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Population and Habitat Management Development Strategy in The Tapanuli Orangutan (*Pongo tapanuliensis*) Conservation Area

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ARTICLE INFO

Article history:
Received July 07th, 2023
Revised May 14th, 2024
Accepted June 1st, 2024
Available online August 31th, 2024

E-ISSN: 2622-5093
P-ISSN: 2622-5158

How to cite:
A. P. M. Athoriez, Samsuri, A. Purwoko, Rahmawaty, and A. Rauf, "Population and Habitat Management Development Strategy in The Tapanuli Orangutan (*Pongo tapanuliensis*) Conservation Area" *Journal of Sylva Indonesiana*, vol. 07, no. 02, pp. 148-160, Aug. 2024, doi: 10.32734/jsi.v7i02.12703

ABSTRACT

Tropical forests in Indonesia, which are mega biodiversity countries, have a rich diversity of species, including the Tapanuli orangutan (*Pongo tapanuliensis*). This species is found in the Batangtoru landscape, mostly in the Other Use Areas (OUA) zone, which can pose a potential threat. The importance of meaningful and long-term local stakeholder engagement. It is necessary to strengthen the management capacity among stakeholders. Therefore, a study of the strategy for developing conservation area management is required. This research aimed to analyze the development and management strategy of conservation areas by related institutions to support the Tapanuli orangutan population and habitat conservation. Despite facing various threats to orangutan conservation, stakeholders still have internal strength. The strategy that must be implemented is to use strength to take advantage of long-term opportunities through a diversification strategy.

Keyword: Conservation Area, Development Strategy, Orangutan Habitat, Orangutan Population, Tapanuli orangutan *(Pongo tapanuliensis)*

1. Introduction

Tropical forests in Indonesia are home to animals that live and live in them. Indonesia is known as a mega biodiversity country with a very high diversity of ecosystems, species, and genetics [1], [2]. One of them is the Tapanuli orangutan (*Pongo tapanuliensis*). Named the third orangutan species, after the Bornean Orangutan (*Pongo pygmaeus*) and the Sumatran Orangutan (*Pongo abelii*) [3].

The Tapanuli orangutan population is estimated to be between 577 and 760 individuals, with a habitat size of 1,051.32 km^2 in the Batang Toru landscape [4]. The majority of Tapanuli orangutans live in secondary forests and other use areas [5]. It demonstrates that secondary woods in OUA provide abundant food and a desirable habitat for the Tapanuli orangutan. According to KLHK land cover in 2016, 15,673 Ha (18.89%) of

the 82,957 Ha of secondary forest in the Batang Toru landscape were in the OUA. Tapanuli orangutans belong to Species Critically Endangered in the Red of IUCN in 2017 [6].

Judging from the number of individual Tapanuli orangutans in the Batangtoru landscape, most are in OUA. It can pose a threat to the safety of the Tapanuli orangutan, besides that land cover in other use areas is agricultural land, plantations, and community settlements, as well as power plant construction project areas. The Batang Toru landscape can be separated into three district areas: South Tapanuli, Central Tapanuli, and North Tapanuli, as well as one city, Padangsidimpuan, comprising at least 26 sub-districts and 187 villages that are directly related to the landscape area, particularly in terms of environmental influence and dependence on hydro-climatological function. According to the Ministry of Environment and Forestry's Forest Area Designation Decree No.579/Menhut-II/2014, the majority of the Batang Toru landscape is Protected Forest (51.5%), Nature Reserve (6.2%), Production Forest (5.3%), with the remainder in the form of OUA (36.8%) and body air (0.2%).

A decrease in the carrying capacity (quality and quantity) of the habitat is thought to have caused a change in orangutan behavior, as an effort to adapt to a narrow habitat that does not meet their needs [7]. Orangutan populations are often found on community-cultivated land, thus threatening their sustainability because they are easier to find and hunt [8]. Conflicts between orangutans and humans often occur and as a result, orangutans find it increasingly difficult to obtain food [9]. The ideal habitat for wild animals, including orangutans, is an area that can guarantee all their needs and survival which is formed from the interaction and combination of various habitat components, both biotic and physical [7].

Improving conservation benefits the Batangtoru Landscape containing the Tapanuli orangutan, developments highlight the importance of long-term, meaningful local stakeholder engagement, and growing evidence to support this [10]. For example, a recent study of landscape techniques indicated that community involvement in decision-making, as well as the incorporation of community-based solutions, were the most important. Cannot contribute to a successful outcome. Similarly, while the results have been mixed-in terms of reconciling conservation and development, a long-term landscape approach assessment of the Batangtoru landscape found that the value of stakeholder processes is deemed important for enhancing the capacity to share and understand complex challenges [11], [12].

