Journal of Environmental and Development Studies
Journal homepage: https://talenta.usu.ac.id/jeds

Community Perception and Participation in the Initiation of the Tapanuli Orangutan Corridor *(Pongo tapanuliensis Nater, 2017)* in Hutaimbaru, Luat Lombang Village, Sipirok District, South Tapanuli Regency

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ARTICLE INFO

Article history:
Received 03-07-2025
Revised 15-08-2025
Accepted 25-09-2025
Available online 03-09-2025

E-ISSN: 2745-4592

How to cite:
Tanjung Syahputra Dede, Athtorick Alief T., & Rahmawaty. Community Perception and Participation in the Initiation of the Tapanuli Orangutan Corridor (Pongo tapanuliensis Nater, 2017) in Hutaimbaru, Luat Lombang Village, Sipirok District, South Tapanuli Regency Journal of Envrionmental and Development Studies 2025. 6(2):063-074.

http://doi.org/10.32734/jeds.v6i2.17098

ABSTRACT

The Tapanuli orangutan (*Pongo tapanuliensis*) is critically endangered and inhabits the Batangtoru Ecosystem, the last refuge of the southernmost orangutan population in Sumatra. Habitat fragmentation due to development from 1989 to 2013 left around 767 individuals in two wild populations, which are predicted to be unable to survive for the next 500 years. This research aims to analyze community perceptions and participation in the initiation of the Tapanuli Orangutan Corridor development in Hutaimbaru. The research method used was a quantitative approach with a sample of 30 respondents. The results showed that the community's perception level of corridor development was in the moderate category with a percentage of 61%, while the level of community participation was in the high category with a percentage of 67%. This condition indicates that although community understanding of the corridor program is still limited, they respond positively and demonstrate active involvement. This research emphasizes the importance of a participatory approach through community-based agroforestry development as a corridor-building strategy, which not only benefits the conservation of the Tapanuli orangutan but also supports the improvement of local community welfare.

Keywords: Tapanuli orangutan, Community Perception, Community Participation, Conservation Planning

1. Introduction

The Tapanuli orangutan (*Pongo tapanuliensis*) is one of the great ape species currently in a highly concerning condition. Globally, the International Union for Conservation of Nature (IUCN) has classified this species as *Critically Endangered*, which means it is at extremely high risk of extinction in the wild. This classification is based on the very small population size, limited distribution range, and severe threats to its habitat. Meanwhile, at the local level in Indonesia, the conservation status of the Tapanuli orangutan also receives serious attention through national regulations, under which this species is fully protected by law.

The primary habitat of the Tapanuli orangutan is the Batangtoru Ecosystem in North Sumatra, which serves as the last remaining stronghold for the species. The orangutan was formally described scientifically under the Latin name *Pongo tapanuliensis* (Nater et al., 2017), which is genetically distinct from the population north of

Lake Toba (Nater et al., 2011). All orangutan populations, including the newly identified Tapanuli orangutan, are currently categorized as *Critically Endangered* (Ancrenaz et al., 2016; Singleton et al., 2017; Nowak et al., 2017) and continue to decline due to habitat loss, fragmentation, and hunting. This ecosystem experienced fragmentation between 1989 and 2013 (Samsuri et al., 2014). As a result, the population was divided into several blocks: the western block with 581 individuals, the eastern block with 162 individuals, and the Sibualbuali Nature Reserve with 24 individuals (Wich et al., 2019). At present, from a total of 767 individuals surviving across two wild populations, none are projected to survive within the next 500 years, with population viability categorized as medium to poor (western Batangtoru) and poor (eastern Batangtoru) (Prasetyo, 2021). The combination of small population size and geographic isolation has led to inbreeding depression, as demonstrated in previous studies (Nater et al., 2017).

