



Community perceptions of the Sumatran Tiger (*Panthera tigris sumatrae*) in Besitang District, Langkat Regency: Case study of Bukit Mas Village

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ABSTRACT

Sumatran tigers (*Panthera tigris sumatrae*) currently face various threats, such as deteriorating habitat quality and quantity due to forest conversion, exploitation, forest encroachment, and increased poaching. Bukit Mas Village, Besitang District, Langkat Regency is one of the villages that are quite close to the Gunung Leuser National Park (GLNP) area. This study aims to analyze community perceptions of human and Sumatran tiger conflicts (HTC). This study used a descriptive quantitative method. The respondents were taken using a non-probability sampling technique. Criteria were designed with purposive sampling type. The results of the study explain that the existence of conflict can affect people's perceptions of the existence of Sumatran tigers. The community considers tigers to be not beneficial to people's lives because tigers disturb public order. Age and latest education do not correlate (relationship) with community perceptions. Due to the Asymp. Sig values of 0.772 and 0.625. This value is greater than the significance level of 0.05.

Keyword: Community Perception, Conflict, Mitigation, Sumatran Tiger



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1. Introduction

Sumatran tiger (*Panthera tigris sumatrae*) is one of the surviving tiger sub-species in Indonesia. The Sumatran tiger population is experiencing a sharp decline of up to 7% in each habitat. Ministry of Environment and Forestry (2019), in unpublished data, showed that it is on the verge of extinction because there are only 500 to 600 individuals in the population. Its existence is increasingly difficult to find. One of the causes is that many tiger habitats have changed from forests to other land uses [1].

According to the IUCN Redlist, the Sumatran tiger is Critically Endangered as its population continues to decline due to uncontrolled habitat degradation, limited prey species, and poaching. The Sumatran tiger is a protected animal in Indonesia according to Law No. 5 of 1990 concerning the Conservation of Living Natural Resources and their Ecosystems. Sumatran tigers are included in Appendix 1 under CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora), meaning that Sumatran tigers are prohibited from being traded in any form in international trade to maintain the population of this animal [2].

One of the most recent challenges in wildlife conservation is the Human-tiger conflict (HTC) as a part of the human-wildlife conflict (HWC) [3]-[4]. Langkat Regency has the highest rate of HTC in North Sumatra Province. During 2007-2020, there were 38 incidents or 2.71 times per year, or around 45.2% of HTC of North

Sumatra cases [5]. Besitang District, as part of Langkat Regency, has been noted as one of the red zones of HTC. Even though in terms of the number of HTC incidents is relatively smaller than in other districts, the category of conflict that resulted in deadly human victims occurred in the Besitang District, as stated by BBKSDA, 2021 (unpublished data).

Bukit Mas Village, Besitang District, Langkat Regency, is one of the buffer zone villages of the Gunung Leuser National Park (GLNP). In 2021, conflicts between humans and Sumatran tigers dominated issues over other wildlife conflicts [6]. The purpose of this study is to analyze data related to community perceptions of human and Sumatran tiger conflicts.

2. Method

2.1. Research location

This research was conducted from February to April 2023 in Bukit Mas Village, Besitang District, Langkat Regency, North Sumatra Province. Two representative villages, Aras Napal Kanan and Aras Napal Kiri, experience human and tiger conflicts. It's closed to the Gunung Leuser National Park (GLNP) area. The research location map can be seen in Figure 1.