To support the sustainability of the Tapanuli orangutan, it is necessary to strengthen management capacity among stakeholders as well as synergize programs and activities for managing their habitat and population. The dynamics of regional development require policy support from the central government, provincial government, district government village government, environmentalists, the private sector, and all components of society [13], [14]. Therefore, in addition to analyzing the interests of the parties, it is necessary to study strategies for developing conservation area management. The purpose of this research is to analyze the strategy for developing conservation area management by related institutions to support the conservation of the Tapanuli orangutan (*P. tapanuliensis*) population and habitat.

2. Materials and Methods

This research was carried out in the Tapanuli orangutan area in South Tapanuli and North Tapanuli Regency, North Sumatra Province, Indonesia (Figure 1).

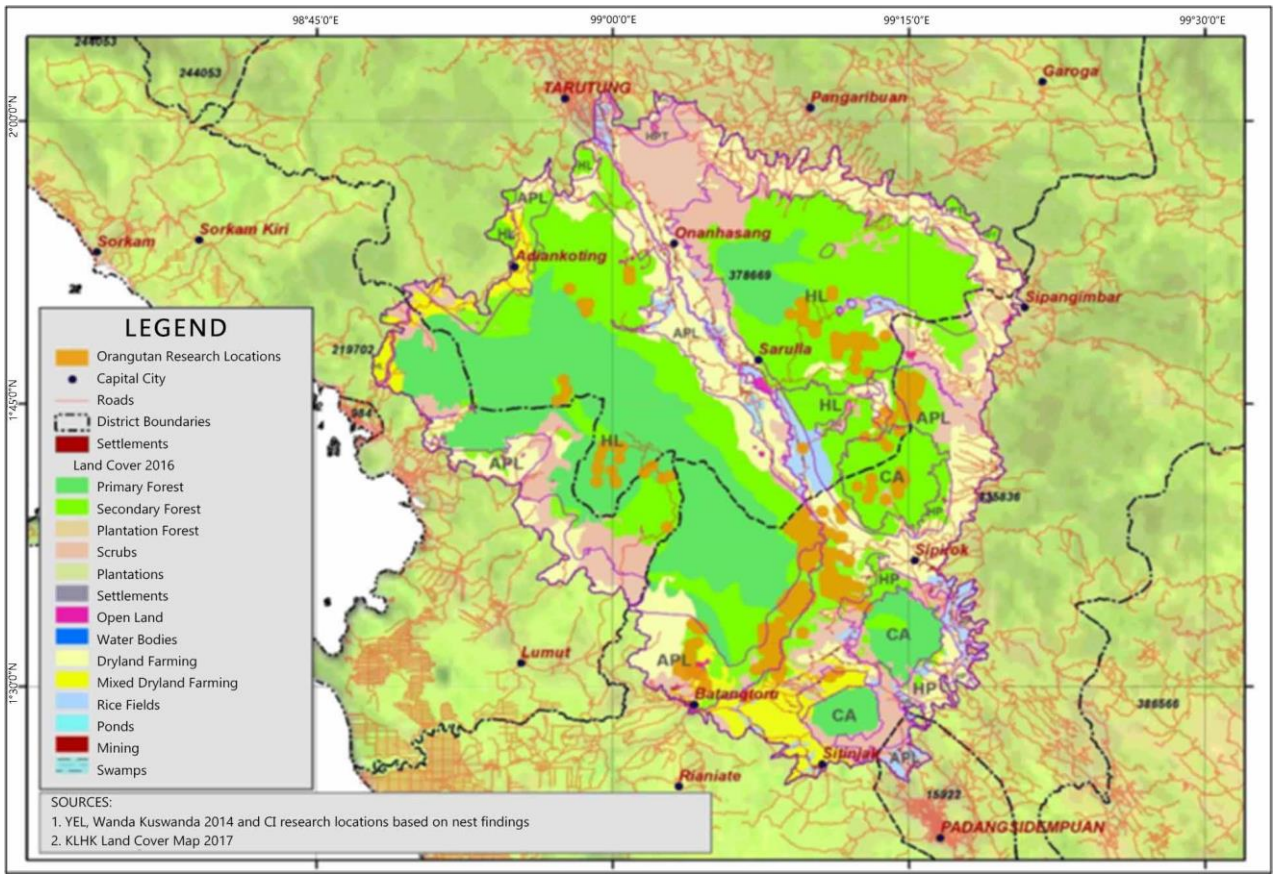

Figure 1. Study Area of Location

2.1 Data Analysis

The data collected in this study consisted of primary data and secondary data. Secondary data is supporting data obtained through reports and documents related to the conservation of the Tapanuli orangutan (*P. tapanuliensis*). Primary data was collected through structured interviews using questionnaires and in-depth interviews with key informants. Informants were selected at each institution using purposive sampling based on their duties and responsibilities, such as the head of local government office, head of central government representative office, head of village, community informal leaders, and nongovernment organization program director. The number of respondents is determined proportionally, namely as many as 45 respondents. Data and information were collected through semi-structured interviews.