One effort to prevent this issue is the establishment of buffer zones and the development of corridors to reconnect fragmented Batangtoru forests, particularly between the western and eastern blocks. Beyond their biological significance in supporting wildlife movement, particularly for the Tapanuli orangutan, the Hutaimbaru corridor also provides social and economic benefits for local communities. Currently, the Batangtoru Ecosystem faces severe pressure from increasing fragmentation, which reduces its ecological quality and directly threatens the long-term survival of key species and populations. The designation of orangutan corridors at the landscape scale has been formalized by the South Tapanuli Regency Government through Regional Regulation No. 5 of 2017 concerning the Spatial Plan of South Tapanuli Regency, which identifies four corridor areas covering approximately 1,284 ha: Aek Malakkut, Bulu Mario, Hutaimbaru, and Silimalima.

The long-term survival of the Tapanuli orangutan remains highly uncertain (Sloan et al., 2018) due to road construction, illegal forest conversion, hunting, and killing (Wich et al., 2011). Habitat loss and fragmentation occur due to various factors, including road construction, mining, geothermal projects, encroachment, illegal logging, land speculation, plantations, and plans to build a hydropower plant. The number of wildlife species that can survive in a fragmented habitat largely depends on the size and quality of that habitat. In small fragments, carrying capacity for both plants and animals is limited, making populations highly vulnerable to extinction due to reduced genetic quality (inbreeding). Tapanuli orangutan populations have been isolated into small, separate groups, making them susceptible to inbreeding, hunting, human-wildlife conflict, and local extinction (Meijard et al., 2021).

Forest fragmentation restricts the movement of orangutans, leading to limited food availability in both quantity and quality, which can weaken their immune system. Conflicts between humans and orangutans also frequently occur, sometimes resulting in losses for humans but more often proving fatal for orangutans. As the intensity of conflict between humans and protected species, in this case orangutans, increases, the government is required to implement conservation measures capable of resolving these conflicts in order to minimize negative impacts (Arief et al., 2020). Efforts to minimize habitat fragmentation are therefore crucial, whether through spatial planning, sustainable forest management, or law enforcement against violations. In already fragmented areas, restoration may be necessary if feasible; if not, the alternative solution is to connect habitat fragments through corridor development.

Several studies on wildlife corridors, particularly orangutans, have been conducted with the aim of identifying potential locations through analysis of the population and distribution of Tapanuli orangutans (*Pongo tapanuliensis*) in buffer zones and potential Batangtoru corridors. Estimated orangutan densities in these areas range from 0.24 ind/km² – 0.14 ind/km² (Hutaimbaru and Bulu Mario) to 0.74 ind/km² – 0.36 ind/km² (Sitandiang and Hopong) (Nasution, A. et al., 2020). Based on these findings, further research is needed, particularly regarding the potential of the Hutaimbaru Corridor in terms of the bio-ecological and socio-economic conditions of the Tapanuli orangutan. Since 2008, the concept of corridor development in Hutaimbaru Village has been introduced to connect the two main Batangtoru forest blocks. Following habitat, land cover, and wildlife surveys across the Hutaimbaru forest area, the initial plan was focused on the Aek Kinandang River region, particularly in steep valleys covered by a mixture of agroforestry, secondary forest, and primary forest.

Among the various aspects in determining habitat suitability for the establishment of the Hutaimbaru orangutan corridor, the factors considered include habitat suitability analysis, vegetation analysis, and community perception and participation. From a socio-economic perspective, program success is strongly influenced by community behavior as a driver of participation levels. Community participation is a key factor in supporting and ensuring program success. Perception relates to how the community understands the program, while participation represents their voluntary involvement in activities. Both perception and participation play an important role in initiating the development of the Tapanuli Orangutan Corridor in Hutaimbaru. Communities with positive perceptions of orangutan habitats will provide positive contributions, whereas negative perceptions may result in actions that threaten forest sustainability. Community support in conservation area management is therefore essential to safeguard forest sustainability (Daulay D.N.O & Hidayat, J.W, 2017). Individuals actively involved can also influence the process of perception formation (Mempun, 2013).

