

Optimizing Forest Resources for Sustainable Livestock Farming in Besowo Natural Reserve Buffer Zone, Indonesia

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Abstract. Goat and sheep farmers in Besowo Village, a buffer zone of the Besowo Natural Reserve, rely heavily on forest resources, leading to potential environmental and social challenges. This study, conducted from August to October 2023 in Kediri Regency, Indonesia, employs a quantitative descriptive survey method with data collected through observations, interviews, questionnaires, and documentation. Data analysis was performed using SWOT and QSPM to identify sustainable forest resource utilization strategies for livestock farming. Farmers utilize non-timber forest products, including *Pennisetum purpureum*, *Pennisetum purpureum* cv. Mott, various weeds, and tree leaves such as *Swietenia mahagoni*, sengon (*Albizia chinensis*), and mindi (*Melia azedarach*) for livestock feed. Timber forest products like *Swietenia mahagoni*, sengon, gembilina (*Gmelina arborea*), balsa (*Ochroma grandiflorum*), and salam (*Syzygium polyanthum*) are used for firewood and livestock pens. The SWOT analysis recommends sustainable strategies, including monitoring forest resource use, optimizing sharecropping land for forage planting, empowering farmers through conservation programs, and enhancing goat and sheep farming. The QSPM analysis emphasizes the importance of government and Perhutani (State-owned forestry company) support in ensuring sustainable forest resource utilization. Strengthening institutional collaboration and promoting agroforestry-based livestock farming could further enhance sustainability and reduce dependence on forest resources.

Keywords: Non-timber forest product, SWOT, QSPM

INTRODUCTION

Supriatna (2018) states that based on their function, forests can be divided into three large areas: production, conservation, and protection. Forests have an important position and role for the Indonesian state because they can be utilized optimally for the prosperity and welfare of the people. Forest products that help life, such as for building materials, firewood, and various plants for medicine and food sources, have become tourist areas because of their natural beauty. Rosalinda et al. (2024) state that forests have two tangible and intangible benefits. Tangibles are benefits that are measurable and can be felt directly because the resulting products are visible, such as wood, honey, fruit, flowers, mushrooms, bamboo, etc. At the same time, intangibles are benefits that are not measurable and cannot be felt directly because they focus on efforts to protect areas and biodiversity inside. This is reinforced by Government Regulation No. 6 (2017), which states that forest utilization aims to obtain results in the form of products or services optimally, fairly, and sustainably for the welfare of the people, which can be done by utilizing the area and collecting/utilizing Non-Timber Forest Products (NTFPs) and Timber Forest Products (TFP). Forests are also residential areas for several community groups. Based on data from the Ministry of Environment and Forestry by Siburian et al. (2021), 48.8 million people live in areas around the forest, with 10.2 million belonging to the lower middle class. One of the community groups that inhabits the forest area is the people of Besowo Village.

Besowo Gadungan Nature Reserve, located in Kediri Regency, is one of eighteen nature reserves in East Java province, and it is the first National Ficus Center (PFN) in Indonesia. This nature reserve is included in a conservation area with a lowland tropical rainforest ecosystem type. Besowo Village is located in Kepung District, Kediri Regency, with an area of ±624 ha and an altitude of 500-600 meters above sea level at the foot of Mount Kelud, so it has loose soil and is suitable for agriculture. Administratively, Besowo Village is a buffer zone adjacent to protected forests, production forests, nature reserves, and local protection areas, so it has abundant natural resource potential. The Besowo forest area has an area of 1067.6 ha, with details of 555.3 ha being protected forest while the remaining 512.3 ha is production forest. This region has a high diversity of flora, so it is beneficial in the lives of all elements of society, including sheep/goat breeders (Pratita

& Laksono, 2020; East Java BKSDA, 2014; Wulandari & Kuntjoro, 2019; Besowo Mapping Team, 2020).

The existence of the Besowo forest has provided benefits for local sheep/goat breeders as the main area for producing animal feed in the form of leaves and grass. The forest is also used to plant several cultivated plants, such as horticulture and secondary crops, with an intercropping system for Perhutani's wood plants and as a source of firewood for fuel. Feed fulfilment is the most important benefit of forests for livestock farmers because feed occupies the most significant business cost at 70-80% (Nursida & Susanto, 2017). Farmers allocate savings from free food sources from the forest to buy livestock seeds, repair cages, and buy family necessities. This condition is an indication of livestock farmers' dependence on forests. Regulations limiting forest use to avoid forest destruction have decreased the productivity of local livestock businesses. Sinery et al. (2015) states that extractive and non-timber forest products generally help improve the economy, so when there is a ban on utilization, it is the same as cutting off the community's survival. This dependence will gradually hurt the conditions and social environment around the forest. Forests will become damaged when uncontrolled encroachment causes animal feed supplies to run low in the dry season; even worse, breeders take the leaves of standing trees in conservation zones. This phenomenon often occurs. Abdullah (2017) stated that breeders tend to encroach on forests and cut leaves to replace grass when there is a feed shortage. The problem is further complicated by illegal logging for firewood or cage repair materials. The wood can be rented (small tree branches), but there is also large wood taken. Sustainable forest destruction cannot be avoided and violates established regulations, namely Law No. 18 Article 12 of 2013 concerning Prevention and Eradication of Forest Destruction, which causes state losses in the form of material and non-material. Wood extraction, as firewood or building materials, can cause a decline in natural tree populations, leading to local extinction due to the long growth time of replacement trees (Santosa et al., 2014).

It turns out that livestock farmers' dependence on forests also influences social and environmental conditions due to conflicts between livestock breeders and farmers with Perhutani (State-owned forestry company). Farmers compete to get easy access to food sources from the forest and try to control the food sources personally so that fulfilling the entire feed source for farmers will be difficult. As a result, livestock productivity and

social conditions become unfavorable. Sumarjono (2013) stated that competition for natural resource management is complex because it relates to human patterns and relationships. Unhealthy competition will create conflict and unrest between communities, impacting the economic crisis of the community itself. Breeders also have disagreements with Perhutani as the forest area manager due to differences in interests between the two parties. Perhutani is interested in preserving the Besowo forest from damage, while livestock farmers are interested in the forest as a source of income. Perhutani's losses were caused by damage to forest areas, and livestock farmers faced economic problems due to limited access to forest resources. Wulan et al. (2004) state that the existence of conflicting interests in the use of forest resources will cause conflict and tension between conservation parties and breeders because breeders' needs for resources are not accommodated well, thus affecting the economic conditions of breeders.

The dependency and conflict over forest resources must be overcome, and a sustainable forest resource utilization strategy must be developed. This strategy can be formulated using SWOT and QSPM analysis. SWOT and QSPM analysis were chosen to find this strategy. SWOT analysis identifies company strategic factors (strengths, weaknesses, opportunities, and threats) to formulate a strategy. In contrast, QSPM analysis is used to objectively determine the best strategy from several strategies based on internal factors' success and external from the SWOT analysis. The expected strategy is in line with the interests of both parties so that the use of this forest can help develop the productivity of sheep/goat farming in Besowo while still preserving the forest. Based on the previous description, this research aims to find out the types of forest resources used by sheep/goat farmers and what are the strategies for utilizing forest resources for developing sheep/goat farming businesses in the Besowo Nature Reserve Buffer Zone area, Kepung District, Kediri Regency.

LITERATURE REVIEW

Utilization of Forest Natural Resources by Local Communities

Local communities often use natural forest resources with important economic and cultural dimensions. For people living in forest areas, forests provide food and have cultural values closely related to their lives. For example, some communities use forests to find animal feed, natural medicines, and building materials. In animal husbandry, grass and leaves from the forest are often used as animal feed, which can support the nutritional

needs of livestock. However, it should be noted that this practice is often carried out without sustainable management, so it can cause environmental damage. For example, research conducted by Suhardi et al. (2025) shows that although forest use can increase people's income, a lack of awareness of the importance of natural resource conservation can lead to over-exploitation, which damages ecosystem quality. Therefore, using natural forest resources must be carried out with the principle of sustainability to ensure long-term benefits for local communities.

