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Setulang forest conservation strategy in safeguarding the conservation of non-timber forest products in Malinau District

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Abstract. Some research on human relationships with forests shows that human activities for the forests are sufficient to meet demand or to meet demand. Both will directly or indirectly change the perceptions of the people who exploit them against the forests being utilized. Setulang community one of the community groups that intensively utilize NTFP as one of the source of fulfillment and fulfill the demand of handicraft product. For needs and demand of livelihood the people of Setulang choose to make the existing forest in the Tane Olen area into. The analysis method used in this research with Strength Weakness Opportunity and Threat (SWOT). The results of this study show the extent to which the commitment of Setulang community and the conservation efforts of Setulang community both self-help and donor assistance and the local government, as well as what strategic steps can be taken by the stakeholders to conserve so that the village forest can provide benefits in the short or long term. Strategic measures need to be set up save Setulang State Forest from degradation and deforestation occurring around the village.

1. Introduction

1.1. Background

Community life in a region is closely related to the availability of nearby natural resources. Such conditions also occur in communities living in or around the forest. Communities in or around the forest will utilize forest products in the form of timber, not wood and environmental services [1,2,3, 4]. Such close dependence of the community on forests, raises awareness to keep the survival of the resources being utilized. Attitudes towards forests of local communities around the forest will be very different to those who only use forest products for commercialization but have no direct attachment to forests.

Based on the empirical data on the number of villages directly related to forest areas stated by the Ministry of Forestry in the Strategic Plan of the ministry of Forestry 2010-2014, there are 31,957 villages, consisting of 1,305 villages within the forest area, 7,943 villages on the edge of the forest



area, and 22,709 villages in around the forest area (Ministry of Forestry Strategic Planning 2010-1014). Specifically, in East Kalimantan (including North Kalimantan), there are 285 villages in protected forest area, 628 villages are in Production Forest area, and 378 villages in Limited Production Forest area [5].

Setulang is one of the villages directly related to the forest in it. Setulang villagers facilitated by several donors (among others: CIFOR, GIZ-Forclime) are committed to preserving the forest in their village. The rationale for the choice of Setulang are for CIFOR's work was that the area had high environmental values, a significant population of poor, forest-dependent people, and that it was located at the forest frontier [6][7].

The commitment is manifested in the form of Village Forest. Setulang State Forest officially gained state recognition with the issuance of Forestry Ministerial Decree No. 526 / Menhut-II / 2003 on the Establishment of Limited Production Forest Area as a Setulang Forest Management Area of 4,330 hectares (hereinafter revised to Decree of Minister of Forestry Number 755 / Menhut-II / 2014 regarding Setting of Setulang Forest Working Area of 4,415 hectares in Forest Protection Area (HL) and Limited Production Forest (HPT) in Kecamatan Malinau Selatan, North Kalimantan Province).

Of the 905 people in Setulang, 32.15 percent of them earn a living from the agricultural sector. Those who have livelihoods from the agricultural sector also use the Village Forest as a source of Non-Timber Forest Products (NTFP) for raw materials for handicrafts and suppliers of food and medicines. Non-wood forest products (NWFPs) or Nontimber Forest Product (NTFPs) such as nuts, mushrooms, herbs, spices, aromatic plants and game have been used for food, health and cultural purposes for millennia, yet there is a tendency to underestimate their role because they are poorly represented in international statistics, as in most cases their use and trade are confined to the informal sector. Recent studies show that NWFPs still form the basis of lives and livelihoods in many parts of the world and play a much more significant role in food and nutrition than previously thought [8,9,10,11]. The main reasons are the role of these products in providing livelihood and food for rural communities to reduce poverty along with supporting various environmental goals such as conservation of biodiversity. Traditional conservation schemes seek to ensure the provision of environmental services by restricting the rights of rural communities to access and use natural resources [12]. Nontimber forest products (NTFPs) are accepted as a veritable means of achieving poverty alleviation because of their role in sustaining this livelihood, for food security and environmental objectives such as biodiversity conservation. Given the importance of forests for community life, it is necessary to devise a conservation strategy that can ensure the sustainability of Village Forest by involving local communities as the main actors