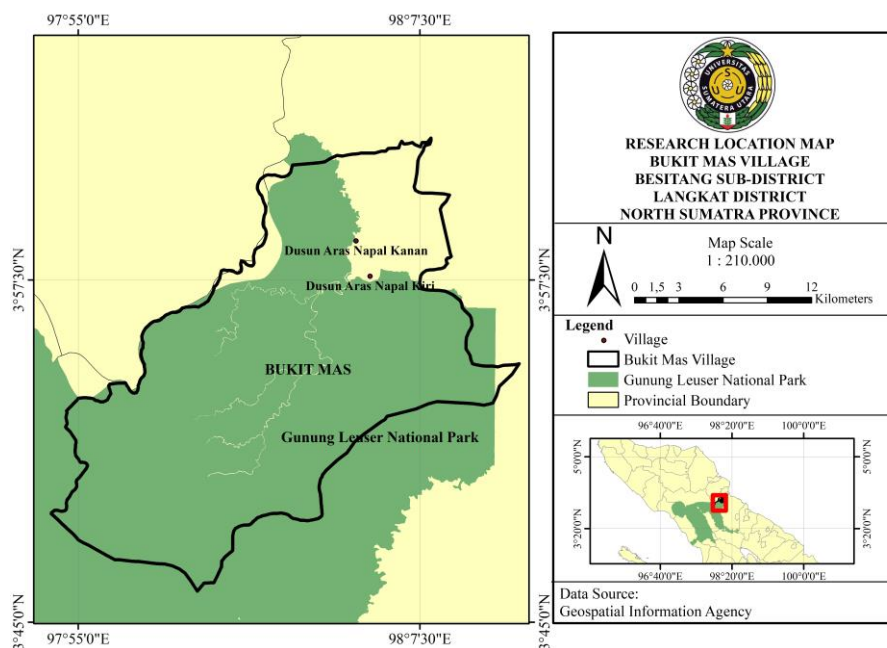


Figure 1. Research location in Bukit Mas Village

2.2. Data collection methods

Field observation, interviews, and literature study carried out perceptual data collection. Respondents were determined by purposive sampling from the community of Bukit Mas Village with the criteria of having livestock, gardens, and living or doing activities around the forest. In addition, respondents have also experienced conflict with tigers.

2.3. Data processing and analysis methods

Respondents' perceptions were measured with the help of an instrument in the form of a questionnaire that set a likert scale as a reference. The data generated from the questionnaire was then analyzed using quantitative descriptive analysis [7]. Likert scale scoring can be seen in Table 1 [8], and likert scale intervals can be seen in Tables 1 and 2 [9].

Table 1. Likert scale rating in research

Statement	Score
Strongly agree	5
Agree	4
Neutral	3
Disagree	2
Strongly disagree	1

Table 2. Likert scale interval

Percentage (%)	Criteria
0 – 30	Strongly disagree
31 – 60	Disagree
61 – 90	Neutral
91 – 120	Agree
121 – 150	Strongly agree

The data analysis technique applied is the Miles and Huberman model. Miles and Huberman found that activities in qualitative data analysis occur interactively and continuously until completion, so the data needed is complete. Interactive data analysis techniques developed by Miles and Huberman are (1)—collection of data collected from various sources, (2). Data reduction includes summarizing, selecting key elements, focusing on important elements, looking for themes and patterns, and discarding unnecessary parts (3). Presentation of data in brief descriptions, charts, relationships between categories, flowcharts, and others (4). Conclusions are drawn with strong evidence based on the data that has been reduced and presented.

To determine the level of relationship between community perceptions, the data obtained will be tested using the Rank Spearman correlation coefficient. Data with a small sample is suitable for using the Rank Spearman correlation. The following is the Rank Spearman correlation coefficient formula for samples ≤ 30 [7]:

$$\sigma = 1 - \frac{6\sum bi^2}{n(n^2-1)} \quad (1)$$

Description :

σ = Spearman Rank correlation coefficient

bi = Ranking of $X_i - Y_i$ variable data

n = Number of Respondents

After the analysis, a decision is made using certain criteria by comparing the calculated σ value with the σ table, formulated as follows. If σ count ≤ 0 , then H_0 is accepted, and H_a is rejected. Meanwhile, if σ count ≥ 0 , it means H_0 is rejected, and H_a is accepted [10]. The hypothesis that is:

H_0 = There is no significant relationship between age, latest education and community perception.

H_a = There is a significant relationship between age, latest education and community perception.