Sustainability of Forest Management and Livestock Business

Sustainable forest management and livestock business must be seen as two interdependent sectors. Proper forest management can provide natural animal feed, protection against natural disasters, and forest products that livestock breeders, such as wood and rubber, can utilize. On the other hand, sustainable livestock farming requires healthy forests to maintain air and water quality and provide sufficient forage areas. In this case, agroforestry as a system that combines agricultural, livestock, and forestry activities can be a solution that bridges the two sectors. According to a study by Aprylasari et al. (2024), forest management that integrates agriculture and livestock can optimize the use of natural resources more efficiently by utilizing trees, which function as protection for the soil and as a source of animal feed. This will support livestock sustainability and encourage overall forest and biodiversity conservation.

Negative Impact of Unsustainable Forest Use

Unsustainable forest use can have broad negative impacts on the environment and society. One of the most apparent impacts is a decrease in soil quality and erosion, which can affect the success of livestock businesses. Illegal logging and converting forests into agricultural land or settlements can reduce the environment's carrying capacity and worsen land degradation. According to one study by Aprylasari et al. (2022), forest destruction can cause the loss of natural habitat for fauna, which is important in maintaining ecosystem balance. For the livestock sector, this environmental damage can potentially reduce the availability of natural animal feed and threaten food security for livestock farmers. Furthermore, decreasing water quality due to the loss of forest vegetation cover can affect the quality of water used for livestock and agriculture, reducing productivity.

Strategy for Sustainable Management of Natural Forest Resources

Sustainable forest natural resource management strategies are crucial to balance natural resource utilization and environmental conservation. One strategy that can be implemented is ecosystem-based management, which considers all forest ecosystem component forest ecosystem components, from vegetation and soil to fauna. This approach views the forest as an inseparable unit, where each element has an important function that supports the system's sustainability. In this case, an agroforestry system that integrates productive plants with protective trees can be a practical solution. This approach not only provides economic benefits but also maintains biodiversity. According to Azizah et al. (2024), agroforestry systems can help improve the condition of degraded land and increase resilience to natural disasters such as floods and landslides. In addition, sustainable forest management also involves active community participation in decision-making and monitoring forest conditions, which can prevent illegal practices and damage to the ecosystem.

RESEARCH METHODS

Research Location and Time

The research was carried out in Besowo Village, Kepung District, Kediri Regency, for three months from August to October 2023. Determination of the research location was carried out purposively based on considerations such as suitable and strategic location for developing goat/sheep farming and ample potential forest resources to support livestock development efforts for goat/sheep.

Research methods

This research uses a survey method carried out with a quantitative descriptive approach. The respondents of the research were goat/sheep farmers in Besowo Village. The method for determining research respondents was carried out in two ways, namely purposive sampling and proportional random sampling.

Purposive Sampling

Maharani and Bernard (2018) stated that purposive sampling is a technique for determining and selecting respondents through specific considerations. This research will use three primary respondents, who will be interviewed, as shown in Table 1.

Table 1. List of Key Respondents

No	List of Informants	Information you want to know
1	Perhutani	Crosscheck SWOT points that have been created based on the results of interviews, documentation, observations, and written documents (journals and books)
2	Village Government	Crosscheck SWOT points that have been created based on the results of interviews, documentation, observations, and written documents (journals and books)
3	Breeders	Responses and Comments to SWOT points

Proportional Random Sampling

Ningrum et al. (2013) stated that proportional random sampling is used when the existing respondent population data is not homogeneous and proportionally stratified. The population (breeders) in Besowo Village is 440 people. The number of respondents to be interviewed is calculated using the Slovin formula with a confidence level of 95% to determine a random sample by using estimates of the size or population of respondents. The sample used in this research was 80 people divided into eight large hamlets: Sidodadi, West Kenteng, East Kenteng, Krajan, Sabiyu, Jaban, Sekuning, and East Besowo. The formula used is as follows:

$$n = \frac{N}{1 + Ne^2}$$

n is the sample size, N is the total population, and e is the error tolerance (0.01)

$$n = \frac{440}{1 + 440(0,01)^2}$$

$$n = 80$$

Type and Source of data

This research uses two types of data: primary and secondary. Primary data was obtained through observation or direct observation of situations in the field, and the results of interviews with relevant respondents were obtained through questionnaires and documentation. Secondary data was obtained from previous research results in journals, books, and other supporting data provided by respondents.

Data Analysis Methods

Data analysis in the research "Analysis of Forest Resource Utilization Strategies for Sheep/Goat Farming Businesses in the Buffer Zone of Besowo Nature Reserve, Kediri Regency" can involve several important stages, including the following:

1. Data description. Data obtained from both primary and secondary data is described in general.
2. SWOT Analysis. The data will determine a sustainable forest resource utilization strategy for developing sheep/goat farming businesses in Besowo Village.

QSPM analysis. The strategy results from the SWOT analysis are then analyzed using QSPM to determine the best strategy that can be implemented and directed by a business's policies and actual conditions. The QSPM matrix is created based on external and internal factors from the SWOT matrix, then multiplied by the AS value to get TAS to indicate which strategy is the best (Akbar et al., 2022)

RESULTS AND DISCUSSION

General Condition of Research Location

Location and Topography of the Village

Besowo Village is a village located in Kepung District, Kediri Regency, and has an environmental temperature of 22-23,6°C, humidity of 80%, as well as regosol and latosol soil types which contain volcanic ash, so they have high levels of fertility and nutrients. Astronomically, this village is located at 112°0' and 112°4' (BT) as well as 08°00' and 08°48' LS. Besowo Village itself has an area of 22.488 km² (BPS Kediri Regency, 2024), which is divided into eight hamlet areas, namely Sidodadi, West Kenteng, East Kenteng, Krajan, Sabiyu, Jaban, Sekuning, and East Besowo.

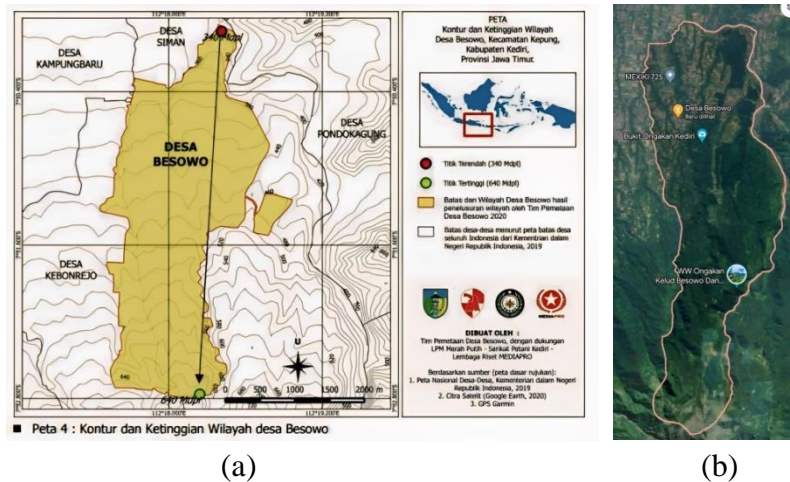


Figure 1. Map of Besowo

Source: (a) Besowo Village Mapping Team (2020); (b) Google Maps

Besowo Village has an altitude of 340-640 meters above sea level (masl). This condition creates a hilly topography with the characteristics of dense contour lines and the formation of many valleys with slopes of 35° . Drawing a straight line from the lowest point of the village in the north (340 meters above sea level) to the village's highest point in the south shows that the topographic slice of Besowo village is 5.04 km.

Forest Areas

Besowo Village is a buffer zone for the Besowo forest ecosystem. The forest area in Besowo is approximately 1,067.6 ha, divided into three areas: protected forests, production forests, and nature reserves (Besowo Mapping Team, 2020).

Protected forest

The Besowo protected forest is a natural forest with an area of 555.3 ha, where several staple plants such as gamal, calliandra, lamtoro, and secang are grown, which breeders can use for animal feed. This area is also used for planting with an intercropping system between staple crops and fruit and vegetable crops (avocado, durian, jackfruit, petai, and coffee), which local breeders can trade as capital for daily needs and capital for developing their livestock. This utilization is a form of sharing system with Perhutani with the condition that they pay IDR 70,000/500 m² per year and are obliged to care for and preserve the principal crops planted. Farmers can grow fruit and vegetables in protected forest areas.



