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Evaluating the Success of Watershed Rehabilitation Efforts in Gowa Regency: A Case Study on Forest and Land Restoration

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The Ministry of Environment and Forestry designates forest and land rehabilitation (RHL) initiatives as a top priority in national policies. Forest and land rehabilitation refers to the deliberate actions taken to restore, preserve, and enhance the functionality of forests and land. Therefore, this study is to assess the viability of cultivating RHL plants. The methodology employed is the observation approach, which entails gathering data firsthand at the specific site. Plant area measurements are conducted on the physical planting area, quantified in hectares, and then compared to the intended plant area as specified in the design. Plant evaluation and assessment is conducted using the Systematic Sampling with Random Start approach, which involves randomly selecting the first measurement plot and then systematically selecting successive measuring plots. The sampling utilised a 5% interval. Rectangular measurement plots are formed with dimensions of 40 meters by 25 meters, resulting in an area of 0.1 hectares. The number of measuring plots can be determined by multiplying the percentage of interest (5%) by the plot area (in hectares) and then dividing by the area of each measuring plot (in hectares). This calculation results in a total of 43 measuring plots. The research findings indicate that the success rate of plant development varies between 76.33% and 77.17%, with an average value of 76.62%.

Keywords: Forest and land rehabilitation, Growing Success, Plants

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1. Introduction

Indonesia's forest areas have an important role in efforts to mitigate and adapt to climate change and global warming, and play an important role in maintaining global climate balance by providing environmental services in the form of absorbing emissions and increasing carbon stocks from existing forests. Indonesia's forests covering an area of 130.68 million ha (RKTN 2011-2030) are believed to be capable of absorbing carbon emissions significantly. The existence of forests is very important in maintaining the survival of living creatures and other ecosystems on earth. Forest ecosystems not only provide shelter for various species of flora and fauna, but the presence of forests is also a source of meeting the needs of all living creatures.

Forest area in Indonesia continues to decline over the years. The rate of deforestation is a source of problems, not only in Indonesia but also globally in the world. However, the Government continues to make efforts to reduce the rate of deforestation.

Based on data from the Ministry of Environment and Forestry (KLHK), Indonesia has reduced the rate of deforestation in the 2018-2019 period by 75.03% from 462.46 thousand ha to 115,460 ha in the 2019-2020 period (Nakita and Najicha, 2022). However, the problems of deforestation, degradation and forest and land fires that occur in Indonesia are also a source of carbon emissions because they can release carbon dioxide (CO^2), which can cause a greenhouse effect.

Currently, the area of critical land in Indonesia continues to decline. Based on data from the Ministry of Environment and Forestry, in 2018 the area of critical land was recorded at 14.01 million ha. However, in 2009 the area of critical land was recorded at 30.1 million ha and in 2014 it was recorded at 27.2 million ha. One effort to overcome climate change and global warming, as well as restore the condition of critical forests and land, can be done by planting trees through Forest and Land Rehabilitation (RHL) activities. Forest and land rehabilitation is an effort to restore, maintain and improve the function of forests and land so that their carrying capacity, productivity and role in supporting life support systems are maintained (Setiawan et al., 2020).

2. Method

The plant plot specified in the activity plan as 84 ha is the unit used in the assessment or evaluation of Priority Watershed Forest and Land Rehabilitation (RHL) planting activities (P0) in Erelembang Hamlet, Erelembang Village, Tombolo Pao District, Gowa Regency. Plant assessment or evaluation includes: (1) measuring plant area, (2) number and type of plants, and (3) calculating percent plant growth.

Plant area measurements are carried out on the actual planting area expressed in terms of the planted area in hectares and compared to the planned plant area according to the design. Plant evaluation/assessment is carried out using a sampling technique using the Systematic Sampling with Random Start method, namely the first measuring plot is made randomly and subsequent measuring plots are made systematically. Where is Intensity The sampling (IS) used was 5%. Creation of rectangular measuring plots with dimensions of 40 m x 25 m or an area of 0.1 ha. The number of measuring plots can be calculated by multiplying the number of IS (5%) by the plot area (ha) then dividing by the measuring plot area (ha), so the number of measuring plots created is 43 measuring.

