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Determination of the Type of Multy Purpose Tree Species (MPTS) Plant Featured in the Area of Community Forest (HKm) Central Lombok

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ABSTRACT

This study aims to: (1) identify the types of existing MPTS plants in the HKm area, and (2) determine the featured MPTS plants in HKm areas. This research was carried out in the HKm area of North Batukliang District, Central Lombok Regency. Data and information collection was carried out through: interviews with 30 samples, in-depth interviews, document tracing, and observations. Data analysis was performed with Process Hierarchy Analysis (AHP). The results of the study are: (1) The dominant types of MPTS planted by the community in the HKm area of North Batukliang, Central Lombok are: durian, banana, coffee, cocoa, jackfruit, rambutan, avocado, mangosteen; and (2) The featured MPTS plants that can be developed in the HKm North Batukliang area of Central Lombok from in order as follows: durian, banana, coffee, cocoa, avocado, jackfruit, rambutan, and mangosteen. It is recommended that the government or other parties support the provision of quality plant seeds, especially for the five priority MPTS plant types.

1. INTRODUCTION

The community forestry program (HKm) raises new hope for the community around the forest area for a better future [1-3]. The community has the opportunity to plant seasonal crops among forest so that it will increase the income of farmers' households [4-6]. With the existence of HKm, it is hoped that the welfare of local communities can increase through the optimal, fair and sustainable use of forest resources while maintaining the sustainability of forest and environmental functions [7-11].

In West Nusa Tenggara (WNT) Province, the establishment of HKm began in 1995/1996 with reference to the Decree of the Minister of Forestry Nomor 622 /Kpts-II/1995. The WNT Provincial Government has had a legal umbrella for the development of HKm by issuing the Regional Regulation (Perda) No. 6 of 2004 concerning Guidelines for the Implementation of Community Forests in West Nusa Tenggara Province. Similarly, Central Lombok Regency of WNT Province has also issued Perda No. 4 of 2009 concerning the Implementation of HKm [12].

The development of the HKm program in the protected forest area of North Batukliang District, Center Lombok Regency began in 1999. However, the governance of the HKm area could not run well so its performance was low [4]. One of the reasons is poor program planning, a factor that is also found in other areas of Indonesia and in other countries [13-23].

The development of HKm in North Batukliang District, Central Lombok Regency cannot be separated from the attention and participation of the parties. Efforts were made in the communication of the parties or stakeholders starting with PAR Rinjani, which then several Non-Governmental Organizations (NGOs) followed up in facilitating the acceleration of licensing for the North Batukliang IUPHKm, Central Lombok Regency. The involvement of NGOs, such as SAMANTA, TRANSFORM, YKSSI, GUMPAR has contributed greatly to the development of HKm in this area [10, 12, 24, 25].

One of the programs aimed to improve the welfare of the community (especially HKm managers) is the development of MPTS (Multi Purpose Tree Species) plants. MPTS is a land management system where various types of wood are grown and managed, not only to produce wood, but also leaves and fruits that can be used as food or animal feed. The HKm program has made a positive contribution to improving the welfare of the people around the forest (especially HKm management farmers) [9].

However, the HKm program is still felt to have not been able to show optimal results, especially in an effort to improve the welfare of the people around the forest. One of the factors that are suspected to be the cause is that the type of MPTS plant developed is not based on the advantages of each type of plant. On the basis of that consideration, the research entitled "Determination of MPTS Plant Types Priority Excellence in Central Lombok Community Forest Area (HKm) needs to be done. The objectives of this study are: (1) to identify the type of MPTS plant existed in the HKm area of North Batukliang, and (2) to dtermine the priority of feartured MPTS plants in the HKm area of North Batukliang District of Central Lombok.

2. METHODS

This research uses descriptive methods. This study only explores data/information related to the development of MPTS

plants in HKm area. Furthermore, a systematic, factual and accurate description of the facts, properties and relationships between the phenomena studied [26].

This research was carried out in the HKm area of North Batukliang District, Central Lombok Regency, namely: Lantan Village, Karang Sidemen Village, Aik Berik Village, and Setiling Village. The collection of data and information was carried out using interview, in-depth interview, document tracing, and observation. The number of samples was set in quota as many as 30 households.