Figure 2. Protected Forest

Source: Research Documentation (2023)

Production Forest

Production forests are areas helpful in meeting people's needs for forest products in the form of timber and non-timber, which have larger areas and are usually owned by private companies or local regional governments whose use is strictly monitored (Mustikaningrum, 2022). The production forest in Besowo has an area of 512.3 ha planted with several production plants, namely pine, sengon, Mindi, gembilina, mahogany, and jabon. Local breeders can use this area for farming due to a sharing agreement between Perhutani and breeders. Each party benefits. Farmers as actors can use the land to grow crops, with the results resold for additional capital for livestock development or reused plant remains as animal feed, while Perhutani, as the land owner, will receive a profit share in the form of money amounting to 70,000IDR/500m² every year and assistance to maintain and protect the central plants (teak, mahogany, sengon, gembilina and salam) planted on the land.



Figure 3. Production Forest

Source: Research Documentation (2023)

Nature preserves area

A nature preserve is a conservation area that acts as a place for protection and development of various plant and animal species. This area is prohibited for tourist or other commercial activities due to its nature as a protection for animals and plants from damage that may arise (Silahooy et al., 2024). The Besowo Village nature reserve has an area of 7 ha (SK: GB No. 83 Stbl. 392. 1999; Besowo Mapping Team. 2020), with the northern and southern areas bordered by PT Perhutani protected forests while pine production forests and PT Perhutani mahogany border the eastern and western parts. This area has several regulations that must be obeyed, namely:

- a. It is prohibited to enter the area without permission
- b. It is prohibited to cut down trees in the area
- c. Forest burning is prohibited
- d. It is prohibited to carry out any activities that could change the integrity of the area



Figure 4. Besowo Nature Reserve

Source: Research Documentation (2023)

Livestock Conditions in Besowo Village

Goat/sheep farming in Besowo Village is a business option other than gardening and farming as savings for emergencies. Besowo Village often experiences long dry periods, resulting in land drying out, which reduces the quality and quantity of agricultural products. Livestock are usually sold to meet the needs of the farmer's family if the agricultural business cannot meet their needs and even suffers losses.



Figure 5. Goats and Sheep in Besowo Village
Source: Research Documentation (2023)

Livestock businesses in Besowo Village usually include broilers and beef cattle, but goats/sheep dominate livestock businesses in Besowo. The nature of livestock farming in Besowo is small farming with ownership of under 10 sheep/goats and is a side business because most breeders are also farmers/farm laborers. This business has experienced an increase in quantity starting from 2020 and 2022. Data on the number of livestock kept is presented in Table 2.

Table 2. Data on Number of Livestock

Year	Hamlet	Livestock			Year	Livestock		
		Cattle	Goat	Lamb		Cattle	Goat	Lamb
2020	Kenteng Barat	5	120	0	2022	14	206	0
	Kenteng Timur	3	152	33		3	321	225
	Krajan	9	502	0		29	413	20
	Sabiyu	6	86	0		34	314	3
	Jaban	35	121	0		40	298	0
	Sekuning	24	83	0		94	234	0
	Besowo Timur	29	197	0		41	291	74
	Sidodadi	53	263	0		50	1029	0
	Total	164	1524	33		Total	305	3106

Source: Besowo Village Data (2023)

The data above shows that the number of large (cattle) and small (goats and sheep) ruminants has increased significantly. The reason for the high public interest in goat/sheep farming is that the capital required is relatively smaller than that of large ruminants, the ease of the rearing process because it does not require a large area, the breeding is relatively fast, it is easy to adapt, it is not an eater. It can produce more than one child, and the by-products can be used as industrial raw materials (hide, bones, and horns), while the manure can be used as manure for use on agricultural land or resale

(Sodiq & Abidin, 2009). Socially, the goat and sheep farming business is made easier with the "maro" system, or parties entrust their livestock to breeders to care for them until they are sold. This system is profitable for both parties because the farmer does not have to spend much capital on seeds and feed, while the owner only spends capital to buy livestock seeds. The profit-sharing system is carried out by dividing profits between the owner and the breeder.

The location of Besowo Village, which is close to a forest area and has large fields (fields), certainly has the potential to be used as capital for developing local livestock businesses. Forests and fields have special needs that local breeders cannot abandon because most breeders will take various grasses and tree leaves for animal feed and wood not used for renovating cages. Also, forest and moorland can be planted with horticulture or elephant/odor grass to be used as another food source or traded to increase profits. Therefore, several strategies for utilizing sustainable forest resources are needed so that they are suitable and on target for livestock development in Besowo Village.

Respondent Characteristics

Several important characteristics that must be known from respondents for this research are gender, the highest level of education, farming experience, and number of livestock of respondents, which can be seen in Table 3.

Table 3. Respondent Characteristics

No	Respondent Characteristics	Type	Amount	Percentage (%)		
1	Gender	Man	64	80		
		Woman	16	20		
		Total	80	100		
2	Last education	Elementary School	43	53,75		
		Junior High School	29	36,25		
		Senior High School	2	2,5		
		Vocational School	2	2,5		
		No school	4	5		
		Total	80	100		
3	Breeding Experience	<5 years	16	20		
		5-10 years	39	48,75		
		>10 years	25	31,25		
		Total	80	100		
4	Number of Sheep/Goat Ownership (heads)	1-5	31	38,75		
		6-10	24	30		
		11-50	24	30		
		50	1	1,25		
		Total	80	100		
5.	Work	Primary	Farm workers	41	51,25	
			Farmer	19	23,75	
			Cattleman	13	16,25	
			Planters	1	1,25	
			Construction laborers	1	1,25	
			Workshop employees	1	1,25	
			Kindergarten teacher	1	1,25	
			Housewife	3	3,75	
			Total	80	100	
			Side job	Cattleman	67	83,75
				NA	13	16,25
Total	80	100				

Source: Primary data processed (2024)

Types of Forest Resources

The Besowo forest area has quite a high diversity of flora and is very useful for local breeders as feed ingredients to reduce feed capital and focus capital on livestock development efforts. The Besowo Village Mapping Team (2020) stated that the diversity of flora in the Besowo Village Forest area is quite varied; this is influenced by the

geological conditions of the land on the Kelud slopes as volcanic soil provides benefits because it is fertile and has good nutrients and water absorption capacity. Various types of plants from grasses, secondary crops (corn and beans), and horticulture (chilies, tomatoes, papaya, onion, vegetable, red onion, avocado, durian, mango, and rambutan) grow abundantly in the Besowo Forest with an intercropping system in the production crop area owned by Perhutani such as mahogany, teak, pine, sengon, gembilina, and *jabon*. Based on the research results, it is known that several types of plants have been used by breeders as animal feed, namely:

1. Mahogany Leaf field grass (*Swietenia mahagoni*)
2. Sengon leaves (*Albizia chinensis*)
3. Lamtoro (*Leucaena leucocephala*)
4. Calliandra (*Calliandra calothyrsus*)
5. Elephant Grass (*Pennisetum purpureum*)
6. Odot Grass (*Pennisetum purpureum* cv. *Mott*)
7. Cassava Leaves (*Manihot esculenta*)
8. Kolonjono Grass (*Brachiaria mutica*)
9. Paitan Grass (*Axonopus compressus*)
10. Trembesi leaves (*Samanea saman*)
11. Mindi leaves (*Melia azedarach*)
12. Gadung (*Discorea hispida*)

Farmers usually collect these plants every morning (06.00-10.00 WIB) and afternoon (14.00-16.00 WIB), depending on weather conditions and the amount of feed needed, adjusted to the number of livestock they own. At that time, breeders will use motorbikes or walk along the path towards the forest, then start looking for and picking up grass or leaves under the feet of the trees with a collection volume ranging from 1-4 bundles, each bundle weighing 40 kg will be carried or carried using a motorbike. Research results from Birgantoro and Nurrochmat (2007) state that breeders in Sumberwaru Village also use grass taken from the forest as animal feed. This collection will be carried out daily by carrying 1-2 bundles on foot and 2-3 bundles using vehicles. The volume taken also depends on the number of livestock each person owns. The volume of use of grass and leaves by breeders in Besowo Village can be seen in Table 4.

Table 4. Grass and Leaf Volume

Volume of Grass and Leaf Utilization (bunch)	Number of breeders	Percentage (%)
1	31	44,93
2	30	43,48
3	5	7,25
4	3	4,35

Source: Primary data processed (2024)

Local farmers also use forest products in the form of wood for daily life. Research results show that Besowo Village farmers use fallen wood branches such as teak, sengon, gembilina, salam and mahogany as firewood for cooking. This is known to be the same as the results of research from Birgantoro and Nurrochmat (2007), namely that the people of Sumberwaru Village and Sumberanyar Village also use rencek (small twigs) from the forest, which are taken using motorbikes or carried on their shoulders. The rencek taken is usually used as firewood or resold as additional income. The tradition of Greek, or looking for wooden branches, also occurs in Saradan, Madiun. Communities on the edge of the Saradan forest also take wood from the forest for cooking purposes at home and in local shops. Harvesting is done by sawing dry twigs at a distance of 10-15 cm from the tree to avoid damage due to rot, which causes the wood to rot and reduce its quality (Lailin & Latansyah, 2022).

