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The effect of forest health on social conditions of the community

S F Rochmah¹, R Safe'i¹, A Bintoro¹, H Kaskoyo¹, and A Rahmat²

¹Department of Forestry, Faculty of Agriculture, University of Lampung

²Research Center for Limnology, Indonesian Institute of Sciences, Indonesia

E-mail: rahmat.safei@fp.unila.ac.id

Abstract. People's forests have essential values for community life, especially in rural areas. This value means that many benefits will be generated from the existence of the People forest. The benefits referred to are economic, socio-cultural, and ecological benefits. This benefit is felt if the health condition of the jati people forests is in good health. This study aimed to determine the value of forest health status from productivity indicators and determine its benefits for community welfare. This research was conducted in September 2020 in Jati Peoples Forest, Natar District, South Lampung Regency. This study's objects were eight Forest Health Monitoring (FHM) plot clusters containing jati stands in the seedling, sapling, poles, and three phases. The result of this research is that the forest health status is in good condition. People's forests benefit the community by increasing income, providing jobs, and living for wildlife. This research concludes that people's forests will benefit the community with good forest health conditions.

1. Introduction

Currently, the area of forest in Indonesia has decreased significantly [1]. This is due to an increase in population so that it requires space and the necessities of life from the forest area. One alternative solution to the problem of forest resources is people forest development [2]. People forest is a forest that is built by the community on people's land [3]. People forests can be owned by both individual and collective farmers [4]. People forest development currently has both strengths and beneficial opportunities, if government policies support and protect people forest farmers [5].

People forests in Indonesia have a high value. According to [6] people forests have an important value for community life, especially in rural areas. This value means that there are many benefits that will be generated from the existence of people forests. These benefits can be economic, socio-cultural in the form of agricultural work and ecological benefits [7]. People forests also have great potential in terms of population and number of households operating them, which are capable of providing raw materials for the forestry industry [7].

One of the people forests that has a focus on meeting industrial timber needs is people forest in RulungHelok Village, Natar District, South Lampung Regency. The wood commodity produced is jati (*Tectona grandis*). Jati was chosen because it has a very high quality wood. This is in line with the statement of [8] which states that one of the most popular plants in the timber industry is jati because of its very high quality.

The quality of jati plants will be closely related to the health condition of the jati people forests. Forest health is an effort to control the level of people forest destruction [9]. With controlled people forests, the quality and quantity of jati plants will indirectly be high. The quality of the jati plant will be proportional to the productivity level of the plant. Productivity is the growth rate of a tree or stand



over a certain period of time or at this time. Productivity can be determined by measuring tree growth [10]. Tree growth is calculated as basic area (LBDs) [11]. LBDs describe the rate of instantaneous growth or productivity of a tree over time. The data source for calculating LBDs is by measuring the diameter of the tree [12].

The problem in this research is how the productivity and health value of the jati people forest and how the forest health affects the community. By knowing productivity as an indicator of forest health, people forest management can lead to the principles of sustainable forest management and farmers will benefit from the existence of jati people forests. That way, research related to the health of community jati forests needs to be done.

2. Research Methodology

2.1. Time and Location of Research

This research was conducted in September 2020. The location of the research was conducted in the people forest jati, RulungHelok Village, Natar District, South Lampung Regency.

2.2. Research Tools and Objects

The tools used in the study consisted of: tally sheets, plastic labels, nails, compasses, permanent markers, meters, meter tape (150 cm), Global Positioning System (GPS), hagometers, and digital cameras. The objects in this study were eight Forest Health Monitoring (FHM) plot clusters containing jati stands in the seedling, sapling, poles and tree phases.