The following table outlines the guidelines for interpreting the correlation coefficient:

Table 3. Interpretation of correlation and level of relationship	
Coefficient interval	Relationship level
0.00 – 0.25	Very low correlation
0.26 – 0.50	Low correlation
0.51 – 0.75	Medium correlation
0.76 – 0.99	Strong correlation
1.00	Very strong correlation

3. Result and Discussion

3.1. Respondent characteristics

Respondents of this study were people from Village Aras Napal Kanan and Kiri, Bukit Mas Village, Besitang District, Langkat Regency, totaling 30 people. The characteristics of respondents are presented in Table 4.

Table 4. Characteristics of respondents of Bukit Mas Village community

No.	Characteristics	Frequency	Percentage (%)
	Age		
	a. < 25 years	1	3.33
1.	b. 26 – 30 years	2	6.67
	c. 31 – 35 years	4	13.33
	d. 36 – 40 years	4	13.33
	e. > 41 years	19	63.34
	Gender		
2.	a. Male	18	60
	b. Female	12	40
	Last education		
	a. Elementary School	14	46.67
3.	b. Junior High School	8	26.67
	c. Senior High School	6	20
	d. University	1	3.33
	e. Not in School	1	3.33
	Jobs		
	a. Students	0	0
	b. Private employee	1	3.33
4.	c. Civil servant	0	0
	d. Housewife	2	6.67
	e. Farmers	25	83.33
	f. Merchant	2	6.67
	Length of stay in village		
	a. 1 – 5 years	4	13.33
5.	b. 6 – 10 years	3	10
	c. 11 – 15 years	2	6.67
	d. > 15 years	21	70
	Field ownership		
	a. Owned	24	80
6.	b. Rental field	0	0
	c. Cultivated fields	3	0
	d. Does not have a field	3	10

The BPS - Statistics Indonesia (2022) states that productive age is measured from 15 to 64 years. Based on the data obtained, respondents have entered productive age as the most data 63.34% with age > 41 years. Based on gender, respondents from Aras Napal Kanan and Kiri Villages, Bukit Mas Village consisted of 60% male respondents. Respondents of the male gender generally work as farmers and are responsible for a family. Women in the fields often only help to ease the work.

Education is related to a person's way of thinking [11]. In general, higher education will broaden a person's thinking and can affect their perspective or perception of various things, including the existence of Sumatran tigers. The education level of respondents who were mostly obtained at the elementary level, as many as 46.67%. In terms of occupation, most people in Bukit Mas Village work as farmers with a total of 83.33%. In addition to farming, some people also raise livestock as a side job, so they farm while tending to their livestock in the palm oil fields.

Many people in both Aras Napal sub-villages have lived in Bukit Mas Village for a long time and opened agricultural land. Twenty-one people (70%) have lived in the village for > 15 years, so many people have agricultural land close to the Gunung Leuser National Park (GLNP) area. The length of stay in the village can cause interaction with Sumatran tigers to be higher. Field ownership in Aras Napal Kanan and Kiri villages are dominated by ownership of their fields by as many as 80%. This field borders GLNP and has been managed by each family for generations. Land expansion is expanding along with population growth. This causes the scarcity of food and shelter for Sumatran tigers. According to [12], the proximity of community land to the area is quite close and moderate, causing wildlife to leave the forest frequently.

3.2. Public knowledge of sumatran tigers

3.2.1. Sumatran tiger is a protected animal

Regulation of the Minister of Environment and Forestry No: P.106/MENLHK/SETJEN/KUM.1/6/2018 establishes the Sumatran tiger (*Panthera tigris sumatrae*) as a protected animal species in Indonesia. According to The IUCN Red List of Threatened Species, the Sumatran tiger is a critically endangered species facing extinction in the wild.

Table 5. Sumatran tiger as a protected animal

No.	Category	Frequency	Percentage (%)
1.	Know	30	100
2.	Don't know	0	0
Total		30	100

People are very aware that Sumatran tigers are animals protected by law. Based on Table 5, 30 people (100%) know that Sumatran tigers are protected animals in Indonesia; this knowledge can be obtained through school education or from counseling that has been carried out. The following sources of community knowledge that Sumatran tigers are protected animals can be seen in Table 6.