Strategy for Utilizing Forest Resources for Livestock Development

Internal Factors

- **Strength**

The forest can be used openly by local breeders

Besowo Village is right next to forest areas owned by Perhutani, and both protected forests and production forests; this makes the opportunity for the community to utilize the forest area even higher, both to take wild grass as animal feed and wood that can be used to repair livestock pens or simply as firewood. Not only that, but the existence of land sharing from Perhutani can also be utilized by breeders to plant crops using an agroforestry system intercropping with types of plants, namely corn, peanuts, shallots, tomatoes, durian, chilies, sweet potatoes, and avocados which can be bought and sold to increase their income—profits, and capital in purchasing livestock seeds. Breeders can

also use the edges of the shared land to plant several animal feed plants such as odot or elephant grass. This is by the opinion of Suryanto (2019) that this agroforestry system has several benefits, namely improving the quality of soil and water, increasing forest resilience in supporting river watersheds (DAS), providing livestock with shelter and feed, and maintaining the necessary land resources both for human and livestock needs.



Figure 6. Farmers collect grass from the forest
Source: Research Documentation (2023)

Water availability, ad libitum

The need for drinking water for livestock comes from river areas, and sources are channeled using pipes directed to every house of Besowo residents. Using this water source requires residents to pay 20,000 IDR annually for installation maintenance costs. Not only that, there is also a Pamsimas program which was built in 2018, namely a clean water installation that comes from the precise source of the Dawung Papat River and is starting to serve the water needs of the Sekuning and Jaban areas and is projected to be distributed throughout Besowo Village. Several rivers and water sources used for water needs in Besowo Village can be seen in Table 5.

Table 5. Besowo Springs

Springs River	Water flow
Kali Konto	Upstream: Mount Kelud Flow: Besowo Forest, Sekuning Downstream: Brantas
Kali Tengah	Upstream: Mount Kelud Flow: Besowo Forest, Plantation, East Kenteng, Wangkalan Downstream: Konto River
Kali Dawung Papat	Upstream: Masekan Forest Flow: East Besowo, Sekuning Downstream: Konto River
Sumber Bening	Pamsimas
Sumber Wangkalan	Wangkalan
Sari Dengkul	Corah Kenteng Barat

Source: Besowo Village Mapping Team (2020)

Breeders use the existing water to bathe livestock according to the condition of their fur. Livestock with filthy fur will immediately be bathed and have their fur brushed to keep the livestock clean and avoid the emergence of disease. Local farmers also use the water to drink for livestock, which will be provided daily.



Figure 7. Water for livestock's drinking and bathing

Source: Research Documentation (2023)

There are many potential forest resource variations for livestock

The forest area in Besowo Village has a reasonably high flora diversity and can be used to help develop goat/sheep farming. Several types of flora that breeders often use for feed are *odot*, *kaliandra*, elephant grass, *paitan* grass, *rete*, *kolonjono*, mahogany leaves, *segon* leaves, *mind*i leaves, and *lamtoro*, while the types of wood that are often used by breeders both for repairing cages and firewood is teak, *segon*, bay, mahogany,

gembilina and basalt. The Besowo Village Mapping Team (2020) also added that other types of local vegetation that are often found in the Besowo Forest are acacia, banyan, bamboo, flamboyant, *kluwer*, *rau*, rattan, *guava*, *rete*, *kedondong alas*, and *cembrit*. The many types of plants are potential commodities for use as animal feed. Farmers will encroach and take leaves and grass from the forest for animal feed. Collection is carried out every morning and evening with the amount adjusted to the number of livestock owned. Forest plants are used as feed to reduce feed costs because feed contributes to substantial production costs, namely 60-80% of the total costs of livestock businesses (Nursida & Susanto, 2017).



Figure 8. Forest Resources Types of Grass and Timber
Source: Research Documentation (2023)

Easy access to forest resources

The distance between the forest area and the Besowo Village residential area is close, only 1-2 km. Road access to the forest is quite good even though the condition is still dirt. This road can be traversed by two motorbikes alternately or on foot and takes 10-20 minutes from the forest entrance gate. The surrounding area is filled with tall trees, such as mahogany, so the conditions are shady. This road access is important because it makes it easier for breeders to go in and out of the forest to pick up grass and leaves for animal feed as well as fallen twigs for repairing cages and firewood; this is the opinion of Afriansyah et al. (2012) that this road infrastructure is quite important to support development and increase accessibility and mobility of the surrounding community so that economic and social needs can be adequately reached and support local economic growth. East Besowo, West Kenteng, Kenteng Timur, and Sidodadi are hamlets directly adjacent to the forest area.



Figure 9. Road access to the forest
Source: Research Documentation (2023)

The existence of forest resources increases the welfare of farmers

Forest areas close to mountainous areas provide high fertility to the soil. This positive value supports the implementation of a sharing system between Perhutani and breeders. Farmers will be given cultivated land in areas on the edges of protected forests and production forests to plant several horticultural plants (fruit and vegetables) and economically valuable secondary crops such as cassava, sweet potatoes, corn, and long beans. Breeders must also pay attention to forest sustainability. Breeders are required to plant and care for one main tree during the maintenance period and planting period for sharing land such as *sengon*, mahogany, *saigondi* provided by Perhutani and are prohibited from destroying or taking anything from forest plants such as leaves or wood that is still intact from the tree directly. This is intended so the forest area does not experience damage and can still benefit all parties, including the livestock community and Perhutani. Planting this plant certainly benefits breeders; the proceeds from the sale can be used for additional capital to develop their livestock or share payment capital to Perhutani is 70,000IDR/5 m² every year.



Figure 10. Corn and Cassava Planting
Source: Research Documentation (2023)

- **Weakness**

Assistance and training on the use of forest resources is still rarely provided

The Besowo Village Government, as the authorized stakeholder, is less focused on the livestock sector. This is due to a lack of human resources, and the village government has launched no unique livestock program, so special assistance and training regarding forest resources are still rarely provided and await cooperation with Perhutani. The agricultural business sector still dominates Besowo Village, so the village government focuses more on increasing agricultural development. Perhutani itself has not yet focused on animal husbandry because it is focused on implementing the Joint Community Forest Management (PHBM) program to create good relations between Perhutani and the surrounding community through land and non-land distribution as a step to increase the community's role in forest preservation and community welfare (Situmorang & Noviana, 2022). The lack of focus on these two stakeholders means that assistance and training on using forest resources are still lacking so that local livestock farmers can use the forest for what has been done for generations.

Lack of number of human resources from the Besowo Village government and DKPP who manage the livestock sector

The animal husbandry sector in Besowo Village is starting to experience development. However, the number of human resources caring for this field remains minimal. Namely, the number of human resources who care for the animal husbandry sector in the Village government area is only one person, Mrs. Ning. "*The Besowo Village Government also does not have a head of division who deals directly with livestock businesses, and there is no special work program on animal husbandry because the majority of the population has their main livelihood as horticultural farmers, so there is no focus on developing animal husbandry. However, the Besowo Village Government is very open to having several external parties or breeders who wish to develop the livestock sector in Besowo*" (Eko Mawanto, Village Secretary). DKPP (Food Security and Animal Husbandry Service) Kediri, as a livestock and animal health service institution, also has not maximized its role, and it is only represented by a PTP (Livestock Technical Officer), namely Mrs. Lilik, with quite a lot of duties such as helping and managing livestock health with breeders. She said, "*I only following the livestock group meeting agenda to provide*

opinions and suggestions and help handle livestock diseases so that I cannot only focus on animal husbandry in Besowo Village”.

Lack of regular socialization and publication of forest resource material

Perhutani's lack of role in providing socialization and publication regarding forest resources means that livestock farmers are unfamiliar with the procedures for forest resources in the field. Farmers tend only to use what they can as long as they do not take leaves or wood still standing because of the threat of sanctions from Perhutani, either summoning them or reporting them to the police. The absence of socialization and publication also means that goat/sheep breeders are less able to innovate regarding leaves and grass taken from the forest, so they are only given directly to the breeders, and there has been no effort to store these resources for a long time.