Ultimately, community perception will accommodate efforts to enhance their role and participation in area management. Therefore, this research is important to conduct. From the explanation above, it can be seen that community perception and participation levels are determinants of program success. The aim of this study is to assess community perceptions and participation in the initiation of the Tapanuli Orangutan Corridor development in Hutaimbaru.

2. Method

2.1 Description of Study Location

The research was carried out for 4 months from December 2023 to March 2024. The research location was in the Batangtoru ecosystem in the Hutaimbaru Corridor, Luat Lombang Village, Sipirok District, South Tapanuli Regency, with this potential corridor covering an area of 1,099.13 hectares. The research location map is as in Figure 1.

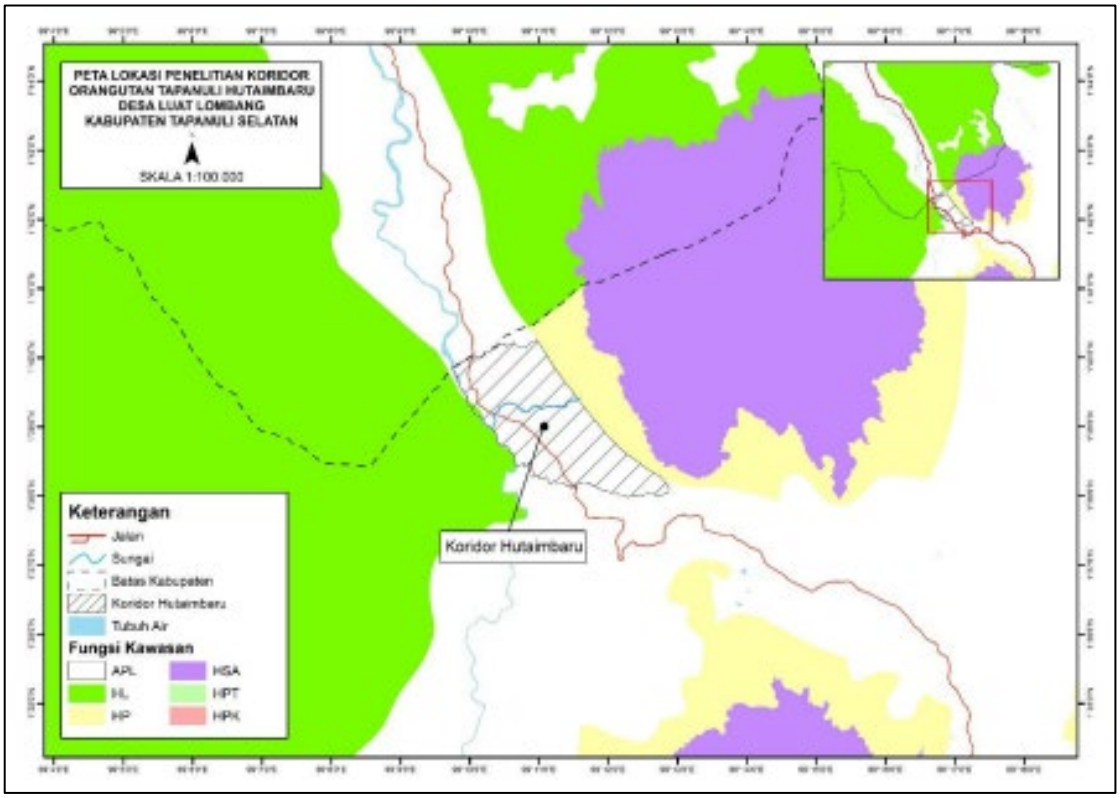

Figure 1. Map of research location

2.2 Sampling Technique

The research sample consisted of community members who are administratively residing around the Hutaimbaru Corridor, Luat Lombang Village, Sipirok District, South Tapanuli Regency. The number of respondents was determined to be 30 individuals (50% + 1) from the total 57 members of the Satahi Farmers Group, with the majority of the members being landowners in the corridor area.

