



## Performance of Gunung Bawo Forest in South Barito District

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### Abstract

Gunung Bawo Forest is one of the tropical rain forest area located in Bintang Ara Village, South Barito Regency, Central Kalimantan Province. The Dayak Bawo people have local traditions and cultural values that are direct connected to the forest and forest areas they occupy. Forest management in Indonesia, as is done by the community, one of them is Gunung Bawo Forest located in the village of Bintang Ara. This research method uses qualitative approach with quantitative, where the society become the main character of extracting information and from result of interview and information from facet of calculation using some alternative each from that used for different information. Productivity, efficiency, equity, and sustainability. Results of research showing better performance Gunung Bawo Forest can be said to be very good, this is done with the value of density, productivity, sustainability, fairness and values that exceed from  $\geq 150$  which is 466 with the category 80% very good because still the preservation of its forest form is automatically guarded by the villagers in Bintang Ara village. If there are factors that affect the very low performance of the whole, only 72, this is due to the uneven distribution of results for the Dayak Bawo community and constrained, but no current distribution results.

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## Introduction

In Indonesia forest rights are granted by the government with the issuance of documents relating to the rights to managed forests. One of the forest management in Indonesia such as that done by the forest of Gunung Bawo located in the village of Bintang Ara, Barito Selatan District, Central Kalimantan Province. In Central Kalimantan there are various - tribes, including the Dayak tribe Bawo located in South Barito district who live in the Village Ara Star in which there is a forest area called the Gunung Bawo Forest. The Dayak Bawo people have their own traditions and local cultural values directly related to the forests and forest areas they occupy. Although the forest area of Gunung Bawo is functionally the area is a Limited Production Forest area but in 2007. Communities in this village get their right to utilize the forest based on the decision of South Barito Regent in 2007 as stated in the Decree of South Barito Regent No. 606/2007 on the Appointment of Location of Forest Right Use in Bintang Ara Village Gunung Bintang districts. Awai, which then related to its utilization is regulated in Regulation of South Barito Regent no. 15 of 2007 on Guidelines on the Implementation of Forest Utilization Rights.

The community has knowledge of seed selection and thinning, the existence of quality selection and maintenance efforts show a higher productivity orientation. The sustainability in this case is how the forests and forest resources contained therein are sustainable. The preservation of the forest and its resources does not mean that it should not be exploited, but how to exploit the forest and its resources in a wise manner so as not to cause damage and loss of forest and the resources contained therein.

Suharjito *et al.* (2004) defines sustainability as the ability of an agroecosystem to maintain its productivity over time. Fauzi (2012) as stating that a forest management can be said to be sustainable if it can provide for years of timber supply from harvests made to stands that have reached the cooking conditions.

Knuchel also stressed that forest sustainability is not only concerned with the volume of fixed yields, but must also include the shape and quality of the stem and the value of money generated.

Performance is influenced by the management system, namely the system of control and decision-making whether individually or communally. The system of governance and decision-making affects the responsiveness to the market economy and its social economic model; business orientation, whether subsistence or commercial.

The level of subsistence and commercialization is a measure of the responsiveness to the market economy; the type and variety of products consumed or marketed is a response to the needs and markets that simultaneously affect the performance of its management (Suharjito *et al.*, 2004).

Salampessy *et al.* (2015), also contributes to the sustainable development of forest resources, as well as by the coastal communities of Ambon, Maluku. Community participation in forest management can be realized in various forms of studies conducted.

Sadono (2013), explaining that Jeruk Village community as one of the buffer villages in forest management contributes to forest management activities in the form of thoughts, suggestions and personnel. In planning, community participation is consultative; the role of forest managers tend to be dominant in planning and designing program activities. The people who participated in the event received incentives.

The forest management by the community given the right of forest management is seen from the aspect of its performance or performance. Performance is a performance related to forest management by the community with attention to productivity, sustainability and equity. There needs to be a study related to forest management conducted by Bintang Ara people (*Bawo tribe*), so that appropriate strategy can be determined in developing and fostering forest management (*Hak ulayat*) by Bawo tribe community.

## Materials and methods

### Materials

Equipment used during the study included questionnaires, cameras for documentation, stationeries and computers.