Breeders use forest resources less frequently

The wide variety of Besowo forest resources makes it easier for breeders to utilize and manage these resources as capital for developing goat/sheep farms. However, most breeders have not been able to utilize them optimally because the nature of their farming is still sideline (future savings). Grass and leaves obtained from forest areas tend only to be used as animal feed for one day's collection, without any direction for creating feed banks or silage. This can, of course, be a problem when the lean or dry season hits because it is very likely that the amount of grass or leaves obtained is uncertain, so feed for livestock is not available continuously, affecting livestock development. Hilmi et al. (2016) believe this green feed is often a problem for goat and sheep breeders because it takes much time to collect. In the dry season, the quantity is uncertain, making breeders worry about being unable to meet the nutritional needs of livestock continuously and even requiring breeders to sell livestock because they do not have the capital to buy animal feed.



Figure 11. Grass and Foliage

Source: Research Documentation (2023)

External Factors

- **Opportunity**

Development of Goat/sheep farming in Besowo

Animal husbandry in Besowo Village is becoming an option for businesses other than gardening and farming, although it is still used as savings for emergencies. As the years go by, the number of farms in Besowo increases and becomes more varied. The most significant development is in goat/sheep farming, with the number of goats increasing sharply from 2020 to 2022 by 100% from 1524 heads (Besowo Village Mapping Team, 2020) to 3106 heads (Besowo Village Data, 2022), while the number of sheep increased by 90% from 33 individuals (Besowo Village Mapping Team, 2020) to 322 individuals (Village Data besowo, 2022).



Figure 12. Development of Local Livestock

Source: Research Documentation (2023)

Numbers of forest resources can be used as traditional livestock medicine

Forest resources are not only used as animal feed or cage repair materials but can also be used as traditional medicine for livestock. Several types of plants usually used by goat/sheep breeders in Besowo Village are empon-empon, such as turmeric and ginger, which treat bloating/colds in livestock. These tampons will be ground into a fine powder and then mixed into the drinking water of sick livestock. This traditional medicine was chosen to reduce production costs because there is no need to call a veterinarian and buy livestock medicines. Zulfanita et al. (2017) believe medicinal plants are used as traditional medicine to replace expensive factory medicines. This medicine will be given to livestock through drinking water or mixed into feed to increase the livestock's appetite for food so

that it avoids disease attacks, optimizes the reproductive and production systems, and does not cause a strong odor in the feces. Soediyo (1992) and Zulfanita et al. (2017) added that herbal plants for livestock help increase body endurance, prevent all diseases, and help to heal from disease. Some herbal medicine ingredients include garlic, galangal, ginger, turmeric, ginger and betel leaves.

Formation of new livestock groups

Goat/sheep farming in Besowo Village is starting to develop consistently. Several groups began to be established that focused on animal husbandry and were no longer affiliated with farmer groups. There are at least seven livestock groups in Besowo, as seen in Table 6.

Table 6. Livestock Groups in Besowo Village

Farmers Group	Year Founded	Commodity
Rojomulyo	2014	Sheep
Tjoelanggi	2020	Trigona Bee
Tani Mulyo	2009	Sheep, goats, beef cattle
Djimat Makmur	2019	Sheep and goats
Sumber Rejeki	2014	Kacang Goats
Maju Mapan Berkah	2022	Ettawa crossbreed goat
Abadi Sejahtera Besowo Al-Barokah	2024	Lamb

Sumber: Azizah, et al. (2024)

The establishment of this livestock group aims to accommodate and help breeders develop their livestock businesses through meetings to exchange information and knowledge and find solutions regarding their respective farms. This is the opinion of Solikin and Linawati (2022), who state that the existence of this livestock group has several benefits, namely being a forum for interaction and cooperation between members to solve livestock problems as well as being a forum for seeking new knowledge and skills regarding livestock rearing management and livestock competency. Livestock groups can also be used as a forum for farmers to meet with Perhutani to discuss approved sustainable forest resource utilization mechanisms and existing regulations. The meeting also made it easier for Perhutani to hold opinion polls with local breeders regarding providing training and assistance focusing on a sustainable forest resource. Livestock groups can also be used as a medium for disseminating the latest information about forests to group members and the general public so that they can disseminate information widely and quickly.



Figure 13. Rojomulyo Farmers Group

Source: Research Documentation (2023)

The existence of superior goat/sheep breeders

Sudirman (2022) states that medium-scale farms have several livestock of 11-50 heads, and large-scale farms have several livestock above 50 heads, so these two types of livestock can be said to be superior because they can manage large numbers of goats/sheep, their characteristics his business has turned to profit, no longer as savings for urgent needs and can utilize existing forest resource, not only as animal feed but also for sale. One of the superior breeders in Besowo Village is Mr. Bagus Dwi Prasetyo. Mr. Bagus is a superior breeder who has been in animal husbandry for 6 years. He has 300 sheep he buys and sells directly and via social media. He has collaborated with YDSF and Nurul Hayat to provide sacrificial animals. Mr. Bagus has also been able to use his shared land as a container for planting forage for livestock, for example elephant grass, which is used as a feed source for his livestock and resold in silage to local farmers and other consumers. Mr Bagus is not only buying and selling animal feed but also selling animal feed chopper machines promoted via YouTube and WhatsApp channels. The existence of superior breeders like Mr. Bagus motivates local breeders to develop and be successful like him; not only that, Mr. Bagus also opens job vacancies to manage his sheep farm. Another successful breeder is Mr Wawan. Mr Wawan has been in the goat farming business for 10 years. He is one of the breeders who use the "macro" system as the starting point for his business by accepting several goats to be kept and cared for until they are ready to sell. At first, Mr Wawan could only raise 3 to 4 goats due to limited land for cages, but gradually, his business grew, and he could buy new land to use as an area for his goat farm. Mr. Wawan's farm now has 35 goats, and his son, Mas Sony, continues his business.



Figure 14. Mas Bagus and his sheep farm
Source: Research Documentation (2023)

- **Threat**

Lack of the sharing system and land utilization socialization

The meeting agenda between the breeders and Perhutani, which discusses the sharing system and land utilization, is still very rarely held, and the absence of PKS means that breeders do not know in detail about the sharing system (purpose of sharing payments, details of sharing system payments) and the stake land they own (location of land whether it is in the middle of the forest or the edge of the forest). This lack of farmer insight means that most breeders only focus on paying for sharing each year without any desire to agree and get further information regarding sharing. Apart from that, there are also several problems with the land given to breeders, namely that some of the breeders' land is in less strategic locations and is more challenging to reach than other breeders' land due to breeders' ignorance of detailed land information. "The land distribution carried out is not fair, bro. "This is because most of the breeders are given land that is located far away (1-2 km from the forest entrance gate) and is perengan land, so it is difficult to reach and utilize" (M, Farmer). This can also cause social jealousy between communities because they feel there is injustice in land distribution, hindering the management and maintenance process.



Figure 15. Sharing Land
Source: Research Documentation (2023)

Forest resource theft

In general, the people of Besowo Village have long used forest areas as a source of livelihood, either in non-timber forms such as grass and secondary crops or in the form of wood. The wood taken by the community consists of fence wood and large wood. This week, wood will be used as firewood for cooking, while large wood will be used as material for repairing and expanding livestock pens. Some types of wood that people often take are teak, mahogany, sengon, gambili, gambilina, basalt and salam. This wood collection is only permitted for dry wood falling to the ground, not wood still standing straight from the tree. However, the problem is that there are still cases of wood theft by irresponsible parties carried out secretly so as not to be discovered by guard officers (Azizah et al., 2024).



Figure 16. Wood Collection by Farmers
Source: Research Documentation (2023)

The difference in the amount of forest resource sharing creates social jealousy

The production forest area owned by Perhutani will be divided into several stakes to be used by Besowo goat/sheep breeders as land for planting secondary crops and horticulture using a system of intercropping with Perhutani's production trees until these

trees are very tall and shady because they hinder the farmer's planting of plants. Utilizing this land requires farmers to pay sharing in the form of money amounting to 70,000/5m²/year or in the form of coffee yields of 2-4 kg, which will be given to LMDH as the representative of Perhutani. This sharing system does not yet have an official written cooperation agreement (PKS), so there are no restrictions on the rights or obligations between breeders and Perhutani so that in implementation in the field, the amount of sharing paid is not by the initial agreement. This difference in sharing payments allows social jealousy between livestock communities that use cultivated land conflict. Nandini et al. (2022) believe this social jealousy will create conflict between communities, which usually occurs verbally through sarcasm or mutual reporting to companions or village officials.