Furthermore, to determine the priority of MPTS plant, a Process Hierarchy Analysis (AHP) was carried out. There are 7 (seven) criteria that were taken into consideration in determining priority MPTS plants, namely: (1) economic benefits obtained, (2) production grace periods, (3) ease of maintenance, (4) opportunities/market demands on production, (5) negative influences on understory plants, (6) resistance to disease, and (7) length productive period.

The determination of these seven criteria was adjusted to the target of HKm development, namely improving the economy of farmer families (HKm managers) while maintaining the sustainability of the functions and carrying capacity of the forest (ecological and economic considerations). Furthermore, these seven criteria are comprehensively used as the basis for the selection of priority MPTS plants, where the weight of each criterion is determined based on the consideration of competent experts.

More about the design and structure of Process Hierarchy Analysis (AHP) for the selection of priority MPTS plants in the HKm area is presented in Figure 1.

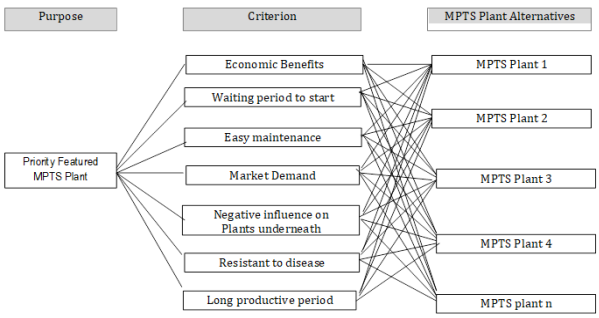

Figure 1. Process Hierarchy Analysis Structure (AHP) for determination of MPTS Plant featured in HKm Kec. Batukliang Area north of Central Lombok

Priority Excellence in HKm Kec. Batukliang Area north of Central Lombok.

To produce priority flagship MPTS plants, expert assessment is required through in-person interview techniques with experts. Assessment of the elements involved in the analysis using a comparison scale in pairs with assessments as in Table 1 [27, 28].

The stages of the Analytic Hierarchy Process (AHP) calculation process are as follows [29-33]:

(1) Establish a hierarchy of problems;

(2) Create a paired comparison matrix;

(3) Determine the overall priority value (TPV) by summing the values of each column and dividing it by the number of columns;

(4) Check consistency ratio (CR) consistency with the following steps:

a. Determines the average value (λ max) with the formula:

$$\lambda_{max} = \frac{(\lambda_{max}K_1 + \lambda_{max}K_2 + \cdots + \lambda_{max}K_n)}{n} \quad (1)$$

where, λ_{max}=Criterion Average Value; K=Criteria; n=Number of Criteria.

b. Find the Consistency Index (CI) value with the formula:

$$CI = \frac{(\lambda_{max} - n)}{(n-1)} \quad (2)$$

where, CI=Consistency Index; λ_{max}=Criterion Average Value; n=Number of Criteria.

c. Calculate the Consistency Ratio (CR) value with the formula:

$$CR = \frac{CI}{RI} \quad (3)$$

where, CR=Consistency Ratio; CI=Consistency Index; RI=Random Index.

RI is a random consistency number, where the amount is adjusted to the size of the matrix according to the provisions used. If CR>0.1 then the matrix value is inconsistent and must be revised, if it is consistent then continue.

3. RESULTS AND DISCUSSIONS

3.1 Types of MPTS plants developed in community forest areas

There are three groups of plant species in the HKm area of North Batukliang, namely: timber, MPTS and seasonal crops. Types of timber include: mahogany, randu, sengon, agarwood, albalsiah, rajumas, banyan, dadap, agarwood, and jowet. The types of MPTS plants include: durian, banana, coffee, jackfruit, avocado, cocoa, rambutan, mangosteen, mango, melinjo, kepundung, and others. The types and numbers of seasonal crops are very limited, namely taro, sweet potato, and several types of horticultural crops such as chili and long beans. These annual crops only planted in a few places that are hollow between MPTS plants.