### Methods

The time of the research is for 8 months, in August 2017 - March 2018, which consists of preparatory research activities, preliminary survey, data collection, data processing and research report. This research was conducted in Bintang Ara village Gunung Bintang Awai District of South Barito Regency which is one of the villages where the people are given the right to manage Gunung Bawo Forest. Forest management performance of Gunung Bawo forest to make plant density, *dukuh* productivity, sustainability, equity, and efficient. (Mulyono, 2012).

Hafizianor (2002) The hamlet of the house is integrated into the settlement and can be reached within a few minutes while the new mountain *dukuh* can be reached after traveling about half to three hours by walking through a hilly path.

It is estimated that *dukuh* starts to form as the cropping pattern changes from shifting cultivation/rotation pattern to sedentary cultivation pattern, estimated to be established since 180 years ago ( $\pm$  1830). The hamlet which is a relic of their grandparents is still preserved until now.

Darusman (2012) argues why the participation of local communities in forest management is important, namely (1) the very authentic fact that their numbers are large, have enormous power to support, or otherwise become vandals; (2) they are part or elements of an interdependent forest ecosystem; (3) they are citizens of the nation who wish to be prosperous, entitled to get justice, have the right to play a role in determining the policy and implementation of development in their area of residence.

### Density of plants

Plant identification was done by measuring plant density according to Soerianegara and Indrawan (1998).

The measurements taken are to calculate the plant density (individual/ha) of each level to determine the amount of plant or density in maintaining the heterogeneity and adaptability of vegetation to the disturbance.

Density offer using summary as follows:

Density = Total of Individuals

Large of Sampling Area

Density = Density type

### Relative Density of all types

The adequacy of the number of plant or forest density is important to maintain the heterogeneity and adaptability of vegetation at that time, ranging from 1,000 to 25,000 individuals/ha with an average range of 5,000 individuals/ha spread from seedling to tree level (Jacobs *et al* 1981).

Plant Density Value is obtained from the total sum of all density values (individual/ha) spread from seedling to tree level. Determination of the current base density values as follows:

- Bad Density Values: the number of individuals per hectare <1,000.
- Good Density Values: the number of individuals per hectare 1,000-25,000.
- Very Good Density Value: number of individuals per hectare > 25,000.

### Productivity of Gunung Bawo Forest

Productivity is the output of the valuable product of all land cover in the Gunung Bawo Forest area, in this context the output of forest products is measured from the value/income of the stand potential for primary forests, secondary (natural) forest and fruit production and yield the production of sap for the rubber plantations, the stand potential for *Sungkai* (*Penorema canescens* Jack) forest forests and the resulting Gunung Bawo forest per hectare, to measure the productivity of Primary Forest and Secondary Forest (Natural), Mixed Garden can be seen in the Productivity Forests Primary and Secondary Forest Productivity Nature), Mixed Fruit Garden (*dukuh*).

**Value Description:**

- a.  $H' < 1$  = Low Diversity
- b.  $H' 1 - 3$  = Medium Diversity
- c.  $H' > 3$  = High Diversity

**Fruit productivity in Mixed Gardens includes:**

- a. Low productivity: Value of fruit/ha <Rp. 7 million.
- b. Medium Productivity: Value of fruit/ha Rp. 7 million s/d Rp. 10 million.
- c. High productivity: Value of fruit/ha > Rp. 10 million.

**Productivity of Rubber and Sungkai Plantation Forest is a calculated from rubber or wood products:**

- a. Low productivity: <1500kg/ton
- b. Medium Productivity: 1500kg/ton,
- c. High productivity: > 1500kg/ton

***Sustainability of Gunung Bawo Forest***

Sustainability is the ability of forests to maintain their productivity over time, measured by efforts made to maintain the existence of plants (nurseries/breeding, replanting/rejuvenation and crop maintenance), namely:

- a. Low: Never done
- b. Medium: Rarely (Sometimes) do
- c. Height: Often done.

***Equitability***

Equitability is the equitable distribution of benefits from the existence of forests, as measured by the level of access to benefits perceived by the community.

- a. Low : Only useful for owners only
- b. Medium: Beneficial for the owner and its fruit buyers
- c. Height: Helpful to many (owner, community as labor/partners, relatives families and neighbors who do not own the land, as well as the fruit buyers etc).