Data analysis

IFAS and EFAS matrices

- IFAS Matrix

Table 7. IFAS Matrix

Points	Internal factors	Weight	Rating	Score	
Strengths	Forests can be used by local farmers openly	0.11	3.14	0.36	
	Drinking water for livestock that is available on <i>an ad libitum basis</i>	0.12	3.29	0.39	
	Potential forest resource variations are available for livestock	0.11	3.05	0.33	
	Access to forest resources is easy to reach	0.11	3.33	0.38	
	Forest resources provide benefits for farmers' welfare	0.11	3.09	0.34	
	Subtotal	0,57		1.80	56.84%
Weaknesses	Assistance and training on the use of forest resources is rarely carried out	0.13	3.63	0.46	
	Only a small number of stakeholders who support the livestock business are involved	0.12	3.20	0.37	
	Lack of information on sustainable forest resources	0.09	2.55	0.22	
	Utilization of forest resources is not optimal	0.11	2.98	0.31	
	Subtotal	0,43		1.37	43.16%
	Total	1,00		3.17	

Source: Primary data processed (2024)

Table 7 shows that the total IFAS matrix is 3.17, with a strength value of 1.80 or 56.84% and a weakness value of 1.37 or 43.16%. The greatest strength lies in the ease of access to forest resource and the need for drinking water for livestock, which is available ad libitum with ratings of 3.33 and 3.29, respectively. In contrast, the biggest weakness of livestock farmers is the lack of assistance and training on the use of forest resource and the lack of human resources available—managing the livestock sector with ratings of 3.63 and 3.20, respectively.

- **Matriks EFAS**

Table 8. Matriks EFAS

Points	External factors	Weight	Rating	Score	
Opportunities	The goat/sheep farming business in Besowo begins to develop	0.19	3.29	0.64	
	Some forest plants can be used as traditional livestock medicine	0.08	3.00	0.25	
	The formation of new livestock groups	0.12	3.24	0.38	
	The existence of superior goat/sheep farmers	0.14	2.36	0.45	
	Subtotal	0,53		1.72	64.93%
Threats	The explanation of the sharing system is not optimal	0.13	2.03	0.27	
	There is theft of forest resources, especially timber products	0.11	2.24	0.24	
	The unfair sharing of human resources triggers social jealousy	0.11	1.80	0.20	
	Information and communication about poor land use cause social jealousy	0.11	1.88	0.21	
	Subtotal	0,47		0.93	35.07%
	Total	1,00		2.65	

Source: Primary data processed (2024)

Based on Table 13, it can be seen that the total EFAS matrix is 2.56 with an opportunity value of 1.72 or 64.93% and a threat value of 0.93 or 35.07%, which can be interpreted as goat/sheep farming in Besowo Village has excellent potential to be developed by maximizing existing opportunities and reducing or avoiding several threats that could disrupt the running of livestock businesses in Besowo. The most significant opportunity lies where goat/sheep farming begins to develop in Besowo Village and the formation of several livestock groups with ratings of 3.29 and 3.24, respectively. In contrast, the biggest threat to livestock development in Besowo is the lack of an optimal

explanation of the sharing system. Still, there was forest resource theft, especially in wood, with ratings of 2.03 and 2.24, respectively.

SWOT Matrix

Based on the results of the IFAS and EFAS analysis, it can be seen that the scores for each factor, both internal and external, are as follows:

- Strength factor (Strengths): 1.80
- Weakness factor: 1.37
- Opportunity factor (Opportunities): 1.72
- Threat factor (Threats): 0.93

From these two types of analysis, an IFAS and EFAS matrix is shown in Table 9.

Table 9. IFAS and EFAS Matrix

IFAS/EFAS	<i>Strengths (S)</i>	<i>Weakness (W)</i>
<i>Opportunities (O)</i>	SO Strategy $1,80 + 1,72 = 3,52$	WO Strategy $1,37 + 1,72 = 3,09$
<i>Threats (T)</i>	ST Strategy $1,80 + 0,93 = 2,73$	WT Strategy $1,37 + 0,93 = 2,30$

Source: Primary data processed (2024)

Based on Table 9 regarding the IFAS and EFAS matrices, it can be seen that the SO strategy with a value of 3.52 is an aggressive strategy (growth-oriented strategy), which is the primary strategy in efforts to utilize forest resource appropriately for the development of goat/sheep farming in Besowo Village and occupies the first quadrant. In the second quadrant, there is a WO strategy with a value of 3.09, which supports the turnaround strategy; in the third quadrant, there is an ST strategy with a value of 2.73, which supports a diversification strategy, and in the fourth quadrant, there is a WT with a value of 2.30 which supports a defensive strategy. These four quadrants will form a SWOT analysis diagram in Figure 17.



Figure 17. SWOT Analysis Diagram
Source: Primary data processed (2024)

Based on the SWOT analysis diagram, it can be concluded that the strategy for utilizing forest resource to develop practical goat/sheep farming is the SO (Strengthens & Opportunities) strategy. The SO strategy is carried out by optimizing strengths to take advantage of existing opportunities to aggressively support the growth of something (Riantoro & Aninam, 2021). The SO strategy position in quadrant 1 is profitable because it has the power to take advantage of existing opportunities so that implementation of this strategy can be carried out easily (Rangkuti, 2005; Widyanto et al., 2012). An analysis of internal and external factors in using forest resource to develop goat/sheep farming in Besowo Village found several alternative strategies, as shown in Table 10.

Table 10. Internal and External Factors

Internal Factors	<p><i>Strength ness</i></p> <ol style="list-style-type: none"> 1. Forests can be used by local breeders openly and optimally 2. The need for drinking water for livestock is available ad libitum 3. There are many potential forest resource variations for animal husbandry 4. Access to forest resource is easy to reach 5. The existence of forest resource provides benefits for forest sustainability and welfare. 	<p><i>Weakness</i></p> <ol style="list-style-type: none"> 1. Assistance and training on the use of forest resource is still rarely provided 2. The number of human resources caring for the livestock sector is still very lacking. 3. Lack of continuous socialization and publication of forest resource material 4. forest resource utilization is less than optimal 	
External Factors	<p><i>Opportunities</i></p> <ol style="list-style-type: none"> 1. Goat/sheep farming in Besowo is starting to develop 2. Variations of forest resource can be used as traditional livestock medicine 3. Start forming new livestock groups 4. The existence of superior goat/sheep breeders 	<p><i>SO Strategy</i></p> <ol style="list-style-type: none"> 1. Optimizing the support of the Besowo Village and Perhutani village governments in the process of using natural resources 2. Optimizing the function of sharing land as a roughage planting area and supporting it by providing seeds/seedlings 3. Empowerment and agricultural extension program for individuals and livestock groups to utilize and conserve forests. 4. Optimizing the potential of farmers to utilize forest resources as profitable and sustainable for the development of goat/sheep farming. 	<p><i>WO Strategy</i></p> <ol style="list-style-type: none"> 1. Increase the intensity of training/counseling on using forest resource to increase farmers' awareness and skills in maximizing the use of forest resource as animal feed, medicine, and additional income that supports livestock development. 2. Strengthen relations between livestock groups as a forum for exchanging ideas and sharing knowledge through publications on forest resource. 3. Increase the number of human resources as stakeholders from both the Besowo Village Government and DKPP to increase the focus of the goat/sheep farming development program in Besowo Village.
<i>Threatens</i>	<p><i>ST Strategy</i></p> <ol style="list-style-type: none"> 1. Explanation regarding the sharing system and land utilization is still lacking. 2. There is still forest resource theft, especially wood. 3. The difference in the amount of forest resource sharing allows social jealousy. 	<ol style="list-style-type: none"> 1. Initiate authentic dialogue between Perhutani and livestock breeders to produce joint programs to accommodate both parties' interests to utilize and protect forests optimally for mutual benefit. 2. Strengthening cooperation in utilizing forest resource by creating a written PKS that is known and agreed upon between Perhutani and livestock farmers, which includes a detailed explanation regarding the sharing system and land utilization 3. Optimizing monitoring of forest areas through collaboration between Perhutani and livestock breeders as forest guards to reduce the level of theft of natural resources, especially wood 	<p><i>WT Strategy</i></p> <ol style="list-style-type: none"> 1. Providing training and regular meetings between breeders and Perhutani to discuss the sharing system and procedures for legally utilizing forest resource Providing several notice boards in areas frequently passed by breeders containing publications on forest resource utilization and protection

Source: Primary data processed (2024)

Table 10 shows that the SO (Strengthens and Opportunities) strategy can utilize forest resources to develop sheep/goat farming businesses in the Besowo Village area.