Table 1. Recapitulation of the number of measuring plots for priority RHL watershed plant assessment (P0) in Malenteng Hamlet**.**

No	Regency	Subdistrict	Village	Location	Plot	Area (Ha)	Number of Measuring Plots
1.	Gowa	Tombolo Pao	Erelembang	Malenteng	1	30	15
					2	25	13
					3	29	15
Amount					**3**	**84**	**43**

Source: BPDASHL Jeneberang-Saddang, 2021

The Ministry of Environment and Forestry places RHL activities as one of the national priority policies. This policy is very relevant to the problems faced by regions (provinces and districts/cities) related to environmental degradation, including damage to forests and land and reduced environmental quality which can cause floods, landslides, high levels of abrasion and global warming. BPDASHL Jeneberang-Saddang as one of the Technical Implementation Units (UPT) of the Ministry of Environment and Forestry in 2021 is targeted to carry out activities to create Priority DAS RHL plants covering an area of 2,500 ha. This Priority DAS RHL activity is carried out in four districts, namely Barru Regency, Enrekang Regency, Gowa Regency and Bone Regency. Malenteng Hamlet, located in Erelembang Village, Kuncio Pao District, is one of the locations for Priority DAS RHL activities in Gowa Regency.

In relation to the above, to determine the success of the 2021 Priority DAS RHL planting activities (P0) in Erelembang Hamlet, Erelembang Village, Tombolo Pao District, Gowa Regency, it is necessary to assess or evaluate the plants resulting from the Priority DAS RHL planting activities (P0) in 2021.

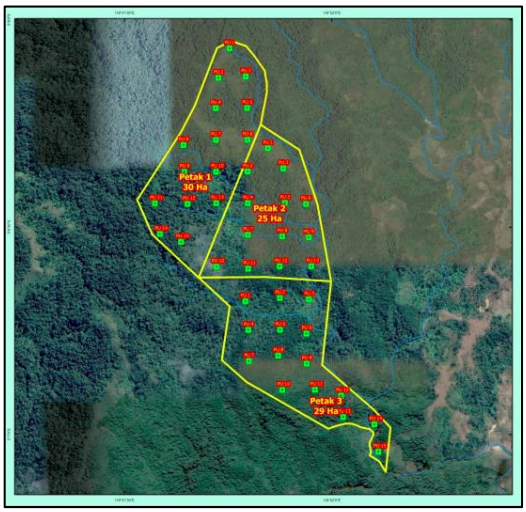


Figure 1. Plant assessment measuring plots in the RHL area of the Priority Watershed for Plant Making Activities (P0) in Malenteng Hamlet.

The criteria used refer to the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia No. 23 of 2021, with acceptable (successful) criteria if the number of plants at the end of the year of

RHL DAS Prioritas (P0) plant creation activities has a plant growth percentage of ≥75%. If the percent grows <75% then it is unacceptable (unsuccessful). On the basis of the reference as described previously, a sampling frame was built containing information on the number of assessment measuring plots in each measurement plot with recapitulation, as follows:

3. Result and Discussion

1) Planting Area

The activity of measuring the size of the planting area is carried out by measuring the plant area against the actual plant area expressed in terms of the area planted in hectares and comparing it with the planned plant area according to the design. Plant area measurements are carried out by mapping the planted plots using GPS, drones and other measuring tools. The results of measuring the plant area for each plot in Malenteng Hamlet, Erelembang Village, Kuncio Pao District, Gowa Regency are presented in Table 2.

Table 2. Recapitulation of the results of measuring plant area in each plot/planting location in Malenteng Hamlet.