2.3 Data Collection

Data were obtained through interviews using questionnaires and literature analysis (Rahmawaty et al., 2023).

Table 1. Indicators and Scales Used in Questionnaire

Indicators	Likert Scale			
	4	3	2	1
Community Perception	Strongly Agree (SA)	Agree (A)	Disagree (D)	Strongly Disagree (SD)
Community Participation	Always	Often	Sometimes	Never

For the perception variable, the Likert scale was applied using reverse coding, where *Strongly Agree = 1* and *Strongly Disagree = 4*. This reverse coding system was used to align the measurement direction with the analytical framework. Meanwhile, for the participation variable, normal coding was used (*Always = 4* and *Never = 1*). It is important to highlight this coding adjustment to avoid misinterpretation in the analysis and ensure clarity in the comparison of results.

2.4 Data Analysis

The questionnaire data, which were quantitative in nature, were analyzed descriptively. The analysis steps included:

a. Calculating the score of each respondent's answer based on aspects or sub-variables.
b. Summing the scores and then calculating the average value.
c. Determining the maximum score, minimum score, and range values:

Maximum Score = Highest score x Number of Items
Minumum Score = Lowest x Number of Items
Range = Maximum Score – Minimum Score

d. Determining the score interval:

Interval = Range ÷ Criteria

The criteria for the levels of community perception and participation were established as follows:

Table 2. Community perception and participation criteria

Score Interval	% Interval	Category
51–60	84–100	Very High
39–50	64–83	High
27–38	27–63	Moderate
14–26	≤26	Low

In addition to descriptive analysis, this research also applied literature analysis to strengthen the findings by comparing them with results from previous studies. The entire process of data collection and analysis was carried out in accordance with research ethics and principles of accuracy to ensure valid and reliable results.

3. Results and Discussion

3.1 Result

3.1.1 Public Perception. Based on the questionnaire tabulation calculations, the results obtained are that the level of perception is in the high category based on the following formula:

$$index = \frac{(Total\ Score)}{Maximum\ Score}\ x\ 100\%$$

$$index = \frac{(38{,}32)}{60}\ x\ 100\%$$

$$index = 61\%$$

The results of the questionnaire applied to 30 respondents resulted in the level of public perception which is presented in Table 3.

The Interval of perception scores regarding the initiation of the Tapanuli Orangutan corridor development in the Hutaimbaru Corridor.

Table 3. Interval of Community Perceptions on Tapanuli Orangutan Initiation

Score interval	%	Participation rate
51-60	84-100	Very high
39-50	64-83	Tall
27-38	27-63	Currently
14-26	≤26	Low

Based on the calculations above, in general it can be seen that the level of public perception in initiating the construction of the Tapanuli Orangutan Corridor in the Hutaimbaru Corridor is classified as Medium. This is influenced by the level of community knowledge regarding the initiation of the construction of the Tapanuli Orangutan corridor in Hutaimbaru. The results of this research are interesting because they are different from research conducted by Anugrah (2019) which stated that people often experience conflicts with wild animals so that people have a negative perception of orangutans.

However, the results of this research are supported by Sunkar's research results et al (2020) which states that the people of Komodo Village have a good perception of Komodo dragons, even though these animals are considered dangerous animals. The differences in each level of community perception are influenced by the experiences experienced by each respondent. According to Snyder (2015), differences in experience and cultural values can influence the perceptions formed. According to Kohsaka and Rogel (2019), experiences formed over years and across generations can form local knowledge in a community group and create the same perception in that community group. Apart from experience, this level of perception can also be influenced by how long a person has lived in an area. Presence influence on participation community because the longer people live in a certain environment, the greater the sense of belonging towards the environment tends to be more visible in the form of participation in activities implemented in that environment (Ekapratiwi, 2021).