This research uses a descriptive research method. The sampling used in this research is a purposive sampling method. The samples in this study are:

1. The central government (Ministry of Environment and Forestry) representative is the North Sumatra Natural Resources Conservation Center.
2. The regional government representative, namely the Regional Planning and Development Agency of Central Tapanuli, North Tapunuli, and South Tapanuli districts are selected by institutions that have work programs and/or there are Tapanuli orangutan's habitat in their working areas, including Forest Management Unit (FMU) region XI in Pandan.
3. Communities whose areas are directly adjacent to and have high interaction with the utilization of forest resources and land around the habitat of Tapanuli orangutan (15 people), consist of village officials or community leaders.
4. Private companies that have interests in the area, have business activities, both private and government-owned, that have the habitat of the Tapanuli orangutan in their work area. In this case there is only one private company.

5. Non-governmental organizations (NGOs) that have conservation programs or are related to Tapanuli orangutansin FMU Region XI Pandan.
6. Academics who are at universities that intersect with research Tapanuli orangutansin FMU Region XI Pandan.

2.2. Procedures

Management Development Strategy Analysis is carried out by Strength-Weakness-Opportunity-Threat (SWOT) analysis. The SWOT is a widely known scanning environment tool [15]. People use this tool to identify conditions as a strengths, weaknesses, opportunities, or Threats [16]. The SWOT is a tool for analyzing both the internal and external conditions of individuals and organizations [17].

The SWOT matrix is a tool used to measure management strategy factors [18]. This matrix can clearly describe how external opportunities and threats are owned [19]. This matrix can produce four possible alternative strategy cells which can be seen in Table 1.

Table 1. SWOT Matrix Guidance

IFAS / EFAS	*Strengths* (S)	*Weaknesses* (W)
Opportunities (O)	S-O Strategy Create a strategy that uses strengths to take advantage of opportunities	W-O Strategy Create strategies that minimize weaknesses to take advantage of opportunities
Threats (T)	S-T STRATEGY Create strategies that use strengths to overcome threats	W-T Strategy Create strategies that minimize weaknesses and avoid threats

It will be obtained internal conditions with strengths and weaknesses factors, which are owned by each institution/agency (Table 1) that plays a role in the conservation of the Tapanuli orangutan (*P. tapanuliensis*). SWOT results are then analyzed using Internal Strategy Factors Analysis Summary (IFAS) and External Strategy Factors Analysis Summary (EFAS). The results of the calculations from the IFAS and EFAS analysis are then compiled into a SWOT matrix to determine the appropriate strategy based on the data obtained by each institution/agency that plays a role in the conservation of the Tapanuli orangutan.

The SWOT analysis is an overall evaluation of the strengths, weaknesses, opportunities, and threats of a plan (Figure 2) [20]. Elements in the SWOT analysis are divided into two parts, namely:

a. IFAS (Internal Strategy Factors Analysis Summary)
   Strength is the main ability that has more value than the ability of the company's competitors. Weaknesses are factors that can reduce the ability of the company's operations. This must be minimized so as not to disrupt the running of the company.
b. EFAS (External Strategy Factors Analysis Summary)
   Opportunities are everything that certainly have the potential to generate profits through efforts aimed at taking advantage of these opportunities. The threat is something that is very likely to occur to the company's operations and has the potential to cause losses to the company