No.	Planting Location (Plot)	Plant Area		
		Plan (Ha)	Realization	
			(Ha)	%
1.	Plot 1	30	30	100
2.	Plot 2	25	25	100
3.	Plot 3	29	29	100
Amount		**84**	**84**	**100**

Source: BPDASHL Jeneberang-Saddang, 2021

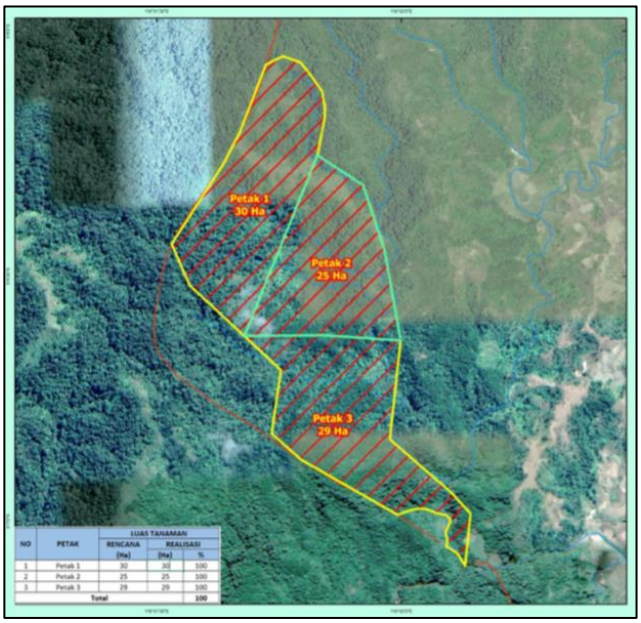


Figure 2. Map of the results of measuring plant area in each plot/planting location in Malenteng Hamlet.

Based on Table 2 and Figure 2, it can be seen that in the forest and land rehabilitation area in Malenteng Hamlet, planting activities have been carried out for all plots with the realization of activities reaching 100% with a planting area of 84 ha. This planting activity is carried out at the first rainy season at the beginning of the year or at the beginning of the rainy season at the end of the year. This is done so that the plants' water needs are met so they can grow well in the field. Planting in the field is carried out by making planting holes, installing stakes, making plant plates, distributing seeds and planting. This activity is carried out by the activity implementer (vendor) by involving local communities or farmer groups in carrying out RHL activities. The success of farmer groups is measured by the level of community participation which is assessed through community involvement in various activity programs, such as participation in planning, implementation and evaluation of these activities (Hermawan, et al. 2016).

2) Number and Type of Plants

The results of selecting the types of plants used in this RHL activity are the implementation of participatory planning that was carried out before this activity took place. The aim of implementing participatory planning is to accommodate community needs, thereby providing encouragement or enthusiasm to innovate in planting activities. In general, the types of seeds used in RHL activities consist of two types, namely wood types and non-timber forest product types (NTFPs). Plant types can be seen in Table 3.

Based on Table 3, it can be seen that the types and number of plants provided in RHL activities in Malenteng Hamlet consist of five types of plants with a total of 36,960 plants including embroidery plants (10%). The target number of seeds planted is 400 stems/ha. Pine trees have a greater number of woody plants compared to other types, because the location of RHL activities is in a high altitude area and is dominated by pine stands. The number of pine plants planted at the RHL location is 22,000, while the number of eucalyptus and suren plants is 2,200. MPTS plant type (Multi Purpose Tree The species planted are nutmeg and avocado. Minister of Forestry Regulation number P88 of 2014 multi-purpose trees (MPTS) are woody plants whose fruit, sap, leaves and bark can be used for people's livelihoods.

According to Indriyanto and Asmarahman (2022), MPTS plants are woody plants that are multipurpose because they are beneficial from an ecological and economic perspective, and produce wood and non-wood commodities, so that cultivating farmers can utilize non-wood commodities from MPTS plants that have been produced. planted without cutting down trees. The selection of forest and land rehabilitation plant types in the Malenteng Hamlet block also adapts to local ecological conditions and community needs.