Table 6. Sumatran tiger is a protected animal source of knowledge

No.	Category	Frequency	Percentage (%)
1.	School education	20	66.67
2.	Extension	10	33.33
Total		30	100

The source of community knowledge related to Sumatran tigers is the most protected animal obtained from school education as many as 66.67%. The existence of public knowledge that Sumatran tigers are protected animals can be seen from the community's attitude toward preserving tigers, which can be seen in Table 11 when tigers prey on livestock. The actions taken by the community are actions that do not endanger tigers, and in Table 14 and Table 15 can also be seen the actions that the community takes to preserve Sumatran tigers.

3.2.2. Tigers are beneficial to people's lives

Frequent human and tiger conflicts can be a factor in changing people's attitudes towards the benefits of Sumatran tigers for people's lives presented in Table 7.

Table 7. Sumatran tigers can be beneficial to people's lives

No.	Category	Frequency	Percentage (%)
1.	Helpful	14	46.67
2.	Not helpful	16	53.33
Total		30	100

Based on Table 7 above, it is known that 53.33% respondents consider tigers to be not beneficial to people's lives. Sumatran tigers are very important animals because they help maintain the balance of the ecosystem. Therefore, their habitat must be protected from various threats. Tigers act as apex predators, controlling populations of prey species below them. The causes of tigers often appearing around residential areas or fields according to the community are presented in Table 8.

Table 8. Causes of tigers frequently appearing around settlement areas and fields

No.	Category	Frequency	Percentage (%)
1.	Habitat that has been damaged	15	50
2.	Lack of food in the forest	13	43.33
3.	Don't know	2	6.67
Total		30	100

In Table 8 above, it can be seen that as many as 50% respondents stated that the cause of tigers often appearing around residential areas and fields was due to damaged habitat. Damaged habitat is due to the conversion of forests into plantations, settlements, and road networks, which results in a reduced tiger habitat area. One of the causes of conflict between humans and tigers is the difficulty of finding prey or the absence of prey in their habitat, such as deer (*Cervus spp*), deer (*Muntiacus muntjak*), wild boar (*Sus scrofa*), and others. For this reason, habitat management efforts are needed by restocking the types of tiger prey animals in the forest or habitat area [13].

Table 10. Actions to take when seeing signs of a tiger passing by

No.	Category	Frequency	Percentage (%)
1.	Reporting to government agencies	21	70
2.	Monitoring / patrolling with the community	4	13.33
3.	Conducting expulsions	3	10
4.	Safeguarding people and their property	0	0
5.	Does not take any action	2	6.67
Total		30	100

The action usually taken by the community when they see signs of tigers passing by is to report to government agencies as many as 21 people (70%), which can be seen in Table 10. According to [14], community participation in addressing wildlife-human conflict is necessary to reduce the negative impacts of conflict.

In some circumstances, Sumatran tigers must be captured for the particular reason of the community's safety and the tiger itself to prevent more victims in HTC. The presence of livestock further opens up opportunities for a long series of conflicts between humans and tigers because tigers are opportunistic species that often like to catch livestock when available and are more accessible to prey on [15]. If tigers have preyed on livestock, the actions taken by the community can be seen in Table 11.

Table 11. Actions taken when tigers prey on livestock

No.	Category	Frequency	Percentage (%)
1.	Reporting to government agencies	29	96.67
2.	Relocate livestock to supervised areas	0	0
3.	Making tiger-proof cattle pens	1	3.33
4.	Capturing tigers for personal use	0	0
5.	Killing tigers	0	0
6.	Does not take any action	0	0
Total		30	100

In Table 11 above, it can be seen that 96.67% of respondents chose to report, and only 3.33% would build a tiger-proof livestock enclosure if tigers preyed on their livestock. Making tiger-proof livestock enclosures is one of the conflict prevention activities, according to [16], the most frequent conflict incident is attacks on livestock. People keep livestock traditionally without enclosing their livestock, thus providing opportunities for tigers to prey on livestock.

3.3. Relationship between age, education and community perceptions of human and tiger conflicts

The relationship between age and education is considered to have no relationship with community perceptions of human-tiger conflict. The Spearman Rank correlation value shows this value in Table 12.