1.2. Reserach Purposes

This research purposes are: 1) Know the factors that strengthen and weaken the existence of village forest in the face of threats and opportunities, and 2) Establish a conservation management strategy of Setulang Forest Village Malinau District based on current conditions

2. Methodology

2.1. Study Area

This research focuses on Conservation strategy in Setulang Forest Village, Sub-district of Malinau Selatan Hilir, Malinau District, North Kalimantan Province. It is approximately ± 32 km from the Capital city of Malinau District. The boundaries of the village, covering the northern border with the village of Sentaban, the south bordering Setarap Village, the east bordering TanjungLapang Village, and the West bordering with Paking Village. Setulang Forest Village Location of Malinau Selatan Sub-district The Malinau District is located at the coordinates of $03^{\circ}20'$ 'North Latitude – $03^{\circ}30'$ North Latitude and $116^{\circ}24'$ 'East Longitude – $116^{\circ}29'$ East Longitude (Figure 1).

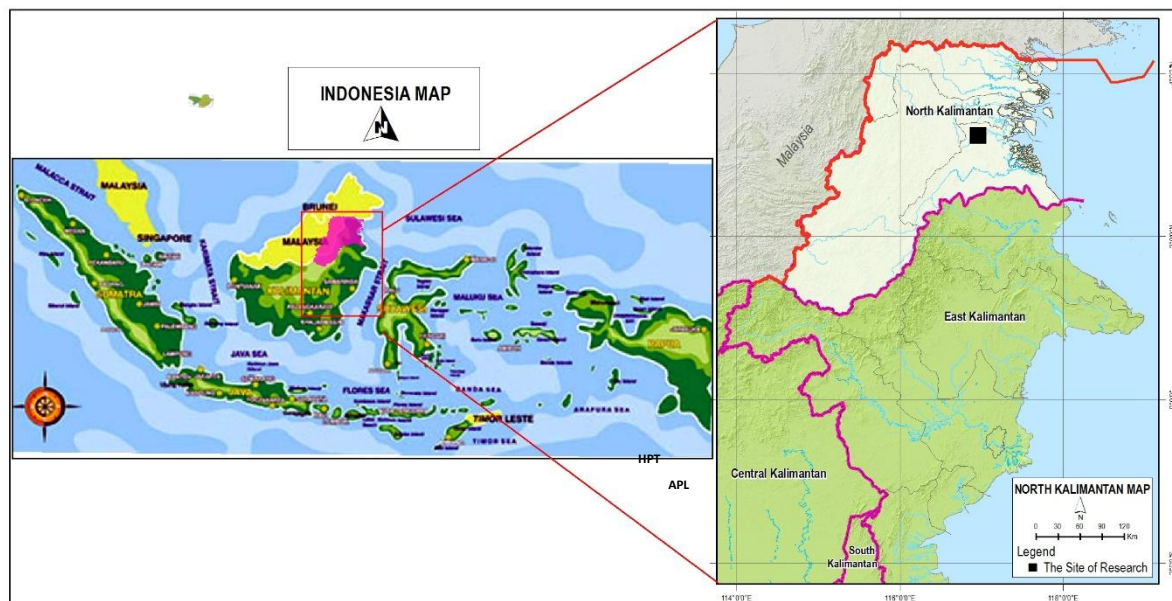


Figure 1. Setulang forest village location of Malinau Selatan Hilir sub-district (■).

2.2. Research Procedure

This research was conducted by collecting primary and secondary data. Primary data was obtained by interviewing selected informants by purposive sampling and tracing the location of Village Forest. While the secondary data collected in the form of previous research results and position maps. The collected data is tabulated and analyzed, to be further interpreted.

2.3. SWOT Analysis

The Analytic Hierarchy Process as a method of measurement with ratio scales and illustrate it with two examples. The use of SWOT as an analytical tool to strategize has been widely used by researchers. This is due to what is presented in the columns of SWOT is a form of interpretation of the results of a researcher's assessment both quantitative and qualitative.