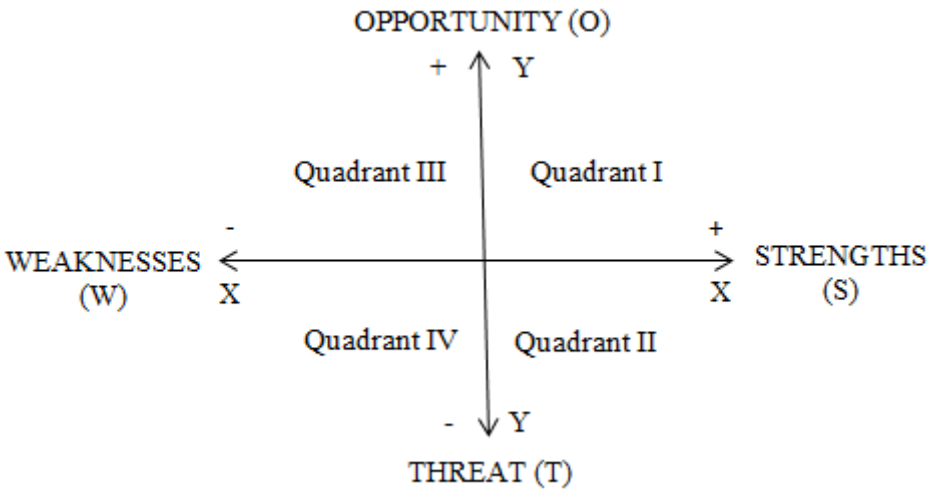

Figure 2. SWOT Analysis Quadrant

The SWOT analysis diagram in Figure 2 produces four quadrants which can be explained as follows:

1. Quadrant I
   This quadrant is a very favorable situation. The company has opportunities and strengths so that it can take advantage of existing opportunities. The strategy that must be implemented in this condition is to support an aggressive growth policy (growth oriented strategy).
2. Quadrant II
   Despite facing various threats, the company still has internal strength. The strategy that must be implemented is to use strength to take advantage of long-term opportunities by way of a diversification strategy (product/market).
3. Quadrant III
   The company faces huge market opportunities, but on the other hand, it also faces some internal constraints or weaknesses. The focus of the company's strategy is to minimize the company's internal problems so that it can seize bigger market opportunities.
4. Quadrant IV
   This is a very unfavorable situation, the company faces various external threats and internal weaknesses.

3. Result and Discussion

Goals and strategies to reach them are developed through the application of SWOT analysis (strengths, weaknesses, opportunities, and threats) [21], [22]. Based on an examination of the possibilities and dangers in the external environment as well as the strengths and weaknesses within the group of farmers, the SWOT analysis yielded these results. After collecting information and data related to the continuity of the research, all of the information/data is used in quantitative strategy formulation models.

3.1. Internal and External Factors

These internal elements have an impact on how strengths and weaknesses (S and W) develop. When it comes to the circumstances surrounding the conservation of the Tapanuli orangutan, this element also affects how decision-making methods are formed for the various roles that the parties involved in the Tapanuli orangutan conservation play. All forms of functional management are included in these internal aspects, including facilities, management, participation, law, policy, human resources, task division, development, and education.

These external variables have an impact on how opportunities and threats develop (O and P). Where this factor is concerned with conditions that occur outside the conservation of the Tapanuli orangutan which influence the decision-making of the strategic roles of the parties in the Tapanuli orangutan conservation. These factors include planning, cooperation, potential, research, economics, politics, law, population, and socio-culture. External and internal factors in the SWOT perspective have an assessment of the condition of

the Tapanuli orangutan conservation, while this assessment is measured based on several conditions (Table 2).

Table 2. Internal Factors and External Factors

INTERNAL FACTORS		EXTERNAL FACTORS	
Strength	Weakness	Opportunity	Threats
• Local government policy support in managing state forests as the habitat for the Tapanuli orangutan. • Labor in the Tapanuli orangutan conservation both from the government, private sector, NGOs, and the community around the area. • Participation in the conservation of the Tapanuli orangutan in the form of protection, preservation, and utilization. • Role in regulating the protection, preservation, and utilization of the Tapanuli orangutan. • Forest area patrols are carried out periodically by the main tasks and functions of each party. • Law enforcement around the area.	• The management of the conservation area is made a part-time job by the stakeholders. • Supporting facilities have not been fulfilled in the Tapanuli orangutan conservation. • Lack of involvement of the surrounding community so that the community's knowledge is minimal in the conservation of the Tapanuli orangutan. • Lack of socialization among related stakeholders main duties and functions of each party. • Unclear division of main tasks and functions. • Lack of knowledge in the conservation of the Tapanuli orangutan due to a newly discovered species.	• The Tapanuli orangutan conservation program plan. • Community empowerment program around the forest. • Collaboration with other parties given the vast territory and many interests around the area. • Potential sources of income such as nature tourism, education, research, and service. • The forest and land reforestation program is a form of protecting the Tapanuli orangutan. • Conducting research related to Tapanuli orangutan to enhance the conservation knowledge about Tapanuli orangutan.	• There is a disturbance from a strategic project on the habitat of the Tapanuli orangutan. • Differences in interests between parties around the area. • Government Laws and Regulations in granting project permits around the Tapanuli orangutan area. • Utilization of other purposes of the Tapanuli orangutan. • Environmental change. • Community dependence on natural resources in the area.