QSPM

The QSPM matrix is created based on internal and external factors from the IFAS, EFAS, and SWOT matrices, then multiplied by the AS value to get the total TAS. This TAS value is an indicator of the best strategy from several alternative strategies that have been formulated. The QSPM matrix in this research can be seen in Table 11.

Table 11. QSPM Matrix

NO	External/Internal Factors	Weight	Strategy 1 Optimizing <i>Stakeholder Support</i> in the Forest Resource Utilization Process		Strategy 2 Optimizing the function of <i>sharing</i> land as a roughage planting location		Strategy 3 Empowerment through extension programs and livestock groups		Strategy 4 Optimizing the potential of farmers to utilize forest resources as profitable and sustainable for goat/sheep farming development.	
			AS	TAS	AS	TAS	AS	TAS	AS	TAS
Strengths										
1	Forests can be used by local farmers openly	0.11	3.3	0.363	2.10	0.231	2.2	0.242	3.8	0.418
2	Drinking water for livestock that is available on an ad libitum basis	0.12	1	0.12	1	0.12	1	0.12	1	0,12
3	Potential forest resource variations are available for livestock	0.11	3.3	0.363	2.1	0.231	2	0.242	3.8	0.418
4	Access to forest resources is easy to reach	0.11	3.3	0.363	1	0.11	1	0.11	1	0,11
5	Forest resources provide benefits for farmers' welfare	0.11	3.3	0.363	2.1	0.231	1.7	0.187	3.6	0,396
Weaknesses										
1	Assistance and training on the use of forest resources is rarely carried out	0.13	3.6	0.468	1.5	0.195	1.9	0.247	3.2	0.416
2	Only a small number of stakeholders who support the livestock business are involved	0.12	3.3	0.396	1	0.12	2.1	0.252	3.1	0,372
3	Lack of information on sustainable forest resources	0.09	1.4	0.126	1	0.09	1.8	0.162	2	0,18
4	Utilization of forest resources is not optimal	0.11	3.3	0.363	2.1	0.231	2.1	0.231	3.4	0,374
Opportunities										
1	The goat/sheep farming business in Besowo begins to develop	0.17	3.2	0.544	2.1	0.357	2.2	0.374	3.5	0,595
2	Some forest plants can be used as traditional livestock medicine	0.16	3.4	0.544	2.1	0.336	2.7	0.432	3.5	0,560
3	The formation of new livestock groups	0.12	1	0.12	1	0.120	2.8	0.336	3.4	0,408
4	The existence of superior goat/sheep farmers	0.14	1	0.14	1	0.140	3	0.420	3.1	0,434
Threats										
1	The information in the sharing system is not optimal	0.12	3.8	0.456	1	0.120	3.2	0.384	1	0,120
2	There is theft of forest resources, especially timber products	0.10	3.4	0.34	1	0.100	2.7	0.270	2.6	0,260
3	The unfair sharing of human resources triggers social jealousy	0.10	3.7	0.37	1	0.100	2.6	0.260	1	0,100
4	Information and communication about poor land use cause social jealousy	0.10	3.3	0.33	1	0.100	2.7	0.270	1	0,100
		1	Total	6	Total	3	Total	5	Total	5

*AS = Attractiveness Score; TAS = Total Attractiveness Score

Source: Primary data processed (2024)

Based on the results of the QSPM matrix analysis above, it can be concluded that of the four strategies that have been previously formulated, there is one strategy that can be prioritized for implementation as a strategy for good use of forest resources, namely optimizing support from the Besowo Village Government and Perhutani in the process of utilizing forest resource with a total TAS value. Amounting to 6. This is supported by the opinion of Wibowo (2013) that political support from stakeholders for NTFP management policies is critical, and stakeholders must integrate in managing NTFPs. Qodriyatun (2019) also added that support from stakeholders is critical; this aims to increase the effectiveness of management of the Paliyan Wildlife Reserve (SM) so that local communities have the skills and expertise to utilize natural resources in Paliyan SM. Support from Besowo Village can be provided in the form of legalizing the position and activities of the local LMDH and collaborating with interested stakeholders to carry out a program to increase farmers' knowledge of how to use forest resource appropriately, such as making processed feed from forage or making livestock medicines from forest resource. The Besowo Village Government can also create a platform or forum for discussion, interaction, and collaboration between breeders, Perhutani, and the Besowo Village Government to utilize forest resources. Support from Perhutani can be provided in the form of written cooperation in the PKS regarding sharing to benefit both parties.

CONCLUSION

The forest resources utilized by Besowo Village breeders consist of non-timber forest products (NTFP) and Timber Forest Products (TFP). Non-timber forest products that have been utilized are grass (odot, elephant, *lapang*, *paitan*, and *kolonjono*) and leaves (cassava, tamarind, mahogany, *mind*, and *segon*), which are used as animal feed, while wood forest products that have been utilized are usually in the form of twigs, which is used as firewood or big wood/timber for repairs and cage expansion are teak, segon, gembilina, salam, mahogany, and basalt.

The appropriate strategy for utilizing forest resources for developing sheep/goat farming businesses in the Buffer Zone area of Besowo Village Nature Reserve, Kepung District, Kediri Regency, is to use the SO strategy by utilizing all existing strengths in the field to optimize opportunities using (a). optimizing government support Besowo and Perhutani Villages in the process of utilizing forest resource; (b) optimizing the function

of sharing land as a special area for planting forage with the support of providing forage seeds/seedlings; (c) empowering and assisting individuals and livestock groups in utilizing and preserving forests; and (d) optimizing the potential of farmers to utilize forest resource as capital for developing profitable goat/sheep farming. The priority strategy to be implemented is optimizing support from the Besowo Village government and Perhutani in utilizing forest resource to develop sheep/goat farming businesses in the Besowo Village Nature Reserve buffer zone area.

REFERENCES

- Abdoellah, O. S. 2017. *Ekologi Manusia dan Pembangunan Berkelanjutan*. Jakarta: PT Gramedia Pustaka Utama.
- Afriansyah, R., A. Wicaksono dan L. Djakfar. 2012. Penentuan Prioritas Pengembangan Jaringan Jalan Pendukung Kawasan Strategis di Pulau Sumbawa. *Jurnal Rekayasa Sipil*. 6(3): 214-225.
- Aprylasari, D., Azizah, S., & Pribadi, T. A. (2024). Group Dynamics Among Beef Cattle Farmers in Merak Hamlet, Sumberwaru Village, Situbondo Regency. *Agriwar Journal*, 4(1), 25-33.
- Aprylasari, D., Azizah, S., Man, N., Siswijono, S. B., Djunaidi, I. H., Wati, A. M., & Rachmawati, A. (2022). Peasant women empowerment as a conflict resolution strategy in Sidomulyo Hamlet, Baluran National Park. *Jurnal Ilmu-Ilmu Peternakan (Indonesian Journal of Animal Science)*, 32(3), 437-451.
- Azizah, S., Aprylasari, D., Djunaidi, I. H., Rachmawati, A., & Indrati, R. (2024). EMPOWERING POULTRY FARMERS THROUGH TRAINING ON PREPARING FEED RATIONS BASED ON LOCAL RAW MATERIALS IN MOJOKERTO REGENCY. *Jurnal Pengabdian Kolaborasi dan Inovasi IPTEKS*, 2(4), 1264-1273.
- Azizah, S., R. Shofiyyah, I. H. Djunaidi, A. Rachmawati, N. Man dan A. Mukaromah. 2024. Empowering Livestock Development: Unveiling Stakeholder Impact in Besowo Village, Indonesia's Nature Reserve Buffer Zone. *Tuijin Jishu/Journal of Propulsion Technology*. 45(1): 4546-4553.
- Birgantoro, B. A., dan D. R. Nurrochmat. 2007. Pemanfaatan Sumberdaya Hutan oleh Masyarakat di KPH Banyuwangi Utara. *Jurnal Manajemen Hutan Tropika*. 13(3): 172-181.
- BPS Kabupaten Kediri. 2024. *Kecamatan Kepung dalam Angka 2024*. Kediri: BPS Kabupaten Kediri.