Table 1. Paired comparison scale in element assessment of a hierarchy

Value	Information
1	Comparable criteria/alternatives (e.g. A & B) are "equally important"
3	Criterion/alternative A "slightly more important" than B
5	Criterion/alternative A "clearly more important" than B
7	Criterion/alternative A is "very clearly more important" than B
9	Criterion/alternative A is "absolutely more important" than B
2, 4, 6, 8	When in doubt between two adjacent values

The three types of plants (timber, MPTS and seasonal crops) are in a mixed manner in the HKM area, not planted in separate areas. In terms of plant composition, it appears that the most dominant (more than 90%) are MPTS plants. In other words, smallholders prefer to plant multipurpose crops compared to woody plants. Thus, the composition of MPTS dan woody plants developed by HKm managers does not comply with the provisions on the ratio between wood and MPTS plants, which is 70:30 (wood: MPTS plants). This phenomenon is also found in various places in Indonesia, with the reason that it guarantees more income security for farming households [19, 34-37].

Farmers as HKm managers get economic benefits from the MPTS plants. From the average HKm area managed of 0.614 ha, farmers earn an income of Rp 26,161,667 per year or Rp 2,180,139 per month. Based on several previous studies, the economic contribution of HKm or other social forestry is quite important for increasing household income and farmers' welfare [2, 34, 38-48].

3.2 Priority of MPTS featured plants in the community forest area (HKm) in north Batukliang, central Lombok

Community forest (HKm) is a forest management system aimed to support the life and welfare of the community without reducing the main functions of the forest due to the reciprocal use of the forest and the community. Therefore, the development of MPTS plants in HKm area must consider the ecological and economic aspects comprehensively. In this study, the determination of priority MPTS featured plants in the North Batukliang HKm area, Central Lombok Regency was carried out using a Process Hierarchy Analysis (AHP) approach. The criteria used as the basis for selecting priority MPTS plants are: (1) economic benefits, (2) waiting period to start production, (3) ease of maintenance, (4) market opportunities, (5) negative effect on under-stand plants, (6) resistance to disease, and (7) length of productive period.

The seven criteria above have different weights depending on the urgency and the assessment was conducted by competent experts. The weight value of the criteria is indicated by the eigenvalues obtained from the results of the AHP analysis. The results of the analysis show that of the seven criteria that are used as the basis for consideration in determining priority superior MPTS plants, the criterion that has the highest weight is the economic benefit obtained, with an eigenvalue of 0.429 (42.9%). The second criterion taken into consideration in the development of MPTS plants is market opportunity with an eigenvalue of 0.224 (22.4%).

The next criteria in a row according to the magnitude of the eigenvalues are: the waiting period to start production with an eigenvalue of 0.107 (10.7%), the length of the productive period with an eigenvalue of 0.107 (10.7%), easy maintenance with an eigenvalue of 0.061 (6.1%), disease resistance with an eigenvalue of 0.037 (3.7%), and a negative effect on plants under stands with an eigenvalue of 0.036 (3.6%).

Based on the seven criteria above, the priority MPTS plants are obtained, either partially based on each criterion or comprehensively based on the overall criteria that have been set (Table 2).

Based on the results of AHP analysis on the basis of comprehensive consideration of the seven criteria, it can be determined the order of priority for MPTS plants that can be suggested in the North Batukliang HKm area, Central Lombok Regency. The determination of this priority order is based on the eigenvalues as the results of the AHP analysis are presented in Table 2, which are: durian, banana, coffee, cocoa, avocado, jackfruit, rambutan, and mangosteen, respectively, (Figure 2 and Figure 3).

It can also be seen from Table 2 that the order of priority MPTS plants on each criterion partially is as follows:

(1) Criteria for market opportunities; namely the demand or marketing opportunities for MPTS commodities both locally and nationally that are available. Based on these criteria, the order of priority is: durian, cocoa, avocado, coffee; banana, jackfruit, rambutan, mangosteen.

(2) Criteria for economic benefits; namely the income obtained from the production of MPTS. Based on these criteria, the order of priority is: durian, banana, coffee, cocoa, avocado, rambutan, jackfruit, mangosteen.

(3) The criteria for the waiting period to start production; namely the length of time waiting for MPTS plants to start producing. In this case, the sooner the production starts, the higher the score. Based on these criteria, the order of priority is: banana, coffee, rambutan, jackfruit, cocoa, avocado, mangosteen, durian.

(4) Criteria for disease resistance; namely the strength of MPTS plant resistance to pests and diseases. Based on these criteria, the order of priority is: mangosteen, avocado, banana, rambutan, coffee, durian, jackfruit, cocoa.