3.2. Results of IFAS and EFAS Analysis

Based on the strategy above, the researcher will make IFAS and EFAS Matrix in tabular form. However, before the researcher made a table format to develop a representative SWOT formula.

3.2.1 Internal Factor Analysis Summary (IFAS)

Identification of factors related to internal issues related to the strategic roles of the parties in the Tapanuli orangutan conservation, namely strengths and weaknesses are presented below:

Table 3. Internal Factors (Strength and Weaknesses)

Internal Factors				
No	Strengths (S)	Weight	Ratings	Score
1.	Local government policy support in managing state forests as the habitat for the Tapanuli orangutan	0.115	3,000	0.345
2.	Labor in Tapanuli orangutan conservation	0.070	2,000	0.141
3.	Participation in the conservation of the Tapanuli orangutan	0.092	3,000	0.276
4.	Role in regulating the taking of animals	0.085	3,000	0.254
5.	Forest area patrol	0.093	3,000	0.279
6.	Law enforcement around the area	0.072	3,000	0.215
	Score Value	0.527		1,511
	Weaknesses (W)			
1.	The management of the conservation area is made a part-time job by the members	0.080	3,000	0.240
2.	The supporting facilities have not been fulfilled	0.074	3,000	0.221
3.	Not involving the local community	0.083	3,000	0.250
4.	Lack of socialization between stakeholders	0.080	3,000	0.240
5.	Unclear division of main tasks and functions	0.077	3,000	0.232
6.	Lack of knowledge in the conservation of the Tapanuli orangutan	0.079	3,000	0.236
	Score Value	0.473		1,419
	Total IFEs	1,000		2,930

Table 3 show that the strengths factor has a value of 1.511 with a weakness of 1.419. The outcomes of computations using the internal environmental component scores in the parties' role-playing strategy for the

preservation of the Tapanuli orangutan in the FMU XI Region, namely the strengths minus the weaknesses factors, the X value is obtained as a horizontal axis 1.511 – 1.419 = 0.092, thus the value of the axis X in the SWOT diagram is 0.092.

3.2.2 External Factor Analysis Summary (EFAS)

Identification of factors related to external issues related to the strategic roles of the parties in the Tapanuli orangutan Conservation, namely opportunities and threats are presented in Table 4.

Table 4. External Factors (Opportunities and Threats)

External Factors				
No	Opportunity (O)	Weight	Ratings	Score
1.	The Tapanuli orangutan conservation Program plan	0.085	3,000	0.256
2.	Community empowerment program around the forest	0.087	3,000	0.261
3.	Cooperation with other institutions	0.095	4,000	0.379
4.	A potential source of income	0.077	3,000	0.231
5.	Forest and land greening program	0.077	3,000	0.231
6.	Research about Tapanuli orangutan	0.079	3,000	0.237
	Score Value	0.500		1,595
	Threats/Threats (T)			
1.	There is a disturbance from a strategic project on the Tapanuli orangutan habitat	0.078	3,000	0.233
2.	Differences in interests between stakeholders	0.081	3,000	0.244
3.	Weak in laws and government regulations	0.091	4,000	0.364
4.	Utilization of other purposes of the Tapanuli orangutan	0.077	3,000	0.231
5.	Environmental change	0.082	3,000	0.247
6.	Community dependence on natural resources in the area	0.091	4,000	0.362
	Score Value	0.500		1682
	Total EFEs	1,000		3,276

Based on the results of the EFAS analysis in Table 4, it can be seen that the opportunity factor has a value of 1.595 with threats having a value of 1.682. It is possible to infer from this number that the conservation of the Tapanuli orangutan in FMU Region XI of Pandan has a higher threat of 1.682 compared to an opportunity of 1.595. The opportunity factor reduces the opportunity factor, and the vertical yields the Y value axis 1.595–1.682 = -0.087, so the X-axis value in the SWOT diagram is -0.087.

3.3. SWOT Diagrams

The findings of the Tapanuli orangutan conservation strategy's assessments using the external environmental factor score in the FMU Region XI of Pandan. The process of subtracting the strength factor (1.511) and the weakness factor (1.419) from the internal environment yields an X-axis value of 0.092. Similarly, the Y-axis value is obtained by subtracting the opportunity factor (1.595) and the threat factor (1.682) from the external environment, yielding a Y-axis value of -0.087 (Figure 3).