***Efficiency***

Efficiency is cost savings (minimization) in the process of forest management to produce the product (fruit), measured from the level of production cost efficiency:

- a. Low Efficiency: Production cost > 40% of Production Value
- b. Medium Efficiency: Production cost 20% - 40% of Production Value
- c. High Efficiency: Production cost <20% of Production Value.

The assessment of efficiency is measured by the level of understanding and compliance of respondents to the written rules that bind individuals or communities. Unwritten rules that bind individuals or communities.

- a. Low : Do not understand
- b. Medium: Enough to understand
- c. Height: Know

**Rate of violation of citizens against the rules:**

- a. Low : Often
- b. Medium: Rarely
- c. Height: Never

**Results and discussion*****Density of plants***

In the Gunung Bawo Forest zone in each land cover both the Primary Natural Forest, secondary and mixed gardens each have a good density. The location in the Primary Forest land cover has an excellent density level of the type of space and the extent of its land cover type.

The highest density is in the secondary natural forest species 91.100 individuals per hectare and the smallest is primary natural forest with a density of 16,500 individuals per hectare, this may be due to the number of species found in each land cover and also at the vegetation growth rate.

Productivity of Primary and Secondary Natural Forest (natural) can be seen from the size of the standing potency the greater the diversity index ( $H'$ ) of the natural forest land cover the higher the productivity level as it is in accordance with its function as a regulator in hydrological concept and the purpose of society is not taking timber and non-timber yields but ecological benefits.

**Table 1.** Land Cover Composition Having Density of Plant From Seedling Level, Piles, Pillars and Trees Available In Gunung Bawo Forest Estate.

No	Land Cover	K (individual / ha)				Total	Density level
		Seedling	stake	Pole	Tree		
1	Primary Nature Forest	2.800	3.900	2.600	7.200	16.500	Good
2	Secondary Natural Forests	47.600	11.800	18.800	12.900	91.100	Very Good
3	Mixed Gardens	23.700	5.600	16.600	37.400	83.300	Very Good

**Table 2.** Potential of Diversity Level of Standing in Primary and Secondary Forest.

No	Tutupan Lahan	H'				Total	Density level
		Seedling	stake	Pole	Tree		
1	Primary Nature Forest	1,234	1,591	1,991	2,993	7,809	High
2	Secondary Natural Forests	1,534	1,409	0,876	2,810	6,629	High

The level of diversity as a whole is very high at ( $H' = 14.437/\text{tckat tree}$ ), and for the highest level of diversity is Primary Natural Forest ( $H' = 7,809/\text{tckat tree}$ ). This is caused for Primary Natural Forest has never been destroyed and the potential to be captured so still up to now. Nevertheless the overall level of diversity in natural forests is very high, namely  $H' > 3$  and very productively useful ecologically in preserving species in the area of

Gunung Bawo Forest. Based on table 3 it can be seen that the level of diversity at each level of growth shows the diversity at the moderate level that is  $H' 1 - 3$ . At the seedling level of 2.503, at the stake level of 2.224, pole level 2.391, but overall the level of diversity is also high of 2,643/tree level. This shows that the productivity level of the mixed garden is very high when compared with the primary and secondary natural forests.

**Table 3.** Level of Diversity ( $H'$ ) Mixed Garden in Gunung Bawo Forest.

Landscape	H'			
	Seedling	Stake	Pole	Tree
Mixed Garden	2,503	2,224	2,391	2,643
Diversity Level	Medium	Medium	Medium	Medium

**Table 4.** Distribution of respondents by level of productivity.

No	Productivity level of mixed gardens	Respondents Distribution
1	Low (< IDR. 7 million / ha)	3,3
2	Medium (IDR. 7 – 10 million / ha)	6,7
3	High (> IDR 10 million / ha)	90

#### *Productivity of Gunung Bawo Forest*

The productivity of mixed farms can be measured in terms of ecological (stand potential) and economical (fruits) in Indigenous Dayak Bawo Communities in general including high category and profitable. The productivity of Permusime Garden on Indigenous Dayak Bawo Community varies from the lowest of IDR. 6.333.333, - per hectare to the highest IDR. 29.000.000 - per hectare. Mostly 90% of the residents of Indigenous Dayak Bawo are classified as high productivity level above IDR 10,000,000 per hectare, as many as 6.7% of people are classified as moderate productivity, ie between IDR. 7.000.000s/d IDR. 10,000,000 per hectare, and low productivity is

only 3.3% of citizens because it is under IDR.7.000.000, - per hectare. In detail the distribution of respondents as well as the level of garden productivity in Indigenous Dayak Bawo Community can be seen in table 4.