Conducted SWOT analysis in identifying strategies for community development. Based on this exercise, the following five categories were identified and prioritized by villagers for the development of their village in future: 1. Conservation and utilization of natural resources (with reference to water and forest). 2. Development of the wasteland, agriculture and livestock sector. 3. Promotion of livelihoods resources and human resource development. 4. Promotion of health, cleanliness and education. 5. Development of village institutions [13]. SWOT analysis indicates a framework for helping the planners to identify the strategies of achieving goals. It is a technique used to analyze the strengths, weaknesses, opportunities and threats of businesses [14]. The SWOT analysis is complemented by AHP [15] to determine the priority of decision making in the formulation of a Village Forest management strategy. Assessing performance involves criteria [16] and priorities that are determined by user requirements and preferences as well as the characteristics of the individual institutes. AHP allows group decision-making. The AHP is now used as common tool in multi criteria decision making process as a part of operation research and management science because of it's both technically validity and practical usefulness [17, 18]. In the process of weighting in the AHP, determined the validity of paired data using the following formula: The ratio is obtained by dividing the Eigen Factor value of each criterion by its weight. Consistency Index (CI) is obtained through the equation:

$$CI = \frac{\text{Average Ratio} - n}{n - 1} \quad (1)$$

CI = Contingency index

Average ratio = Average ratio are ratio of paired comparisons matrix total with criteria total.

n = Sum of criteria

If the value of *CI* equal to zero, then the matched pairwise matrix is said to be consistent. The inconsistency limit set using Consistency Ratio (CR), ie comparison of consistency index (*CI*) with random index value (*RI*). The Consistency Rate can be formulated as follows:

$$CR = \frac{CI}{RI} \quad (2)$$

CI = Consistency index

RI = Random index

Random index (*RI*) is a random consistency index of each number of criteria. The compiled Random index as follows:

Table 1. Random index (*RI*)

<i>n</i>	1	2	3	4	5	6	7	8	9	10
<i>RI</i>	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.51

Note: If the value of *CR* < 0.1, then the value of *CR* or inconsistency value is still acceptable. However, if the value of *CR* > 0.1; then the assessment matrix must be repeated.

3. Results And Discussion

3.1. Internal and External Factor Analysis

Measures related to conservation efforts by the UmaLongh Community of Setulang Village have been carried out since their origin (Long Saan). One form of conservation efforts that are done is with the Tane Olen area which until now still maintained its existence. Tane Olen's own history has been clearly. Nevertheless, conservation efforts by UmaLongh community of VillageForest, along with time shift experienced obstacles and threats. On the one hand, the establishment of Tane Olen as a Village Forest so that the Setulang people have NTFP needs providers, but on the other hand, the opening of Setulang status as Tourism Village is also increasingly open relationship with the outside world which has the potential of inclusion of threats to the preservation of Village Forest. The following will present the Setulang Forest conservation strategy prepared based on the actual conditions.

Test results on consistency of paired data obtained by *CR* = 0.085012 (*CR* < 0.10); shows consistency is still acceptable. Based on EFI analysis, it is known that the total (score of *x* weight) obtained is 2.74. Weights on internal factors are presented in the following table 2:

Table 2. Evaluation of internal factor matrix (EFI)

No.	Internal Factor	Priority	Rating	Score
A. Strengths				
1	Forest Village in Setulang has a high diversity of biological and animal species	0.11	3	0.33
2	Boundary Clarity of Village Forest Area	0.22	4	0.88
3	Uma LonghSetulang community participation is quite high	0.15	3	0.45

4	The existence of a special institution responsible for the management of Village Forest area	0.08	3	0.24
5	Gets the attention of the world community	0.10	3	0.30
Subtotal		0.66		2.20
B. Weaknesses				
1	Large budget uncertainties available in managing Village Forest	0.11	2	0.22
2	The dependence of donor agencies who are willing to provide guidance and technical assistance in the management of Village Forest	0.10	2	0.20
3	Most young people are less interested in taking care of the Village Forest Most of the people of UmaLongh	0.06	1	0.06
4	Setulang who are domiciled around the Village Forest do not have the ability to prevent forest destruction.	0.03	1	0.03
5	The UmaLonghSetulang community does not have the capacity to cope with the possibility of forest and land fires	0.04	1	0.04
Subtotal		0.34		0.55
Total		1.00		2.74

