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Community preference on agroforestry systems at post-mining revegetation land at PT Arutmin Tambang Asam-asam, South Kalimantan

Muhammad Yusuf*[1], Hafizianor[2], Mahrus Aryadi[2]

[1]*Student of Master Program of Forestry Science Postgraduate Program, Lambung Mangkurat University, South Kalimantan, Indonesia*

[2]*Forestry Science Postgraduate Program of Lambung Mangkurat University, South Kalimantan, Indonesia*

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Abstract

During this time, land reclamation by means of revegetation so that plants can live on post-mining land finds obstacles in its implementation, including technical, social, expensive and long time problems. One of the ways is to formulate a post-mining land revegetation model effectively and efficiently (Kustiawan, 2001). Land use with agroforestry systems is a combination of tree crops that have an economic and ecological role with seasonal plants or other types of plants. The object of this research is the PT Arutmin Indonesia. Tambang Asam-asam coal mining area which has been and is currently conducting post-mining revegetation activities. The concept of land revegetation patterns after the coal mine that will be formulated is a reference for local government policies in utilizing natural resources, especially land that has been damaged. Community preferences are obtained by conducting interviews and using questionnaires to respondents. The number of respondents from the community was carried out by purposive sampling (Sugiyono. 2007). The chosen community is the head of the family with the livelihood of farming and gardening located in the area closest to the company's operations. Community preferences analyzed included community expectations for groups of plant species, main types of plants and types of herbaceous plants and supporting plants. Public preference for agroforestry systems that can be developed in post-mining revegetation lands is 60% of the plants that are expected to be in agroforestry areas are timber-producing plants, 50% want rubber as the main crop in the agroforestry area, 70% choose turmeric as an herbaceous plant It is expected to be planted in post-mining areas, while 80% want ginger as a supporting plant that is expected to be planted in post-mining areas based on agroforestry.

***Corresponding Author:** Muhammad Yusuf ✉ myusuf@arutmin.com

Introduction

The main problem in post-mining land is environmental changes that affect conditions in groundwater and surface water, then morphologically and topically change land (Suprapto, 2008). The problem of post-mining land rehabilitation is complicated, because it involves costs and time and special expertise is needed. Land reclamation activities combine the work of vegetation management to create a sustainable natural environment and the economy of the community remains good (Lubis, 1997). Until now there is still little research on the use of reclaimed land by coal mining companies to improve the welfare of communities around the mine.

One way to overcome the obstacles as described above is to formulate effective and efficient post-mining land revegetation models. The revegetation model is based on agroforestry (Kustiawan, 2001). Agroforestry systems have great potential both in terms of ecology and economics. This system is beneficial for the management of water and soil in the surrounding environment because there are various types of plants with different canopy strata with their respective functions, as well as the biodiversity of plants that become habitats for animals. Besides that it is beneficial for people around the mine area because the community can periodically harvest the results of intercropping before and after the main crops produce products that can be harvested.

According to Foresta, et.al. (2000), land use with agroforestry systems is a combination of tree crops that have an important economic role or have an ecological role (such as coconut, rubber, cloves, cashew or tree crops) with seasonal crops (such as corn, rice, nuts, vegetables) or other types of plants (such as bananas, coffee, chocolate) are simple agroforestry systems. In addition, the types of plants chosen are directed to native plants. It is better to choose local plants that are in accordance with the current climate and soil conditions (Qomariah, 2003).

The basis of this research is the effort to recover post-mining land which is a production forest area in order to be able to function again through the agroforestry system by exploring preferences for the return of the function of agroforestry-based production forest areas. This research was conducted at PT. Arutmin Indonesia Tambang Asam Asam, South Kalimantan which is a company that has implemented post-mining revegetation implementation. Efforts to restore the condition of post-mining land to be productive are expected to be maximally beneficial for human needs and the environment in a sustainable manner.