Based on table 4 it can be seen that the majority of productivity in mixed Garden is above Rp. 10 million per hectare, and based on the assessment of total value, it is known that the productivity of the mixed garden is categorized as "high". Efforts to increase the productivity of the garden is done through maintenance activities on the plants that start flowering so that the fruit can be maximized.

Garden productivity is also protected by the community through fruit harvesting, especially durian and cempedak. How to harvest by not climbing was able to maintain the quality and productivity of the tree.

#### *Rubber (Hevea brasiliensis) Plantation*

Rubber forest area of Gunung Bawo Forest is a forest owned by individual farmers and also the management system has started using land preparation, planting hole and also spacing regularly that is  $5 \times 3\text{m}$  with an area of 376 from 2007. Because it is still running 10 year for the calculated

performance is from Table 5 can be seen from the amount of rubber latex production (kg/ha). The production of rubber latex (kg/ha) from year 8 to 10 increased from 3,780 to 4,320kg/ha with a productivity value of three.

Despite an increase from the initial production level average annual production and the average production increase in the current year has not increased due to the year-on-year price of rubber that dropped from 8000 per kg to 5000 per kg. Then financing from the aspects of maintenance and labor also affect so that the productivity of the rubber plantations in the village of Bintang Ara has not increased.

**Tabel 5.** Production of Rubber Size (kg / ha).

Year to	Production (kg / ha)	Standard Production Value	Production Value	Level of Rubber Productivity
3	No latex	$\leq 1500 \text{ kg/ha}$	Low	Low
6	No latex	1500 kg/ha	Medium	Low
8	3.780	$\geq 1500 \text{ kg/ha}$	High	High
10	4.320			High

#### *Sungkai (Peronema canescens Jack) Plantation Forest*

In Sungkai forest the first harvest can be measured in terms of the yield of the wood because the age of the stand is still 10 years is still low but if seen in general if seen from the economic value of sungkai wood on the growth age of 10 grow we can measure through the following Table 6. Based on the results of the assessment of production aspects of sungkai wood in

table 6 can be seen financial analysis or value of NVP at the age of 3 years is still in the low category of Rp.- 6.722.000, because the harvest from sungkai itself can be done at the age of 10 years.

This is evidenced in the harvest of age to 10 years pertained high income size that is IDR. 10.831.813. However, the profit is only Rp 4,109,813 so it can be said that the productivity of sungkai plantation is still low.

**Tabel 6.** Assessment of Productivity Aspects Of Sungkai Plant Hutn In Gunung Bawo Forest.

Age (Year)	Standart Production Value	Interest rate (%)	NVP (IDR)	Category
6	Low (< IDR. 7 Million / ha)	9	-6.722.000	Low
10	Medium (IDR. 7 – 10 Million / ha)		10.831.813	High
	High (> IDR. 10 Million/ ha)			
Total Production		4.109.813		Low

#### *Sustainability (Sustainability)*

The existence of Gunung Bawo Forest area in the form of mixed gardens, rubber plantations and sungkai that have long served in sustaining the lives of the people who manage them both socio-economically and ecologically need to be maintained sustainability. A manifestation of the people's desire to maintain the sustainability of the forests can be seen from the

explanations of community members who will not sell their land to people outside their village if they are forced to sell their land at some point. But on average they say they will not sell the land because there is a sense of pride if they have a garden and feel there is less if they do not have land. The system of land sales within the village community will be able to prevent the conversion of mixed garden land.



The efforts made by the Dayak Bawo community to maintain and improve the sustainability of their land is to do the cultivation of mixed garden activities in the form of regeneration and maintenance activities.

Land-keeping activities can take place in mixed plantations and rubber plantations and sungkai. In a mixed garden the intensity of land maintenance will begin at the beginning of the fruiting season when the fruit plants begin flowering until the harvesting activity is over. Maintenance activities in the form of weeding of lower plants, on durian trees done before harvesting activities with the aim to facilitate the collection of falling durian, on the cempedak tree is done just after the harvest is completed where the remnants of weeding is left to rot under the cempedak stands, the planting langsung weeding the plant down does not really need to be done with a reason to keep the soil moisture.