Successful management of the initiation of corridor development The Tapanuli orangutans in the Hutaimbaru Corridor are greatly influenced by institutional strengthening and increasing the capacity of Human Resources (HR). The human resources in question are an understanding of the meaning, objectives and various benefits related to conservation, this is very necessary, especially for regional and field officers who are directly in contact with conservation areas. Strengthening existing institutions in the community needs to be synchronized with various programs and forest management patterns that cover the entire landscape area for the development of the Tapanuli Orangutan corridor in the Hutaimbaru corridor.

The level of community participation and perception has a very close correlation with success in initiating the construction of the Tapanuli Orangutan corridor in the Hutaimbaru Corridor, but there is still the challenge of local communities (through farmer cooperatives from the main hamlet) wanting to obtain some kind of 'management rights/authority' for the corridor, which can be positive but also

It can be a challenge, as there is a possibility that their understanding remains limited regarding the fact that establishing effective wildlife corridors requires minimal human intervention, except to prevent disturbance and poaching. The behavior of the people around the area has an influence on success in conservation. Tebay et al (2021) which states that community participation is the key to success which must be realized and become the basis for formulating policies, strategies and main development programs, especially in responding to strategic issues of empowering the people's economy; which emphasizes the need for alignment and empowerment of local communities, including empowering the capacity and role of communities as the main actors in development.

This is further supported by the statement in the research results of Tampubolon et al (2021) which states that activities that are fully supported by the approval of the local community can run well. caused by factors of support from the local community in the form of participation and positive community perceptions. Perception is one of the determinants of level community participation because perception is a psychological process that cannot be separated from each individual which functions to form attitudes and determine decisions to act.

3.1.2 Community Participation. Based on the questionnaire tabulation calculations, the results of the participation rate in the high category are obtained based on the following formula:

$$\text{index} = \frac{Total\ score}{makximum\ score} x100\%$$

$$\text{index} = \frac{40{,}4}{60} x100\%$$

$$= 67\ \%$$

The results of the questionnaire applied to 30 respondents resulted in the level of community participa0ption which is presented in Table 4.

Table 4 Interval of participation scores towards the initiation of the Tapanuli Orangutan corridor development in the Hutaimbaru Corridor

Table 4. Interval of Community Perceptions on Tapanuli Orangutan Initiation"

Score interval	%	Category
51-60	84-100	Very high
39-50	64-83	Tall
27-38	27-63	Currently
14-26	≤26	Low

Based on the calculations above, in general it can be seen that the level of community participation in the initiation of the construction of the Tapanuli orangutan corridor in the Hutaimbaru Corridor is relatively high. The high level of community participation can be seen from the community's participation in various activities to protect natural biodiversity and prevent the potential impact of habitat fragmentation. By providing corridors for wildlife to move around, these corridors can help reduce human development in sensitive areas, protect important natural habitats and promote sustainable land use.

Based on the statement that the community participates in helping and preserving orangutans, the dominant answer is sometimes with a total of 16 people, as well as providing initiatives related to managing orangutan habitat, 10 people answered often and 6 people answered always and participate in exploiting the economy of the corridor that has been determined with the dominant answer being often with a total of 13 respondents. This is in accordance with Silvia's statement. et al (2017) who stated that community attitudes and behavior will provide sustainability in determining community actions towards orangutans and their habitat.

In the next statement, the community participates in exploiting the economy from the corridor that has been determined with 17 people answering sometimes and 13 people answering often to the statement fully support and want to be involved in the development and long-term management of wildlife corridors, while in the open statement on all plans aimed at maintaining the suitability of orangutan habitat, 16 people answered that they often participate, followed by statements following the socialization of drafting village regulations on corridors - corridor agreements with land owners, community leaders and village government. The dominant respondents answered often with a total of 10 respondents.