Table 3. Types of RHL plants in Malenteng Hamlet

No.	Plant Name	Plant Groups	Plant Type	Number of Seeds (Trunk)
1.	Pine (*Pinus merkusii*)	Jungle Wood	Wood	22,000
2.	Eucalyptus (*Eucalyptus sp*.)	Jungle Wood	Wood	2,200
3.	Suren (*Toona sureni*)	Jungle Wood	Wood	2,200
4.	Nutmeg (*Myristica fragnas*)	MPTS	HHBK	10,340
5.	Avocado (*Persea americana*)	MPTS	HHBK	220
Overall Plant Total				**36,960**

Source: BPDASHL Jeneberang-Saddang, 2021

3) Plant Growth Percentage

Percent plant growth is calculated by comparing the number of plants in a measuring plot with the number of plants that should be in the measuring plot. The average percent of plant growth for each RHL location plot in Malenteng Hamlet can be seen in Table 4.

Table 4. Percentage of RHL plant growth in Malenteng Hamlet

No.	Plot Name	Number of Measuring Plots (PU)	Percent Plant Growth (%)	Criteria
1.	Plot 1	15	76.33	Succeed
2.	Plot 2	13	76.35	Succeed
3.	Plot 3	15	77.17	Succeed

Source: Plant assessment results, 2021

Table 4 shows that the average percentage of plant growth ranges from 76.33 – 77.17%. Where plot 3 with a planting area of 29 ha with a total of 15 PU had the highest percentage with a value of 77.17%, while the lowest growth percentage was in plot 1 with a planting area of 30 ha with a value of 76.33%. These results indicate that the success rate for growing RHL plants in Malenteng Hamlet is said to be successful (acceptable) for each planting plot because the percentage of plant growth is at ≥75%. The success of growing plants is greatly influenced by the conditions of the growing place or conditions in the planting plot/location such as land physiology, the condition of the undergrowth, soil conditions, as well as pests and disease. The soil conditions in each plot are fertile and the undergrowth conditions are moderate to dense. In plant areas that have dense undergrowth, it is necessary to carry out weeding activities so that the main plants can grow well in the field. Apart from that, the success of forest and land rehabilitation activities in Malenteng Hamlet cannot be separated from the contribution or involvement/participation of the local community in these activities such as clearing land, clearing land, making planting holes, distributing seeds and planting, as well as plant maintenance activities in the form of weeding, replanting, fertilization and eradication of pests and diseases.

Nawir et al. (2008) stated that the involvement of local communities should be a stimulus for community participation and a driver for the success of forest rehabilitation. According to Njurumana et al. (2010) forest and land rehabilitation activities have an important role in increasing the beneficial value of environmental services in supporting farming activities and restoring soil fertility.

Figure 3 above shows the condition of live and healthy plants in the planting location area. Initial maintenance and follow-up maintenance activities need to be carried out periodically so that the plants continue to grow healthily and receive adequate nutrition in the growth process, and there needs to be protection and safeguards against disturbances from pests or diseases that can damage and cause death of the main plant. According to Wahyudin (2014), RHL plant maintenance activities take the form of replanting dead reforestation plants, freeing plants from pests and increasing planting fertility through watering and fertilizing activities.



Figure 3. Condition of RHL Plants in Malenteng Hamlet

Plant maintenance activities are carried out until the plants are 3 years old, starting from initial maintenance (P0), first year maintenance (P1), to second year maintenance (P2). Plant maintenance needs to be carried out gradually and continuously at least 2 – 3 times a year. In order for plants to grow healthily, maintenance activities need to be carried out 2 – 3 times a year. These maintenance activities include replanting, weeding, watering, fertilizing, and eradicating pests and diseases. Plant maintenance is an activity to maintain, secure and improve the quality of plants resulting from forest and land rehabilitation activities, reforestation of plant types and plant enrichment (Pertiwi et al., 2016).