- Hilmi, M., E. S. Haq dan F. Panduardi. 2016. IBM Pemberdayaan Kelompok Ternak Kambing Ettawa melalui Pelatihan dan Pendampingan dalam Produksi Silase sebagai Pakan Ternak Alternatif di Desa Wongsorejo. *Jurnal Pengabdian Masyarakat J-Dinamika*. 1(2): 70-76.
- Lailin, M. I. A. H., dan A. N. Latansyah. 2022. Nilai-nilai Kearifan Lokal dalam Tradisi “Ngalas: sebagai Upaya Pelestarian Lingkungan Hutan di Wilayah Saradan Madiun. *Pawitra Komunika: Jurnal Komunikasi dan Sosial Humaniora*. 3(2): 141-154.
- Maharani, S. dan M. Bernard. 2018. Analisis Hubungan Resiliensi Matematik terhadap Kemampuan Pemecahan Masalah Siswa pada Materi Lingkaran. *Jurnal Pembelajaran Matematika Inovatif*. 1(5): 819-826.
- Mustikaningrum, D. 2022. *Serapan Karbon Hutan Produksi*. Yogyakarta: CV Bintang Semesta Media. ISBN: 978-623-8015-26-9.
- Nandini, R., B. G. R. Putri, S. N. Setiawan, F. Anggraeni dan M. Fedryansyah. 2022. Peran Pendamping Program Keluarga Harapan (PKH) dalam Upaya Resolusi Konflik Sosial di Desa genteng Kecamatan Sukasari, Kabupaten Sumedang. *Jurnal Kolaborasi Resolusi Konflik*. 4(1): 74-82.
- Nursida dan H. Susanto. 2017. Kelayakan Finansial Penggemukan Kambing Potong di Kota Sangatta. *Ziraa'ah*. 42(3): 200-207.
- Perhutani. 2021. *Perhutani Dukung Masyarakat Sekitar Hutan Kembangkan HMT di Ponorogo*. Diakses 4 Januari 2024. < <https://www.perhutani.co.id/perhutani-dukung-masyarakat-sekitar-hutan-kembangkan-hmt-di-ponorogo/>>.
- Pratita, I. dan A. D. Laksono. 2020. “Anak ini kalau makanan, ya apapun yang diminta...”: Eksplorasi Nilai Anak dan Pola Pengasuhan Anak pada Suku Jawa di Desa Besowo, Kediri, Jawa Timur. *Amerta Nutrition*. 4(2): 147–154.
- Qodriyatun, S. H. 2019. Peran dan Partisipasi Masyarakat dalam Pengelolaan Kawasan Konservasi secara Kolaboratif. *Kajian*. 24(1): 43–56.
- Rangkuti, F. 2014. *Analisis SWOT: Teknik Membedah Kasus Bisnis*. Jakarta: Gramedia Pustaka utama.
- Riantoro, D. dan J. Aninam. 2021. Analisis SWOT untuk Strategi Pengembangan Objek Wisata Hutan Bakau Kormun Wasidori Arfai di Manokwari. *Lensa Ekonomi*. 15(1): 151-172.
- Roslinda, E., T. Widiastuti dan L. Sisilia. 2024. Pengenalan Manfaat dan Nilai Ekonomi Hutan sebagai Usaha Pelestarian Sumberdaya Hutan. *JMM (Jurnal Masyarakat Mandiri)*. 8(2): 2228-2236.

- Santosa, L. W., T. N. Adji, A. J. Pitoyo dan A. Suyanto. 2014. *Kajian Lingkungan Hidup Strategis (KLHS) Kabupaten Banggai Kepulauan*. Yogyakarta: Gadjah Mada University Press.
- Santoso, A. B., T. Supriana dan M. A. Girsang. 2022. Pengaruh Curah Hujan terhadap Produksi Ubi Kayu di Indonesia (*Precipitation impact on cassava yields in Indonesia*). *Agro Bali: Agricultural Journal*. 5(3): 520-528
- Siburian, R., M. Imron, T. Indrabudi, A. Hilmawan, L. Nurhidayah, A. Wahyono, R. Indrawasih, D. Rachmawan, Sudiyono dan H. Hidayat. 2021. *Dari Hutan sampai Laut: Mendorong Pengelolaan Berbasis Masyarakat Lokal*. Jakarta: Yayasan Pustaka Obor Indonesia.
- Silahooy, V. B., M. Kaihena, A. Killay, M. Nindatu, T. W. Watuguly, M. Moniharapon, A. J. A. Unitly, D. D. Moniharapon, L. M. Ch. Huwae, R. S. Mantaiborbir, A. Sairudy, J. P. E. Rumangun, I. Welerubun dan B. Gairtua. 2024. *Alam dan Perkembangannya*. Makassar: CV. Tohari Media. ISBN: 978-623-8421-31-2.
- Sinery, A. S., R. Angrianto, Y. Y. Rahawarin dan H. F. Z. Peday. 2015. *Potensi dan Strategi Pengelolaan Hutan Lindung Wosi Rendani*. Yogyakarta: Penerbit Deepublish.
- Situmorang, M. T. N., dan L. Noviana. 2022. Peningkatan Pendapatan Masyarakat dan Pelestarian Hutan melalui Program Pengelolaan Hutan Bersama Masyarakat. *Arus Jurnal Sosial dan Humaniora (AJSH)*. 2(2): 68-75.
- Sodiq, A., dan Z. Abidin. 2009. *Meningkatkan Produksi Susu Kambing Peranakan Etawa*. Jakarta: Agromedia Pustaka.
- Solikin, N. dan Linawati. 2022. Partisipasi Anggota Kelompok Ternak dalam Pengembangan Sumberdaya dan Usaha Peternak Sapi Potong. *AMMER: Journal of Academic and Multidiscipline Research*. 2(1): 32-36.
- Sudirman. (2022). *Daya Saing Usaha Ternak Sapi Bali*. Pekalongan: PT. Nasya Expanding Management.
- Suhardi, S., Aprylasari, D., & Wibowo, A. (2025). Improving Community Literacy in Environmental Management Through Community-Based Education in Muara Kaman District, Kutai Kartanegara District, East Kalimantan Provision. *Karunia: Jurnal Hasil Pengabdian Masyarakat Indonesia*, 4(1), 67-81.
- Sumarjono. 2013. *Konflik Agraria Pengelolaan Sumber daya Air*. Yogyakarta: APMD Press.
- Supriatna, J. 2018. *Konservasi Biodiversitas: Teori dan Praktik di Indonesia*. Jakarta: Yayasan Pustaka Obor Indonesia. ISBN: 978-602-433-633-2 e-book.
- Suryanto, A. (2019). *Pola Tanam*. Malang: UB Press.

- Tim Pemetaan Potensi Desa Besowo. 2020. *Besowo Profil Desa*. Kediri: Pemerintah Desa Besowo.
- Wibowo, G. D. H. 2013. Analisis Kebijakan Pengelolaan Hasil Hutan Bukan Kayu (HHBK) di NTB dan NTT. *Jurnal Hutan dan Pembangunan*. 2(1): 197-225.
- Widyanto, J., H. Basri dan Dahlan. 2012. Potensi dan Strategi Pengembangan Hutan Rakyat di Kabupaten Bireuen Provinsi Aceh. *Jurnal Manajemen Sumber daya Lahan*. 1(1): 1-9.
- Wulan, Y. C., Y. Yasmi, C. P. and E. Wollenburg. 2004. Analisa konflik sektor kehutanan di Indonesia. Bogor: Center for International Forestry Research.
- Wulandari, Y.E & Kuntjoro, S. 2019. Keanekaragaman dan Kelimpahan Jenis Burung di Kawasan Cagar Alam Besowo Gadungan dan sekitarnya Kabupaten Kediri Jawa Timur. *Jurnal Riset Biologi dan Aplikasinya*. 1 (1): 18-25.
- Zulfanita, R. E. Mudawaroch dan J. M. W. Wibawanti. 2017. Manajemen Kesehatan Ternak melalui Pemberian Jamu Herbal Fermentasi. *Surya Abdimas*. 1(1): 38–44.