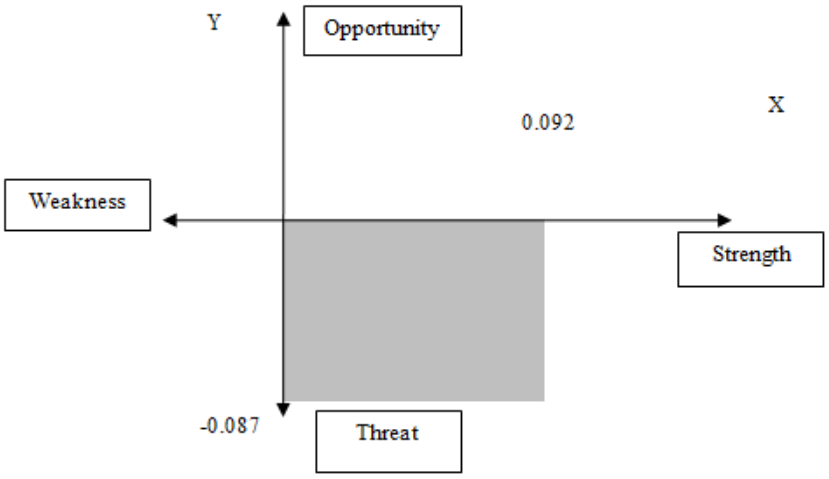

Figure 3. The results of the SWOT diagram

Based on Figure 3 above, it can be seen that the Tapanuli orangutan conservation strategy in FMU Region XI of Pandan is in quadrant II where the Tapanuli orangutan conservation condition has strengths, in the face of threats conservation still has strengths. In this situation, the approach that must be used is one that relies on strength to defeat dangers. Despite confronting different dangers, the organization maintains internal strength. The plan that must be executed is to utilize force to capitalize on long-term opportunities through powerful, binding, and conforming policy initiatives.

3.4. SWOT Matrix

Based on an analysis of the conservation strategy for the Tapanuli orangutan in FMU Region XI of Pandan, it is in quadrant II between internal strengths and external threats. In this position, use the strengths of the Tapanuli orangutan conservation to overcome existing threats [23]. These factors can be seen in Table 5.

Table 5. SWOT Analysis Matrix Diagram

Internal factors / External Factors	***Strengths* (S)** Local government policy support in managing state forests as the habitat for the Tapanuli orangutan Labor in Tapanuli orangutan conservation Participation in the conservation of the Tapanuli orangutan Role in regulating the taking of animals Forest aArea patrol Law enforcement around the area
***Threats* (T)** There is a disturbance from a strategic project on the habitat of the Tapanuli orangutan Differences in interests between stakeholders Government laws and regulations Utilization of other purposes of the Tapanuli orangutan Environmental change Community dependence on natural resources in the area	**S-T Strategy** Strengthening government policies to limit strategic projects around the Tapanuli orangutan area. Utilizing the workforce of all stakeholders for the division of tasks and functions in the conservation of the Tapanuli orangutan. Land rehabilitation to restore the physical environment of the Tapanuli orangutan. Protection and safety of areas that are habitats of Tapanuli orangutan. Education and environmental awareness to the community about conflicts and the use of natural resources in the area

Based on the SWOT matrix diagram in Table 5, in developing the Tapanuli orangutan conservation strategy in FMU Region XI of Pandan the S-T Strategy is used by carrying out the following operational activities.

a. Strengthening government policies to limit strategic projects around the Tapanuli orangutan Area
   This orangutan population is closely related to changes in the forest around the forest area [24]. Deforestation is quite high in Indonesia causing a lot of orangutan habitat to be lost. Strengthening government policies through regulations and laws is urgently needed to limit strategic projects that will change the function of land around the Tapanuli orangutan Area, especially those using forest areas. Like some of the following policies:
   1) Law number 5/1990 concerning the Conservation of Living Natural Resources and Their Ecosystems and Government Regulation number 7 of 1999 concerning the Preservation of Plant and Animal Species.
      Emphasizing safeguards such as the protection of buffer systems, preservation of species diversity, what activities are prohibited and what are sanctions. This law also describes nature reserve areas, community participation, and conservation areas. More emphasis on land conservation areas.
   2) Law number 23/1997 concerning Environmental Management
      Governs the guiding principles, purposes, and objectives of environmental management in Indonesia, as well as the community's rights and responsibilities, the management authority, the

maintenance of environmental functions, the environmental management requirements, oversight, administrative penalties, environmental audits, and the resolution of environmental disputes.