Apart from that, the community also stated that they had participated in a multi-party action planning workshop to support the management of the Hutaimbaru corridor which was held with 19 people answering sometimes and 17 people answering always. In the statement of participation in the enrichment of 1000 mangosteen plants, 1000 stems have been carried out on the axis/corridor path (left and right of the Aek Kinandang river), participating in the enrichment of 800 Durian plants in the buffer zone of the corridor, this statement received a high level of participation, where 17 people stated that they always participated, but in the statement of participating in the enrichment of 1000 areca plants in the people's plantation area, the percentage of participation was not much different, namely 15 people. stating that he always participates, this can be due to the maximum notification given to the local community regarding this activity. Meanwhile, in the statement he is involved in the activity Focus Group Discussions (FGD) with local stakeholders, including local communities, land owners and the government, obtained a fairly high level of participation, namely 15 people stated that they always participated.

Meanwhile, the statement of commitment to receive various suggestions and long-term guidance regarding corridor development and management received a response from 16 respondents stating that they sometimes participate, while the statement that there is an increase in the economy and income by participating in enriching agricultural plants that have economic value received a response from 16 respondents stating that they sometimes participate, while in the last statement, namely participating in protecting forests which have various benefits that can be used as a source of funds for conservation activities, 10 respondents stated that they sometimes participate.

The level of community participation can be influenced by various things, including outreach to the community, especially the community around the conservation forest area, as well as the lack of participation from organizations working in the environmental sector regarding the importance of protecting rare and endangered animals, namely orangutans. According to Melis et al (2016) The factors that influence community participation in development are internal and external factors. Internal factors include awareness or will of the community itself, education and community income. The educational factor is one of the factors that causes various changes to occur if it is linked to the level of education and the level of community participation in development, and the reality shows that there is a close relationship. Communities with a high level of education usually have great attention to development activities carried out, both development carried out by the government and those carried out by the community. This fact illustrates how big the influence of education is on community participation in the management of an area. Furthermore, income factors also influence the level of community participation, especially in the form of donations and activities. On the other hand, busy activities also influence the level of community participation in village development.

Community perception and participation influence success in the Initiation of the Tapanuli Orangutan Corridor. Wrong perceptions can lead to wrong behavior (Harihanto, 2001). People who perceive Orangutans as obstacles, destroyers, and nuisances hinder society's efforts to preserve the Sumatran Orangutan (Pongo abelii). Suppose the Perception of the Sumatran Orangutan (Pongo abelii) is understood as something beneficial. In that case, the community will work together in protecting the Sumatran Orangutan (Pongo abelii) from harmful activities. This Perception is influenced by various factors, including experience, point of view, cultural values, educational background, family background, interests, and motivation (Kuswanda, 2021). A factor that is closely related to a person's Perception is their educational background. This is in line with Notoatmojo (Ayunita, 2021), who suggests that one of the factors influencing perception is the level of education. The results of education also shape a person's thinking patterns, perception patterns, and decision-making attitudes.

Conflicts between orangutans and humans often occur due to poor perception and participation factors regarding the presence of these orangutans. Conflicts of interest between humans and orangutans will of course result in orangutans being marginalized because in any case the competition will be won by humans. Humans feel disturbed by the presence of orangutans around their plantations and homes, so some people drive the orangutans away by using bells, making traps, tying them up and even shooting the orangutans with air guns. The conflict between orangutans and society is exacerbated by society's perception that does not benefit orangutans, where some people have the perception that orangutans are just pests and destructive animals that undermine public order, so that orangutans' rights and needs for life are often not taken into consideration (Nasution, 2021). In response to this, public perception and participation regarding orangutans and their habitat is very important because public perception is the basis for forming attitudes and behavior that will continue to determine community actions towards orangutans and their habitat.

3.2 Discussion

3.2.1 Perception Factors. The research results show that the level of community perception toward the initiation of the Tapanuli Orangutan corridor development in Hutaimbaru is classified as moderate (61%). This is influenced by several key factors. First, the community’s knowledge regarding the goals of conservation is still limited, so some respondents do not fully understand the long-term benefits of corridor development. Second, experience in interacting with wildlife plays a significant role. As Snyder (2015) points out, both individual and collective experiences can shape perceptions; communities that have experienced conflicts with wildlife tend to have negative views, while those with experiences of coexistence show more positive attitudes.