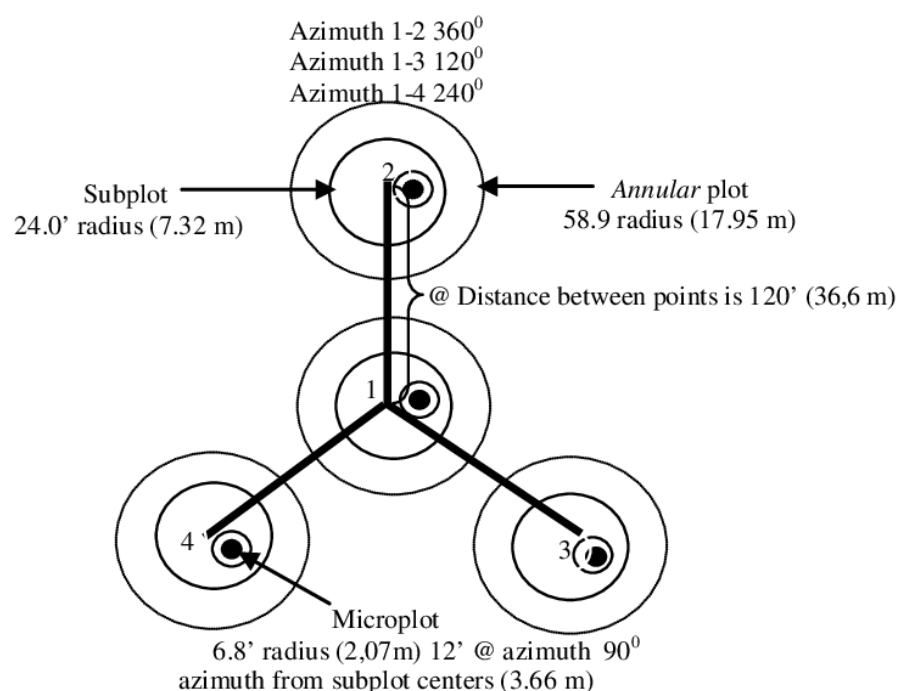


Figure 1. Plot cluster design FHM.

2.3. Sampling and Data Collecting

Forest health monitoring is carried out using the Forest Health Monitoring (FHM) method [23]. Forest Health Monitoring (FHM) is a method of monitoring forest health conditions introduced by the USDA to monitor which is designed for forest health [24]. Determination of the number of plot clusters was carried out using a sampling intensity of 8% in order to obtain 12 cluster plots. This is based on the Regulation of the Director General of Forestry Planning and Environmental Management No.P.1/PKTL/IPSDH/PLA.1/1/2-17 concerning Technical Guidelines for Forest Inventory in Protected Forest Management Units (KPHL) and Production Forest Management Units (KPHP).) that

the Sampling Intensity for inventory activities is 0.056%. Determination of the location for taking the 12 plot clusters was carried out by purposive sampling in accordance with the personal considerations of the researcher. The personal consideration of the researchers was to make a FHM plot calculator with consideration of area size.

Data collection in the field is obtained by measuring the productivity indicator parameter. The parameters used in this study were tree growth (LBDs) whose data can be obtained through diameter measurements. The stem diameter is measured 1.3 m above ground level. Techniques for measuring tree growth or productivity were carried out on jati plants in each cluster plot. These measurements are carried out at the seedling, sapling, poles and tree phases.

2.4. Data Analysis

Tree growth is calculated as growth in basal area (LBDs). LBDs parameter was chosen because it is a parameter that is easy to measure and has a high level of consistency. Therefore, tree diameter growth can be used as the basis for calculating the growth of the basal area (LBDs) of the tree [22]. The following is the formula for LBDs:

$$\text{LBDs} = \frac{1}{4} \times \pi \times d^2$$

Information :

LBDs = basal area of individual trees (m²)

d = trunk diameter (1.3 meters from the base of the tree)

π = constant (3.14)

Forest health assessments in jati people forests in Natar District were obtained from the final value of the jati forest health conditions. This assessment aims to determine the current health condition of the forest based on indicators of productivity. To get the final forest health value, you can use the following formula:

$$\text{NKH} = \text{NT} \times \text{NS}$$

Information :

NKH = final value of forest health condition

NT = parameter weighted value of the productivity indicator

NS = parameter score value of the productivity indicator

Where, NKH is the final value of forest health condition, NT is the parameter weighted value of each forest health indicator, NS is the parameter score value of each forest health indicator [25]. The score value is obtained from the transformation of the parameter values of each plot cluster with a score range of 1-10. While the weighted value (NT) is obtained using the Analytic Networking Process (ANP) [26].

To find out the role of people forests in the community, interview methods were used with key informants who were managers of community jati forests. This interview was conducted to find out what benefits the community got from the existence of community jati forests.

3. Results And Discussions

The results of interviews with the owners / managers of community jati forests in Rulung Helok Village, Natar District, South Lampung Regency, show that the people forest has its main function, namely production in the form of wood for timber industry needs in East Java. This function can be fulfilled by good forest health conditions. Forest health conditions can be determined by measuring forest health indicators [27]. Health indicators that can be measured in jati people forests with a production focus are indicators of productivity or tree growth [10]. This shows that the productivity indicator is the right one to measure in the jati people forest.

Fulfillment of people forest production functions through productivity indicators is something that must be considered [4]. The level of productivity will be a guarantee of quality (quality and support for

jati plant growth [4]. To determine the level of productivity, it is necessary to measure productivity indicator parameters, namely basal area or LBDs. LBDs can be determined by measuring tree diameter at breast height or 1.3 meters above ground level According to [28], tree diameter growth is a parameter of growth that is easy to measure and has a high level of consistency. The results of the LBDs assessment for each cluster-plot can be seen in Table 1.