3) Law number 41/1999 concerning Forestry; It has been updated with Government Regulation in placed of Law number 5 of 1990 No. 1 of 2004 and stipulated to become Law No. 19 of 2004 concerning Forestry
   Regulating forest functions, planning, and management, including the role of the wider community. Regulating forest protection as an area rather than as an ecosystem
4) Government Regulation of the Republic of Indonesia number 8 of 1999 concerning the Utilization of Wild Plants and Animals
   Controlling the use of wild plant and animal species allows for the effective usage of wild plant and animal species or their parts and products thereof while maintaining species diversity and ecosystem balance. Wild plants and animals that can be traded are wild animals that are not protected.
5) Minister of Environment Regulation number 106/2018 concerning Protected Plant and Animal Species
   Tapanuli orangutan (*P. tapanuliensis*) is included in protected animal number 63.
6) Regulation of the Director General of Conservation of Natural Resources and Ecosystems Number: P.6/KSDAE/SET.3/REN.0/9/2020 concerning the Strategic Plan of the Directorate General of Conservation of Natural Resources and Ecosystems 2020-2024
   Formulation of the mission related to the Directorate General of Conservation of Living Natural Resources and Their Ecosystems and supporting the mission of the Ministry of Environment and Forestry, namely realizing good management of natural resources and ecosystem conservation development.
7) Government Regulation of the Republic of Indonesia number 23 of 2021 concerning Forestry Administration
   Implementation of forest protection is carried out with the principle of preventing and limiting damage to forests inside and outside forest areas and forest products, caused by human actions, livestock, fires, natural resources, pests, and diseases in the framework of at least protecting and fragility of endemic flora and fauna.

b. Utilizing the workforce of all stakeholders for the division of tasks and functions in the conservation of the Tapanuli orangutan.
   Human resources is a key factor for an organization in achieving its goals, both in quantity and quality [25]-[27]. The ability required for professional human resources is mastery and ability in the fields of office administration, projects, investigation, and forest protection and by the available position formations. MGO and the community to find the best solution that can ensure the existence of these primates amid the state's efforts to improve the welfare of its people. In-situ conservation is an activity to preserve orangutans in their natural habitat. The strategy aims for all stakeholders to work together to monitor the conservation management of orangutans and their habitat. Regional consolidation, corridor development, and relocating non-forest cultivation areas into conservation areas are some of the activities that can be carried out to save the Tapanuli orangutan in its habitat. Habitat protection is the main basis for in-situ conservation management for the Tapanuli orangutan. One of the causes of the loss of orangutan habitat is poor spatial planning. The orangutan conservation program requires that existing forest areas remain as forest areas and are not converted for other uses. This will greatly help reduce pressure on orangutans whose populations are already critically endangered. The allocation of forests as habitats can be made at the regency, provincial, and national spatial planning levels.

c. Land rehabilitation to restore the environment of the Tapanuli orangutan
   Threats to environmental change are one of the factors in the existence of orangutans. The Tapanuli orangutan is only found in parts of the area, especially in the western part, namely in highland habitats [28]. Based on the function of the forest, orangutans are distributed in production, protection, conservation, and community forests (part of OUA). The existence of its population in the Batang Toru ecosystem is currently limited to an altitude of 300 – 1,300 meters above sea level. Populations with the highest densities are in primary forest areas, although they are also found at low

densities in mixed forests at the edge of primary forests. Approximately 85% of the Batang Toru ecosystem area became a protected FMU, through the Decree of the Minister of Environtment and Forestry number SK.637/MenLHKSetjen/2015 dated 14 December 2015, while the other 15% is still under the status of OUA and production forests.
During the non-fruiting season, orangutans will explore more than eat, whereas during the hotter months, they will rest more during the day [29]. The availability of food in the area has a significant impact on the number of orangutans moving about everyday and their distribution [30]-[31]. Therefore, rehabilitating plants, especially orangutan food, so that the movement of the Tapanuli orangutan does not disturb the community and become threatened. Types of food for the Tapanuli orangutan include *arrangemangan* seeds (*Casuarinaceae*), *sampinur tali* flower/fruit (*Podocarpaceae*), and agatis (*Araucariaceae*).

d. Protection and security of the area is intended as a basic principle in an area
Protection and security of the area are intended as a basic principle in an area. Both from the preparation of personnel or the addition of personnel, the readiness of security equipment, and the coordination of security with other stakeholders. Utilization for other purposes of the Tapanuli orangutan, environmental change, and community dependence on the natural resources of the area are the identified threats. Efforts to secure forest assets, and prevent and control the occurrence of threats and disturbances from crimes against forests are the main activities of the Directorate of Forest Prevention and Security of the Ministry of Environment and Forestry. Apart from that, good collaboration and coordination are also needed for the protection and security of the Batang Toru landscape forest area between the central government, regional governments, the private sector, NGO, and communities around the forest area.