Another form of maintenance is the provision of salt into the trench around the durian tree after the harvest is completed and the security of the flowers and fruit of the plant from the attack of the beast. And maintenance of rubber forests and sungkai biasanya once a month if seen on the sidelines of plants already have plants to grow it will be cleaned and specifically for the rubber is done pruning stalk unjung free branch at the age of 3 years up to 10 in order to keep

the growth of rubber to the side for the amount increase productivity sap.

Within one year of mixed garden maintenance activities in rubber plantations and sungkai lasted one to two times but on home land some people will do routine maintenance if there is free time outside the main work. Regeneration activities take place in mixed gardens through the process of seedling selection along with new gardening activities in non-productive rubber plantation areas and in empty areas with artificial regeneration of indigenous fruit trees. In the old fruit trees are mostly left to die naturally and rarely used by the community's wood.

Then after experiencing weathering long enough people will do enrichment in the place and people believe that planted fruit crops will be able to thrive. Maintenance on newly created garden land is done by weeding, weeding and fertilizing as necessary. The purpose of weeding and weeding is to soil the soil, stimulate the growth of plants and facilitate maintenance. While fertilization aims to maintain soil fertility and provide nutrients into the soil either directly or indirectly. People usually prefer to use manure or compost. The distribution of respondents in the effort to maintain the sustainability of forests can be seen in Table 7.

**Tabel 7.** Distribution of respondents in an effort to maintain the sustainability of Gunung Bawo Forest.

No	Type of Land Cover	Level of intensity of Forest Maintenance	Respondents Distribution	Forms of Maintenance
1	A mixed garden	Low (Never done)	0	Weeding and weeding is to soil, fertilize
		Medium (Rarely done)	0	
		High (Often done)	100	
2	Natural Forests (Primary and Secondary)	Low (Never done)	0	Safeguards from fires and allowed to grow naturally
		Medium (Rarely done)	0	
		High (Often done)	100	
3	Rubber and Sungkai Plantation Forest	Low (Never done)	0	Weeding and weeding is to soil, fertilize
		Medium (Rarely done)	0	
		High (Often done)	100	

Based on Table 7 seen in each land cover the level of maintenance is high but different from the way of maintenance such as Natural Forest cover (Primary and Secondary) visible way of maintenance to protect from fire and allowed to grow naturally, this is caused by community menganggap in natural forest area is

area sacred no one should cut and make use of both for personal and social purposes. But the desire of the community is very eager to develop the tour of its natural attractions because natural attractions are partly in natural forests such as caves and waterfalls. Bawo Customary Council Delivered in Dayak

Lawangan language "kam dayak lawangan, our custom iro wara eso unique. Steel iro bowen bone. Our stories iro suntame dian na'an merensia. Sentume regan pengu memtepelok pan danum, ali ayus story, intong, ali tia pelule iro manari bone. Da iro, yes pini mangel unuk ali jaji un luangan. Which means we are dayak lawangan, customs and rules that we always keep. If anyone wants to disturb the forest. Although in a good way - good but we know the evil intention if it wants to damage our nature both forest and all the forest products that are inside.

#### *Equitability*

Gunung Bawo Forest in the village of Bintang ± 80% of the inhabitants of Bintang Ara Village is the community of Land owners evidenced by 99 certificates in 1993 and 102 in 2007. Citizens who do not have land if the fruit season arrives will also benefit from the existence the natural resources. Citizens who own land will freely share some of their land-harvest fruits to their landless neighbors as a form of solidarity and a sense of kinship and high moral responsibility of the land-owning community, so routine is done on each time the harvest season.

People who do not have land if they are willing to be involved as laborers, either for maintenance (weeding, weeding and fertilizing), or in harvesting (picking and transporting fruit), and even if the landless communities have enough then they will become partners as intermediary traders (middlemen), and of course they will gain a considerable profit up to 40% of the landowner's profits. Institutional system or rules like this is very

conducive where people who do not have land still get a proportional and fair benefits. So there has been a distribution of profits from 75% and 79% of landowners to 25% and 21% of landless people.