Third, cultural and local values act as a foundation of collective knowledge. Kohsaka & Rogel (2019) emphasize that inherited values form local knowledge that influences how communities perceive wildlife and the environment. Finally, the length of residence in a particular area also affects perception. Communities that have lived in an area for a long time usually have a stronger sense of belonging to their environment, making them more open to conservation activities (Ekapratiwi, 2021).

3.2.2 Participation Factors. Community participation in this study is classified as high (67%), as reflected in their involvement in various activities such as tree planting, focus group discussions (FGDs), and village-level agreements regarding the corridor. The high level of participation is influenced by several factors. First, education plays an important role. Melis et al. (2016) noted that communities with higher education levels tend to be more concerned with conservation activities. Second, income is also influential. Communities with sufficient income are relatively more able to contribute to conservation efforts, whether through labor or resources. Conversely, groups with limited economic capacity tend to prioritize meeting basic needs, resulting in lower participation levels. Third, organizational outreach and external socialization serve as driving factors. A lack of support from environmental organizations can lower participation, whereas strong and consistent socialization has been shown to increase community involvement.

3.2.3 Relationship Between Perception and Participation. There is a strong connection between perception and participation. A positive perception encourages communities to participate more actively, while a negative perception can reduce involvement. A local example from this study shows that when communities view the corridor as an economic opportunity (such as through utilizing corridor crops or agroforestry activities), their participation increases in the form of planting durian, mangosteen, and areca trees. On the other hand, when some communities still perceive orangutans as pests damaging their crops, their participation in conservation efforts tends to decrease. Thus, it can be concluded that perception forms the basis of motivation, while participation is the tangible expression of that motivation.

3.2.3 Challenges. Although the findings indicate a moderate level of perception and high participation, several challenges remain. First, the demand for management rights from community groups (farmer cooperatives) can be both an opportunity and a challenge. If managed with a proper conservation understanding, it could strengthen program sustainability. However, if the focus is solely on economic interests, there is a risk of excessive human intervention within the corridor. Second, human-orangutan conflict continues to be a potential threat. Some community members still see orangutans as pests, leading to risks of expulsion, traps, or even shooting with air rifles. Another challenge is the limited understanding of the corridor concept itself, as some communities consider the corridor as land that can be managed like plantations, whereas in reality the corridor concept emphasizes minimal human intervention.

3.2.4 Policy/Management Implications. These findings have important implications for conservation strategies. First, the research highlights the need to increase community knowledge and awareness as a top priority through socialization, environmental education, and training for both village officials and local communities. Second, strengthening local institutions is necessary so that conservation programs are not only top-down but also community-based. Third, conservation programs must be integrated with sustainable local economic development, such as agroforestry, ecotourism, or environmentally friendly non-timber forest product utilization, ensuring that communities gain direct benefits. Fourth, from a policy perspective, it is essential to ensure institutional synchronization across local government, NGOs, and community groups, so that the development of the Tapanuli Orangutan corridor is not only a conservation project but also part of long-term landscape governance. In this way, more positive perceptions and higher levels of participation can continue to be strengthened to support the success of the orangutan corridor initiative in Hutaimbaru.

4. Conclusion

The findings of this study indicate that community perception of the Tapanuli orangutan corridor development in Hutaimbaru is categorized as moderate, while the level of community participation is relatively high. Perception is influenced by factors such as knowledge, experiences in interacting with wildlife, cultural and local values, as well as the length of residence in the area, whereas participation is shaped by education level, income, and support from organizations and external socialization. The implications of these findings highlight the need to enhance community knowledge and awareness through education and outreach, strengthen local

institutions, and integrate conservation programs with sustainable economic development so that the corridor development not only serves as a conservation effort but also provides tangible benefits for the community while ensuring ecosystem sustainability.

Acknowledgments
The author would like to express sincere gratitude to all parties who provided moral and material support, making the completion and publication of this research possible.

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