Materials and methods

Materials

The object of this study is the location of revegetation land after PT. Arutmin Indonesia Mine Asam-asam which is engaged in coal mining in Jorong District, Tanah Laut Regency, South Kalimantan Province. Preference is aimed at farmers who have an interest in the post-mining land of PT Arutmin Indonesia Tambang Asam-asam. The study was conducted from May to September 2016.

Methods

Community preference is obtained by conducting interviews and using questionnaires to respondents. The number of respondents from the community was carried out by purposive sampling (Sugiyono. 2007). The chosen community is 10 heads of households with their livelihoods in farming and gardening who are in the area closest to the company's operations. Community preferences analyzed included community expectations for groups of plant species, main types of plants, and types of herbaceous plants and supporting plants. This is used as an indicator of the suitability of plant species to be adopted in the revegetation area as an agroforestry system that they can manage on post-mining land.

Results and discussion

The people who become respondents generally have a good enough understanding to know the contents of the questions so that they can communicate easily and directed according to the purpose. Although most respondents have a livelihood from the monoculture farmers sector, from the results of the questionnaire they have the desire to be directly involved in

agroforestry-based post-mining revegetation activities at PT Arutmin Indonesia Tambang Asam-asam (Fig. 1). Based on the results of questionnaires and interviews with the community, respondents expect the PT Arutmin Indonesia Reclamation Area of Asam-asam Mine to be used as a plantation area for sap-producing, fruit-producing, and timber-producing plants. The results of community preferences are presented in Table 1. Sap-producing plants are the most dominant community expectation and as the main commodity because the results can be utilized continuously for a longer period, while fruit-producing plants are expected to be in the plantation area for self-consumption and partly for resale. The types of plants that are of interest to the community are shown in the main types of plants expected for the reclamation area are types of rubber (*Hevea brasilliensis* Willd), acacia (*Acacia mangium*), sengon (*Albizia chinensis*), and sawit (*Elaeis guineensis* Jacq). As many as 50% of respondents expect the type of karet (*Hevea brasilliensis* Willd) as the main crop on reclaimed land, if viewed from the surrounding area (which is not a mining area) it is indeed a rubber plantation area. There were also expectations of the people for planting *Acacia mangium* (30% of respondents), *Albizia chinensis* and *Elaeis guineensis* Jacq (10% of respondents) (Fig. 3).

Table 1. Community Preferences.

No	Parameter	Criteria	Preference (Respondents)	%
1.	What kind of plant species do you expect in the agroforestry area?	a. Fruit-producing plants	1	10
		b. Plant producing wood	5	50
		c. Sap-producing plants	4	40
2	What are the main types of plants that are of hope in agroforestry areas?	a. Karet (*Hevea brasilliensis* Willd)	4	40
		b. Akasia (*Acacia mangium*)		
		c. Sengon (*Parasareanthes falcataria*)	2	20
		d. Sawit (*Elaeis guineensis* Jacq)	3	30
			1	10
3	What types of herbal plants are expected to be planted in post-mining areas?	a. Kunyit (*Curcuma longa*)	7	70
		b. Jahe (*Zingiber officinale*)	3	30
		c. Kumis kucing (*Orthosiphon aristatus*)	0	0
		d. Temulawak (*Curcuma zanthorrhiza*)	0	0
4.	What types of supporting / complementary plants are the hope in the agroforestry area?	a. Salak (*Salacca zalacca*)	0	0
		b. Kapulaga (*Amomum compactum*)	0	0
		c. Jahe (*Zingiber officinale*)	8	80
		d. Lainnya	2	20

Source: Results of Community Data Collection (2016).

Fig. 1. Retrieval of community preference data.