Table 12. Spearman rank correlation analysis results

Correlations					
			Age	Last Education	Community perception
Spearman's rho	Age	Correlation coefficient	1.000	-.266	.055
		Sig. (2-tailed)	.	.155	.772
		N	30	30	30
	Last Education	Correlation coefficient	-.266	1.000	.093
		Sig. (2-tailed)	.155	.	.625
		N	30	30	30
	Community Perception	Correlation coefficient	.055	.093	1.000
		Sig. (2-tailed)	.772	.625	.
		N	30	30	30

The results of the study of age and latest education on public perception using the non-parametric statistical test of rank spearman correlation. This rank spearman correlation tests between age and latest education as variable X with community perception as variable Y. The results of the research data analysis obtained asymp. sig. values of 0.772 and 0.625. This value is greater than the significance level value of 0.05. So, age and the latest education do not correlate (relationship) with community perception. From the results of the SPSS output calculation change analysis, it can also be seen that the correlation between age and community perception, which is 0.55, is moderate. Meanwhile, the correlation between the last education and community perception is 0.93, which is strong.

According to [17], the relationship between the age of the community and the level of perception of people at a productive age will have a good mindset and perception. From the results of the study, it was found that the age of respondents had entered productive age with the most data, 63.34% with age > 41 years. Thus, people's perceptions background of Sumatran tigers can be different in any area of conflict.

Based on direct observation in the field, the characteristics of respondents can be known from the level of formal education. Formal education is the level of formal education taken or achieved by respondents expressed in educational strata/levels [18]. The education of the Bukit Mas Village community is classified in the deficient category, which can be seen in Table 4. The education level of respondents is included in the low category because most of them only graduated from elementary school, which affects farmers' understanding of Sumatran tigers.

Low education levels result in poor knowledge and perceptions. According to [19], educational background influences views and determines the level of acceptance of innovations in determining the success or failure of a government initiative. Meanwhile, [20] states that people with higher education can have the same or different perceptions, attitudes, and behaviors towards Sumatran tigers as those with lower education. Another thing is also stated by [14] that people who have an elementary school education have a good perception.

3.4. Public perception of sumatran tiger

The likert scale measures the level of opinion and perception of the community. Each question option will be given a score so that respondents can describe or accept statements (positive) or statements (negative). The results of the questionnaire can be seen in Table 13.

Table 13. Public perception of tiger poachers being punished severely

No.	Attitude category	Score	Frequency	Percentage (%)	Total score
1.	Strongly disagree	1	0	0	0
2.	Disagree	2	0	0	0
3.	Neutral	3	0	0	0
4.	Agree	4	11	36.67	44
5.	Strongly agree	5	19	63.33	95
Total			30	100	139
Score interpretation					92.66

As many as 63.33% of respondents expressed a very agreeable attitude regarding tiger poachers being severely punished. Calculations using a likert scale obtained the final result of the score percentage of 92.66%, where the score interpretation criteria based on the interval show the criteria agree. So, people's perceptions regarding tiger poachers being immediately severely punished are strongly agreed. Sumatran tigers are a type of wildlife protected by Law No. 5 of 1990 and Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number P.106 / MENLHK / SETJEN / KUM.1 / 12/2018 concerning Protected Plant and Animal Species.

According to [21], the most significant risks to tigers are overhunting and human-caused habitat degradation. The increasing price of tiger skins motivates groups of humans to hunt illegally, leading to a decline in tiger populations. The perpetrators of tiger poaching will be charged with Article 21 paragraph 2 letter a of law No. 5 of 1990 concerning Conservation of Natural Resources and Ecosystems, with a maximum penalty of five years in prison and a fine of Rp. 100,000,000. To avoid a decrease in the number of tigers, the people of Aras Napal Kanan Village and Aras Napal Kiri Village agreed not to set snares around gardens or fields for any purpose, which can be seen in Table 14.