(5) Criteria for negative influence on under-stand plants; namely the negative influence of MPTS plants on other plants. In this case the greater the negative effect, the smaller the score. Based on these criteria, the order of priority is: avocado, rambutan, banana, durian, mangosteen, coffee, jackfruit, cocoa.

Table 2. Eigen value of each criterion for each MPTS plant

No	Criterion	Eigen Value of Each MPTS Croptas								
		Coffee	Rambutan	Jackfruit	Alpukat	Mangosteen	Banana	Cocoa	Durian	Model
1	Market opportunities	0.135	0.074	0.074	0.135	0.044	0.074	0.135	0.329	0.224
2	Economic benefits	0.149	0.034	0.034	0.051	0.023	0.214	0.104	0.391	0.429
3	Waiting period begins production	0.164	0.164	0.102	0.067	0.025	0.351	0.102	0.025	0.107
4	Resistance to disease	0.087	0.106	0.078	0.162	0.268	0.162	0.049	0.087	0.037
5	Negative influence on another plan	0.062	0.164	0.039	0.270	0.098	0.164	0.039	0.164	0.036
6	Ease of maintenance	0.035	0.145	0.239	0.145	0.088	0.239	0.054	0.054	0.061
7	Long productive period	0.038	0.057	0.212	0.092	0.092	0.026	0.092	0.392	0.107
	Result	0.123	0.073	0.083	0.051	0.051	0.175	0.102	0.298	

(6) Criteria for ease of maintenance; namely MPTS plant care, where the easier it is to maintain, the higher the score. Based on these criteria, the order of priority is: jackfruit, banana, rambutan, avocado, mangosteen, durian, cocoa, coffee.

(7) Criteria for length of productive period; namely the length of the productive period of the MPTS plant from the time it started producing until the crop was unable to produce. Based on these criteria, the order of priority is: durian, jackfruit, avocado, mangosteen, cocoa, rambutan, coffee, banana.

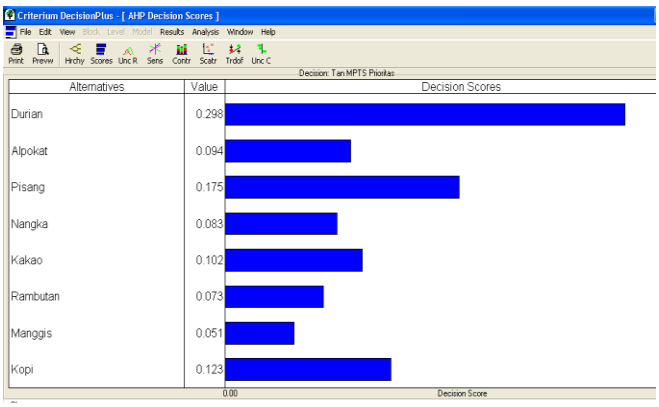

Figure 2. AHP results selection of priority featured MPTS plants

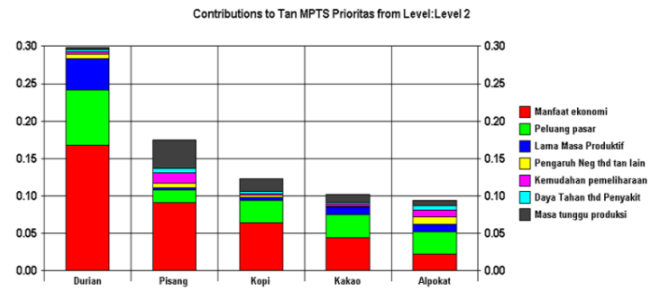

Figure 3. Contribution of each criterion to each MPTS plant priority excellence

4. CONCLUSIONS AND SUGGESTIONS

4.1 Conclusion

(1) The dominant types of MPTS plants developed by the community in the HKm area of North Batukliang, Central Lombok are: Durian, Banana, Coffee, Cocoa, Jackfruit, Rambutan, Avocado, Mangosteen.

(2) Based on the seven criteria comprehensively, the priority order of MPTS featred plants that can be developed in HKm Batukliang Utara, Central Lombok Regency can be determined, as follows: durian, banana, coffee, cocoa, avocado, jackfruit, rambutan, and mangosteen.

4.2 Suggestions

Based on the results of the study and findings in the field, in order to optimize the management of HKm and the economic benefits of the area, it is recommended that the government or other parties support the procurement of quality plant seeds, especially for the five priority MPTS plant types.

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