Table 1. Value of LBDs in each plot cluster

Klaster Plot	LBDs (m ²)
1	0,0390
2	0,0419
3	0,0397
4	0,0413
5	0,0378
6	0,0373
7	0,0312
8	0,0328
9	0,0461
10	0,0465
11	0,0461
12	0,0461

Source: Processed from field data

Jati plant growth tends to increase along with the age of the stands. The jati plants were planted in 2006, 2008, 2009 and 2011. The highest growth was in cluster plot ten with a value of 0.0465 m². While the lowest tree growth value is in cluster plot seven with a value of 0.0312 m². From the values obtained, all plot clusters have different values from one another. One of the factors that determine the size of the diameter is the spacing. A wide spacing will make plants more adaptable to the environment [29]. However, this people forest has a fairly tight spacing because it aims to make wood that is straight and tall. The score for tree growth parameters is based on the average LBDS value of trees per hectare in each cluster-plot (Table 2).

Table 2. Scoring values on LBDs parameters

Score	LBDs		
1	0,0312	-	0,0326
2	0,0327	-	0,0342
3	0,0343	-	0,0357
4	0,0358	-	0,0372
5	0,0373	-	0,0388
6	0,0389	-	0,0403
7	0,0404	-	0,0418
8	0,0419	-	0,0434
9	0,0435	-	0,0449
10	0,0450	-	0,0465

Source: Processed from field data

The scoring scores are given at intervals of 1-10. Value starts from the smallest value to the largest. The higher the score, the higher the health level of the jati people forest. Scoring of tree growth conditions is based on the average LBDs value per hectare [10]. The 1-10 interval provides a level for each value that exists for each measuring plot cluster that has been previously obtained. The threshold value for forest health status is based on the value of the LBDs parameter score (Table 3).

Table 3. Threshold values for forest health status based on productivity indicators

No	Categori	Value Class
1	Good	7,00-10,00
2	Moderate	4,00-6,99
3	Bad	1,00-3,99

Source: Processed from field data

The health condition value of the jati people forest on each cluster-plot with the health condition category of the jati people forest (Table 4).

Table 4. Final values of forest health status based on productivity indicators

Claster	NKH	Status
1	6	Moderate
2	8	Good
3	6	Moderate
4	7	Good
5	5	Moderate
6	5	Moderate
7	1	Bad
8	2	Bad
9	10	Good
10	10	Good
11	10	Good
12	10	Good

Source: Processed from field data.

The results obtained from table 4 show that the health condition of the jati people forest in Rulung Helok Village, Natar District, South Lampung Regency is in good condition. There are twelve cluster plots made on an area of 60 Ha of people forest. Six plot clusters are in good categories, four are in medium categories and 2 plot clusters are in bad categories. The health condition assessment is obtained from the measurement of productivity indicators for each individual tree in the jati people forest. It can be said in broad outline that the community jati forests in Natar District have good forest health conditions.

According to [30] the higher the forest health score indicates that the higher the people forest health level, conversely, the lower the score, the lower the forest health level. This community jati forest has good forest health conditions in terms of productivity, presumably because the jati seeds planted come from saplings in Perhutani's nursery. Where the broodstock of the finished plant has superior seed varieties. This will affect the growth of jati plants in the people's forests of Rulung Helok Village.

A high level of productivity can also contribute to the economic level of farmers. People forest farmers will benefit more from the sale of wood. The wood from the people forest is sold to East Java to supply industrial raw materials. This is in line with the benefits of people forests, namely to increase community income [31]. However, these benefits can be felt if people forest farmers can manage the forest well. This means that people forest management must be based on the principle of sustainable forest management (PHL) [4]. However, in order to achieve this, it needs proper and dynamic SFM so that it is adaptive to local conditions [4]

The existence of people forests also provides employment opportunities for local communities. In maintaining people forests, additional workers are needed so that the implementation is fast. The

implementation of maintenance activities that are usually carried out in people forests are weeding, fertilizing, pruning branches, thinning, eradicating pests and diseases [31]. From these activities, it will reduce the unemployment rate in the local area.

4. Conclusion

The Jati community forest's health status in Rulung Helok Village, Natar District, South Lampung Regency is in good condition. The twelve cluster plots created, six were in good categories, four were in medium categories, and two were in bad categories. From this health status, community forests can be said to be good. Besides, community forests' health can provide benefits to local communities in economic aspects such as increasing income, such as providing new jobs and ecology as an environmental improvement.

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