Table 14. Community perceptions regarding not setting snares around gardens/fields with any purpose

No.	Attitude category	Score	Frequency	Percentage (%)	Total score
1.	Strongly disagree	1	0	0	0
2.	Disagree	2	0	0	0
3.	Neutral	3	1	3.33	3
4.	Agree	4	16	53.33	64
5.	Strongly agree	5	13	43.34	65
Total			30	100	132
Score interpretation					88

Calculations using a likert scale obtained the final result of the score percentage of 88%, where the score interpretation criteria based on the interval show neutral criteria. If the community sees a tiger passing by, then the community agrees to repel the tiger in a way that does not harm the tiger, which can be seen in Table 15.

Table 15. People's perception of tigers being evicted in a way that doesn't harm tigers

No.	Attitude category	Score	Frequency	Percentage (%)	Total score
1.	Strongly disagree	1	0	0	0
2.	Disagree	2	0	0	0
3.	Neutral	3	0	0	0
4.	Agree	4	15	50	60
5.	Strongly agree	5	15	50	75
Total			30	100	135
Score interpretation					90

Calculations using a likert scale obtained the final result of the score percentage of 90%, where the score interpretation criteria based on the interval show neutral criteria. So, people's perceptions related to tigers are driven away in a neutral way that does not harm tigers. According to M. Aldiansyah (40 y.o), ways to repel tigers can use firecrackers, explosions such as tube, cans, rubbing alcohol fuel or cannons and lighters and lighting so that tigers do not appear around residential areas or fields.

Table 16. People's Perception of no compensation needed for human and tiger conflicts

No.	Attitude category	Score	Frequency	Percentage (%)	Total score
1.	Strongly disagree	1	7	23.33	7
2.	Disagree	2	21	70	42
3.	Neutral	3	2	6.67	6
4.	Agree	4	0	0	0
5.	Strongly agree	5	0	0	0
Total			30	100	55
Score interpretation					36.66

The community disagreed if there is no compensation related HTC (70%). They need for compensation due to human and Sumatran tiger conflicts. Guidelines for Handling Conflicts Between Humans and Wildlife have been regulated in the Minister of Forestry Regulation No. P.48/Menhut-II/2008.

People who own livestock usually graze their livestock on plantation land by leaving livestock unattended so that livestock can roam freely and enter young plants and plant cover. This grazing model tends to have the potential to cause damage. This is in relation to the statement from [13], which states that the pattern of illegal grazing around the national park triggers this conflict. Table 18 below shows how many people agreed to make tiger-proof cattle pens independently.

Table 18. Community perceptions of making tiger-proof cattle pens independently

No.	Attitude category	Score	Frequency	Percentage (%)	Total score
1.	Strongly disagree	1	0	0	0
2.	Disagree	2	0	0	0
3.	Neutral	3	5	16.67	15
4.	Agree	4	15	50	60
5.	Strongly agree	5	10	33.33	50
Total			30	100	125
Score interpretation					83.33

Calculations using a likert scale obtained agreed result of the score percentage of 83.33%, compared to another score interpretation criteria. Community awareness of making anti-tiger cattle pens independently is high, which can be seen in the table above. However, local NGOs still assist the community in making anti-tiger cattle pens in the field. Caging is done in the afternoon, and the livestock can be released to graze in the morning. Another advantage of this enclosure is that the community can utilize livestock manure for fertilizer and biogas [16].

4. Conclusion

The diverse characteristics of respondents in Bukit Mas Village provide varying results regarding answers to perceptions of HTC. Even though all respondents knew that the Sumatran tiger was a protected animal, only 46.67% said tigers were beneficial to life. Many of them still thought tigers disturbed public order. Respondents opined tigers frequently appear around settlement areas and fields due to habitat damage (50%), and asked the government to control it. Government conservation agencies still become a reference for the community in reporting HTC (70%). The analysis shows sig. values of 0.772 and 0.625, which is greater than the significance level value of 0.05. Therefore, age and latest education do not correlate with community perceptions. Most communities strongly agree (63.33%) that tiger poachers are being punished severely, and 53.33% agree not to set snares around gardens/fields for any purpose. Regarding compensation, 23.33% strongly disagree if there's no compensation related to HTC. Overall, it indicates the huge challenge of Sumatran tiger conservation in Bukit Mas Village and needs collaboration from all parties to support it.

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