Test results on consistency of paired data obtained by $CR = 0.065393$ ($CR < 0.10$); shows consistency is still acceptable. Based on EFE analysis, it is known that the total (score of x weight) obtained is 2.63. Weights on external factors are presented in the following table 3:

Table 3. Evaluation of external factor matrix (EFE)

No.	External Factor	Priority	Rating	Score
C. Opportunities				
1	Village Forest is one of the government's priority programs in the development of social forestry	0.12	3	0.36
2	The only model of Village Forest in Prov. Kaltara who has got the Decision Letter	0.16	4	0.64
3	Positive perceptions of local communities	0.11	3	0.33
4	The attraction for visitors from different countries to see directly Forest Village	0.14	3	0.42
5	Third party support (donor agencies)..	0.08	3	0.24
Subtotal		0.60		1.98
D. Threats				
1	The emergence of illegal plantation activities owned by individuals	0.13	2	0.26
2	The potential for horizontal and vertical conflicts.	0.13	2	0.26
3	Environmental conditions around the Tane'Olen area are more open.	0.04	1	0.04

4	Accessibility to the Village Forest location is increasingly accessible to outsiders.	0.05	1	0.05
5	Instability of socioeconomic conditions outside Setulang	0.05	1	0.05
Subtotal		0.40		0.65
Total		1.00		2.631

3.2. Conservation Strategy

There are several forest conservation efforts that can involve local communities, among others: All sites are forest areas considered to be “under threat”, where communities can harvest nontimber forest products for their own consumption. As in upstream areas in other parts of Asia, average areas of household cultivable land are <2 hectares, and most sites are located in undulating upstream areas [19]. This means that conservation here there are efforts to prevent damage as well as recovery efforts. In support of forest restoration activities by IUCN and others, here we present a comparative analysis of ecosystem service assessment tools that can quantify ecosystem service tradeoffs. In the following sections, we present an overview of ecosystem service models relevant to restoration decision making and characterize the tools based on five key criteria. These criteria include their ability to quantify the benefits of restoration activities and scenarios in a timely and cost-effective manner across different geographic locations and scales, ecosystem service types, decision contexts, and under varying levels of uncertainty [20].

From the result of the analysis to the internal aspect, it is seen that the biggest score becomes the strength in the clarity factor of Village Forest boundary (0.87), while the highest weakness score is on the big uncertainty factor available in managing the village forest (0.22). Then on the external aspect the largest score that becomes an opportunity lies in the factor of the only model of Village Forest in Prov. North Kalimantan that has got the Decision Determination (0.66), while the biggest threat to factor the emergence of illegal plantation activities owned by individuals (0.25). Based on the largest weight gain on both internal and external aspects, the village forest management strategy depends heavily on: (1) clarity of boundaries and land / ownership status, (2) budget availability, (3) government policy support, and (4) community participation. Boundary clarity is very important because one source of conflict that occurs in the community is the ambiguity of the boundary area / land. The encounter between internal and external factors will represent the current condition of management as shown in Figure 2. Point X is obtained by $(\text{Total strength} - \text{Total Weakness}) / 2 = (2.20 - 0.55) / 2 = 0.82$. Whereas point Y is obtained by $(\text{Total Opportunity} - \text{Total Threat}) / 2 = (1.98 - 0.65) / 2 = 0.67$. When presented in Cartesian diagram it will appear that the coordinate position obtained lies in quadrant I.