e. Environmental education and extension
Environmental education and outreach to the community to provide community understanding of the function of the area designation, human and Tapanuli orangutan conflicts, and the utilization of the area's natural resources. At present, some local communities often regard orangutans as pests that disturb community crops around the forest. Lack of food in the forest causes orangutans to move out of the forest in search of sufficient food. Because of that, it is necessary to carry out environmental education and outreach through outreach or FGDs for the community around the Batang Toru landscape. Besides that. Mitigation efforts are carried out by expelling and dispelling orangutans using the sound of striking/hitting wood and zinc and controlled fumigation.

Based on the development of the Tapanuli orangutan conservation strategy in FMU Region XI of Pandan through a SWOT analysis, it can be concluded as in Figure 4.

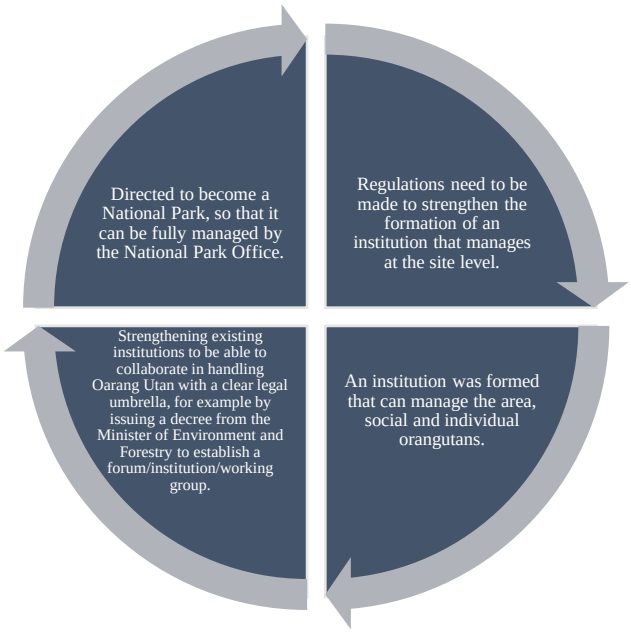

Figure 4. Conservation Development Strategy

3.5. Development of the Management of the Tapanuli Orangutan Conservation Area

Orangutan management with quite diverse stakeholders requires an adaptive management pattern. On the other hand, there is also a need for traditional wisdom in managing orangutans. Communities who live around orangutan habitats have customary rules and local wisdom in protecting forests and can support efforts to protect orangutans to be more effective and efficient. Increasing the role of customary rules, and village regulations are needed to support the protection of orangutan habitat.

Collaborative management is a long-term partnership management option initiated by the government [32]. This is the most appropriate management option considering the difficult conditions and the wide range of stakeholders involved in orangutan conservation. Therefore, encouragement is needed to develop cooperation to protect Indonesian orangutans. Although it still has to be adjusted for execution, collaborative management has also been adopted in the Minister of Forestry Regulation number P.19/Menhut-II/2004 regulating collaboration in conservation areas. Collaborative management with multi-stakeholders is believed to be able to move efforts to protect orangutans more effectively.

As part of community-oriented natural resource management, measures to protect orangutans must be implemented in collaboration with the community [33]. The developed model should benefit both stakeholders and orangutans. Community involvement is very important to ensure the achievement of conservation goals [34]. In its implementation, communities can be involved in protecting/protecting orangutan habitat and combating orangutan's illegal hunting and trafficking.

4. Conclusion

Identification of SWOT internal and external factors shows the position of the Orangutan Tapanuli conservation strategy in FMU Region XI of Pandan is in quadrant II or in a position that supports the (Strength-Threat) development strategy. Despite facing various threats to orangutan conservation, stakeholders still have internal strength. Using strength to capture long-term opportunities through biodiversity management is an approach that must be implemented. The formulation of recommended priority strategies for the conservation of Tapanuli orangutans is; 1) Strengthening government policies to limit strategic projects around the Tapanuli orangutan area, 2) Utilizing the workforce of all stakeholders for the division of tasks and functions in the conservation of the Tapanuli orangutan, 3) Land rehabilitation to restore the physical environment of the Tapanuli orangutan, 4) Protection and safety of areas that are habitats of Tapanuli orangutan, and 5 Education and environmental awareness to the community about conflicts and the use of natural resources in the area.

Acknowledgments

The author would like to thank all parties in the FMU Region XI of Pandan, others government and non government office for providing support for data collection in this research, including community leaders who have provided good information.

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