4. Conclusion

The success of growing plants is greatly influenced by the conditions of the growing place or conditions in the planting plot/location such as land physiology, the condition of the undergrowth, soil conditions, as

well as pests and disease. Apart from that, choosing the right type of plant also greatly determines the success of forest and land reforestation activities. In the social aspect, community involvement in vegetative forest and land rehabilitation activities is also one of the keys to the success of a reforestation activity. Community involvement in Malenteng Hamlet has been carried out in terms of participatory planning, one of the activities being involvement in determining the location and selecting types of NTFP plants. Apart from that, the people of Malenteng Hamlet are also involved in management activities starting from land clearing activities, making planting holes, distributing seeds and planting, as well as plant maintenance activities.

The study emphasises that the organised participation of local communities in Malenteng Hamlet has been quite crucial in attaining a significantly high success rate in plant development, above the acceptable threshold for average growth rate. This partnership not only encourages the implementation of environmentally friendly methods in forestry but also empowers the local population by improving their abilities and offering economic prospects. The project's success highlights the significance of integrating scientific methodologies with community involvement to effectively tackle environmental concerns. These coordinated endeavours are essential for guaranteeing the enduring viability of rehabilitation initiatives, promoting environmental preservation, and improving the well-being of local people.

5. Author Contributions

The first and second authors contributed to the writing and conceptual design; the third and fourth authors assisted in data analysis and tabulation; and the fifth and sixth authors contributed to the writing and conceptual design.

6. Completing Interests

The authors declare that there is no conflict of interest in doing this research.

7. Acknowledgements

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8. References

Hermawan, Y. Sulastri, S., Kusumawardani, Niniek D. (2016). Success of Farmer Groups in Forest and Land Rehabilitation Programs. Forest Resource Conservation. *Journal of Forestry Science, 1*(1), 61-68.

Indriyanto and Asmarahman, C. (2019). Types of plants that make up stands as a food source in the KPPH Sumber Agung Joint Farmers Cultivation Area in the Wan Abdul Rachman Grand Forest Park. PBI 25 National Seminar on Biology. University of Lampung. Pages 1-11.

Nakita, C. and Fatma, U., N. (2022). The Effects of Deforestation and Efforts to Preserve Forests in Indonesia. *Ius Civile Journal (Reflections on Law Enforcement and Justice). 6*(1), 2022. Page 93.

Nawir, AA, Murniati, Ramboko, L. (2008). *Where will forest rehabilitation in Indonesia go after more than three decades?* CIFOR. Bogor. Page 283.

Njurumana, ND, Gerson, Dwi, P., Budiyanto. (2010). Lende Ura, A Community Initiative in Forest and Land Rehabilitation in Southwest Sumba. *Journal of Forestry Policy Analysis. 7*(2): 98-99.

Regulation of the Minister of Forestry of the Republic of Indonesia. (2014). Minister of Forestry Regulation Number P.88/Menhut-II/2014 concerning Community Forests. Ministry of Forestry. Jakarta.

Regulation of the Minister of Environment and Forestry. (2021). Minister of Environment and Forestry Regulation Number 23 of 2021 concerning Implementation of Forest and Land Rehabilitation. Ministry of Environment and Forestry. Jakarta.

Pertiwi, R. S. and Marta, A. (2016). *Rehabilitation of the Peranap District Forest by the Indragini Hulu District Forestry Service in 2014 – 2015*. Online Journal for Students of the Faculty of Social and Political Sciences. Riau University.

Setiawan, B., Firdaus, R., Idris, MH. (2020). Evaluation of Post-Disaster Conventional Forest and Land Rehabilitation Activities at the Maria Donggomasa Forest Management Unit Center, Bima Regency. *Sangkareang Mataram Journal. 6*(1): 22-28.

Wahyudin, J. (2014). Guidebook for Forest and Land Rehabilitation in Mount Merbabu National Park 2014. Mount Merbabu National Park. Boyolali. Page 11.

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