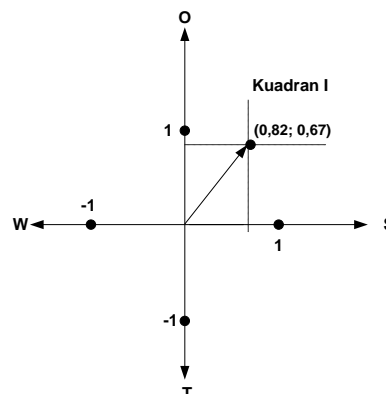


Figure 2. Cartesian graph of village forest position

In Figure 2 it is apparent that the Setulang Forest position at the time of study is in quadrant I, indicating that the Village Forest is in a very favorable situation. Village forest management has the opportunity and strength of the UmaLonghSetulang Community to take advantage of existing opportunities with the utilization of NTFPs from the village forest. The strategy to be implemented under these conditions is to support the policy of taking NTFPs to meet family needs and market demand. Here is a conservation strategy concept in sustainable Setulang Forest management considering the strengths and weaknesses (IFE) as well as the opportunities and challenges (EFE) can be arranged as follows:

Table 4. Conservation strategies in village forest management

Strategy of S-O	Strategy of W – O
Involvement of local communities in intensive conservation activities in KawasanForestVillage (S1O1, S2O1, S3O1, S2O2, S2O3, S3O3,S2O4)	Sufficient budget available from APBN, APBD and / or APBDes. On the other policy it reduces the dependence of aid from donor agencies (W1O1, W2O2, W2O3, W3O3, W1O4, W1O5)
Prevent the entry of illegal activities that could disrupt the continuity of Village Forest. (S5O1, S2O2)	Strengthen the capacity of the Village Forest Management Institution and complete the management office with comprehensive information related to Village Forest. (W2O1, W4O2, W4O3, W2O4,W2O5, W3O5)
Conduct ongoing socialization related to the protection and utilization of Village Forest as a source of NTFP and sustainable environmental services. (S1O2, S4O2, S3O4, S5O4)	Provide opportunities and provide capital assistance to young children in the villages around ForestVillage in order to utilize NTFPs and Ecotourism potential. (W3O1, W3O2, W1O3, W3O4, W4O4, W3O5)
Encourage the growth of civic economic activities for local communities. (S4O3, S5O3, S1O4, S4O4)	Preparing local communities to anticipate forest degradation and forest and land fire hazards (W5O1, W5O2, W5O3, W5O4, W5O5)
Optimizing the role of trained communities in empowering local communities around VillageForest. (S4O1, S1O5, S2O5, S3O5, S4O5, S5O5)	Make the community groups trained as pioneers in every activity in contact with forest management and its follow-up. (W4O1, W1O2, W4O5)
Strategy of S –T	Strategy of W –T
Prevent the expansion of illegal plantation activities by giving reprimands, legal sanctions (adat), to report to the authorities. (S1T1, S4T1, S2T1, S1T2, S2T2, S1T3, S5T4, S1T5)	There is a sufficient budget for the maintenance and restructuring of the village forest area. (W1T2, W1T3, W1T4)
Enable Village Forest patrols to conduct area monitoring by involving local communities. (S3T1, S5T1, S3T2, S2T3, S3T4, S4T4, S4T5)	Local community assistance intensively as needed. (W4T1, W4T3, W2T4, W4T4, W2T5)
Establish surveillance posts along access to the Village Forest area. (S4T2, S3T3, S4T3, S2T4)	Involvement of young people in securing Village forest area. (W3T1, W3T2, W3T3, W3T4, W3T5)
Limiting the entry of outsiders to village forest areas, except those licensed by the village forest management agency (S1T4, S2T5, S3T5)	Encouraging Setulang Village as a unique wicker craft center by using NTFP. (W2T3, W1T5, W4T5)
Maximizing business opportunities generated by the community from the utilization of NTFPs. (S5T2, S5T3, S5T5)	Minimize the influx of negative impacts that can prompt societal frictions with social approaches effectively (W1T1, W2T1, W5T1, W2T2, W4T2, W5T5, W5T3, W5T4, W5T5)

4. Conclusion

From the result of the research, it can be concluded that: Setulang community has done conservation effort in a consistent way, that is only utilizing ForestVillage as a producer of NTFP and environmental services in limited amount, so as not to cause risk of damage. On the other hand, although some of the short-term threats can still be controlled, long-term if left to disrupt the

sustainability of the village forest, the decline of biodiversity (flora and fauna) and the decrease of carbon stocks.

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