach. It is applied to the agroforestry Tlahap. The approach is to promote the values of forest conservation without leaving the economic benefits to local communities. It needs to be a thorough understanding of a safe farming effort for the environment and local communities. And the agroforestry Tlahap has applied it.

b. Diversification

Diversification in agriculture is a multicultural farmer effort that allows several types of plants to be planted at once in the same time and place. Tlahap Agroforestry adopted the principle of diversification in its implementation. Several types of plants are planted on land with an effort to increase farmers ' income, without leaving conservation values. The main plant that once was tobacco, has now begun to combine with coffee, hard crops, and a short-lived cultivation plant.

c. Maximization

The maximization principle in Tlahap agroforestry is related to the utilization of Farmer's business opportunity effectively with arrangement of planting pattern, harvesting time, planting of crop seedlings, and making fertilizer independently of the processing of crops. Maximization also translates to maximum utilization of land, without allowing a waste of land, therefore in maximization also run the principle of diversification because land will always be filled with plants, so advantage can be taken.

IV. CONCLUSION

The implementation of agroforestry Tlahap has entered the 20th year. During this time there have been changes in the ordinance of farming of Tlahap village community, from monoculture to multicultural. Tlahap Agroforestry is also gradually implementing methods of vegetative, mechanical, and chemical conservation. The management of land undertaken by farmers in Tlahap agroforestry can provide alternative improvement of soil quality and improve the welfare of farmers. Tlahap Agroforestry needs to be introduced to people in other areas by training or workshop. The expectation of Tlahap agroforestry can be applied in other areas to reduce land degradation and improve the welfare of farmers without changing the existing ecosystem structure, because basically, sustainable development in the field of agriculture is an agricultural business activities involving many aspects with different backgrounds and motifs, from the aspects of social, cultural, economic, and environment. The alignment of all these things will create conditions that support the implementation of agricultural activities in the community. Thus, the Tlahap agroforestry became a forest conservation education through the development of conservation, diversification, and maximization principles.

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