The form of reclamation land use is not only on the main crop, but offered by the herbaceous concept of agroforestry or intercropping so that the community gets the annual production of land from agroforestry crops. The results of the questionnaire showed that 80% of respondents agreed with the concept of agroforestry. Other types of herbaceous plants from the main crops of agroforestry which are the people's expectations are kunyit (*Curcuma longa*) (70% of respondents) and jahe (*Zingiber officinale*) (30% of respondents), while kumis kucing (*Orthosiphon aristatus*), temulawak (*Curcuma zanthorrhiza*), and others by 0% (Fig. 4). Community preference for the types of supporting plants that are expected to be planted in post-mining areas based on agroforestry are *Zingiber officinale* (80%), salak (*Salacca zalacca*)

(0%), kapulaga (*Amomum compactum*) (0%), and other plants namely gaharu (*Aquilaria malaccensis*) and padi (*Oryza sativa*) (20%) (Fig. 5). Most people prefer *Zingiber officinale* plants, this shows that there is good support from local farmers to be involved in agroforestry-based post-mining revegetation.

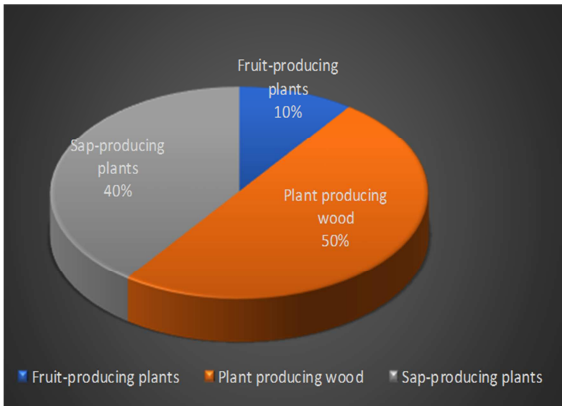

Fig. 2. Diagram of community preferences about the types of plants expected in agroforestry.

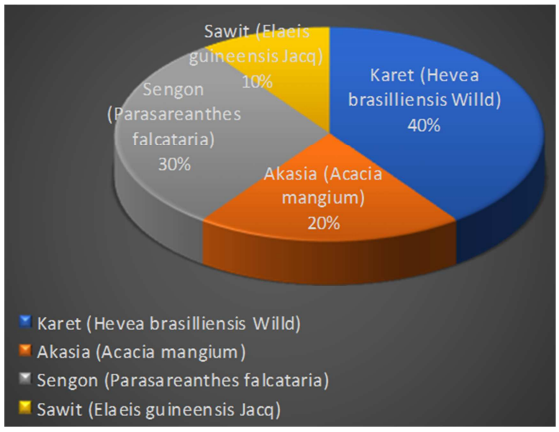

Fig. 3. Diagram of community preferences for the main types of plants that are expected in agroforestry areas.

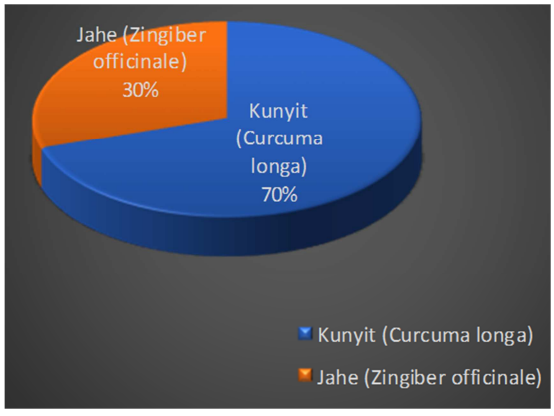

Fig. 4. Community preference diagrams of herbaceous plants that are expected to be planted in post-mining areas.

With this preference from the community, this form of post-mining land use will be able to support each stakeholder. The commodities selected for the implementation of the post-mining program into agroforestry areas will be directed to commodities that are the people's expectations and commodities that are common in the surrounding area. The main commodity is *Hevea brasilliensis* Willd, while other plants act as intercropping plants, namely Curcuma longa and Zingiber officinale.

Conclusion

Community preference for agroforestry systems that can be developed in post-mining revegetation land is 60% of the plants that are expected to be in agroforestry areas are timber-producing plants, 50% want *Hevea brasilliensis* Willd as the main crop in agroforestry areas, 70% choose *Curcuma longa* as Herbaceous plants are expected to be planted in post-mining areas, while 80% want *Zingiber officinale* plants as supporting plants that are expected to be planted in post-mining areas based on agroforestry.

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