With the high realization of solidarity and sense of kinship and moral responsibility of the community of gardeners to the people who do not own the garden as described above, there are at least two advantages that will have a positive impact on such a reality. First, there has been equitable distribution of benefits as well as profit on land yields between landowners and landless communities. Secondly, because the distribution of benefits and benefits causes fruits in the land away from theft or destruction because landowners and landless people share land ownership.

Table 8 explains that land cover that has a high degree of fairness in terms of benefit to landowners, laborers, middlemen, traders, and buyers of fruit/gum/wood is on a mixed plantation land cover with a benefit of 93.30% while for forests the rubber plant is of medium benefit level with a value of 80.00% because rubber latex can be harvested and sold to middlemen. However, for natural forests and sungkai still cannot provide economic benefits because based on the results of respondents 100% respondents answered only beneficial to the owner the level of benefits is still low natural forests and sungkai. For sungkai plantation forest still not give benefit financially because harvest time is estimated at age 12 year and age of sungkai plant still 10 year. Overall the level of justice in Gunung Bawo Forest is still low at 50%.

**Tabel 8.** Distribution of Respondents According to Equitability Level of Gunung Bawo Forest.

No	Parties Feeling the Benefits of the Forest	Distribution of Resondents at Each Land Cover				Total	Average
		Natural Forest	Mixed Garden	Rubber Plantation Forest	Sungkai Plantation Forest		
1	Low (Only beneficial to the owner)	100	0	0	100	200	50
2	Medium (Only beneficial to landowners and buyers of fruit/sap/wood)	0	6,7	80	0	86,7	21,675
3	High (Useful for landowners, laborers, wholesalers, traders, and buyers of fruit/sap/wood)	0	93,3	20	0	113,3	28,325



Justice at a high level can be seen from the statement of the community where he is the chairman (Dewan Adat Dayak Bawo) from Lawangan language. *"Pembagian kawasan harus supaya tau ne kelola lahan ye ali masyarakat. Harapan ye dine te Desa Bintang Ara alas Gunung saing Bawo apu ne karamatken jadi mpe kapan pun sa akan ne jual belikan"* means: the division of areas outside the forest of Mount Bawo must be fair in order to be managed by the community's land. The hope because Mount Bawo has been saved then it will not be sold.

#### Efficiency

Production costs incurred by mixed plant owners are relatively small, ie less than 10% of the value of production, where the average cost of production in the Dayak Bawo Bintang Ara Village community is

only 7.60%, which means that the net income value of mixed plantation reaching 92.40%, while in the rubber plantation production is even smaller by only 15.75% or in other words that the net income value of rubber plantation forest reach 85.25%.

While for natural forest (primary and secondary) production cost is very small that is equal to 100% and is also proportional to the value of income is also 100% because the community does not take the forest products. In sungkai plantation the production cost is very high from the average of respondent's opinion that is 100% and the net income value of sungkai plant forest is still 0.00% because it still not harvest. The distribution of respondents according to the efficiency level of Gunung Bawo forest on various land cover can be seen in Table 9.

**Table 9.** Distribution of respondents according to the efficiency level.

No	Efficiency Level	Respondents Distribution				Total (%)	Average
		Natural Forest	Mixed Garden	Rubber Plantation Forest	Sungkai Plantation Forest		
1	Low (Production cost > 40%)	0	0	0	100	100	25,00
2	Medium (Production cost 20-40%)	0	6,7	75,25	0	81,95	20,49
3	High (Production cost < 20%)	100	93,3	25,75	0	219,05	54,76

The high level of efficiency in the management of Gunung Bawo Forest is in mixed gardens it is caused by low in-put costs in production management systems (time, capital, labor, security), and the presence of good running rules, property right

components in mixed garden management (ownership rights, control and management).

These factors will be able to explain the comparison between output and input.

**Table 10.** Level of Understanding and Compliance of Respondents.

No	Efficiency Level	Respondents Distribution				Total (%)
		Natural Forest	Mixed Garden	Rubber Plantation Forest	Sungkai Plantation Forest	
1	Rendah : Tidak paham	0	0	0	0	0
2	Sedang : Cukup paham	0	0	0	0	0
3	Tinggi : Paham	100	100	100	100	100

From the labor aspect, mixed garden management also has a high level of efficiency, because the existing mixed garden management system is individualized where mixed workforce farm workers generally come from their own family members.

The most intensive production used is labor for maintenance and harvesting. Other productions of security have no effect on production cost so that the management of mixed garden is relatively very efficient.

The efficiency of mixed gardens is also reflected in the existence and respect of various rules of play on interdependencies between related parties or the linkages of those parties with the natural resources they manage with clear boundaries of authority. In addition, the efficiency picture in the mixed garden can be seen from the obvious rights of ownership, control, and management. In terms of forest security efficiency can be measured from the level of understanding and compliance of respondents to written rules that bind individuals or communities, unwritten rules that bind individuals or communities. For more details can be seen in Table 10.

Based on table 10 can be seen that the level of Understanding and Compliance Respondents in obeying the rules of individuals or groups is very high that is equal to 100%, thus people can be said to understand the rules to maintain the sustainability and utilization of Gunung Bawo Forest area. This is derived from the characteristics of Dayak society where the rule is always obeyed especially from the chairman and customary institution of the community must obey if violation will be imposed fines. For example, cutting timber from fruit-bearing trees will be fined for the expenditure and prices of timber and fruits being felled.

**Tabel 11.** Level of Citizens Violations Against Rules Based on Respondents' Opinions.

No	Efficiency Level	Respondents Distribution				Total (%)
		Natural Forest	Mixed Garden	Rubber Plantation Forest	Sungkai Plantation Forest	
1	Low : Do not understand	0	0	0	0	0
2	Medium : Quite understand	20	20	20	20	20
3	Tinggi : understand	80	80	80	80	80

In the Bawo tribe the management of the land becomes the two ownership of the land which is controlled individually (individually) and communally owned land (communal/custom). The lands that are individually administered are the rights forest land located in the residential area, whereas the customary managed land is land intended for joint use. Ownership of a land is also influenced by the existence of a growing understanding in the Dayak Bawo tribe community, that who is the first to work on a land then that person is entitled to the ownership of the land. Most of the land is also passed on from their parents to their children or who are entitled to the inheritance given. Land management is done by shifting cultivation.

Based on table 11 the level of violation of the rule based on the results of the opinions of respondents including the high category that is 80% never and the answer rarely is 20%, this is because the respondent also felt not during the management of Mount Bawo Forest also never committed violations either intentionally or accidental. And they feel human nothing is perfect.

#### *Performance Gunung Bawo Forest Area*

Performance of agroforestry management conducted by KPHP Barito Hilir in mountain bawo forest is classified as medium category. Performance is based on the assessment of the variables of productivity, sustainability, equity benefits, and efficiency table 12.

**Table 12.** Level of performance category of Gunung Bawo Forest.

No	The Performance element of Gunung Bawo Forest	Performance Value On Each Land Cover					Category
		Natural Forest	Mixed Garden	Rubber Plantation Forest	Sungkai Plantation Forest	Total Value	
1	Density	52	30	10	10	102	Good
2	Productivity	30	30	30	10	100	Good
3	Sustainability	10	30	30	30	100	Good
4	Equitability	10	30	22	10	72	Bad
5	Efficiency	30	30	22	10	92	Good
Jumlah		132	150	114	70	466	Very Good

Based on table 12 illustrates that when viewed from the value of performance on each land cover then that has a very good category is the natural forest is a combination of primary and secondary forests that are managed naturally by the community of indigenous communities of Gunung Bawo with a total value of 132 and a mixture of orchards the highest value of its performance with very good category with a total value of 150 this thing can be obtained because the good management system of the community of Bintang Ara Village is dominantly working as a farmer and the appropriate land to be a supplier of fruits in South Barito Regency. From all the elements of the performance included in the bad category is the level of fairness that is equal to 72, therefore there needs to be a fair share of forest products in order to keep the mountain forest bawo to remain sustainable.

### Conclusion

Performance values on each land cover with very good category are natural forest and mixed gardens both have advantages over the rubber plantations and sungkai that still not maximally produced, this is because the natural forest and mixed garden has a high density, indirectly things provides ecological and production benefits that are sufficient to provide economic prosperity and improvement for forest villagers in the Gunung Bawo Forest area.

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