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The Effect of Storytelling and Outdoor Learning Methods on Elementary School Students' Literacy Regarding the Conservation of Sumatran Tiger (*Panthera tigris sumatrae*)

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Abstract

The Sumatran tiger (*Panthera tigris sumatrae*) is an endemic species native to Indonesia and is currently classified as Critically Endangered (CE). Conservation cannot depend solely on regulations; it requires active societal participation, strengthened by early environmental literacy. This study evaluated the impact of

storytelling and outdoor learning on elementary students' literacy in Riau Province. A one-group pretest–posttest design was conducted among elementary students aged 9–13 years who met the inclusion criteria, recruited from schools surrounding Tesso Nilo National Park, Riau Province. The intervention consisted of storytelling and outdoor learning activities. Data were obtained using a 12-item questionnaire and analyzed with descriptive statistics and paired t-tests to assess differences in literacy scores before and after the intervention. A total of 71 students participated in the study. The mean pretest score was 59.27 ± 14.08, which increased to 75.80 ± 16.79 on the posttest. A paired t-test confirmed a statistically significant improvement in conservation literacy following the intervention ($t = -8.45$, $df = 70$, $p < 0.001$). This finding suggests that storytelling, combined with outdoor learning, is an effective strategy for enhancing elementary school students' literacy in Sumatran tiger conservation. Storytelling and outdoor learning are effective educational strategies for improving conservation literacy among elementary school students. Early integration of environmental education into school curricula may play a crucial role in fostering long-term commitment to wildlife conservation.
Keywords: conservation literacy; environmental knowledge; outdoor learning; storytelling.

A. Introduction

Wildlife conservation faces significant challenges due to forest degradation, illegal hunting, and human-wildlife conflicts. The Sumatran tiger (*Panthera tigris sumatrae*) is an endemic species and the only remaining tiger subspecies in Indonesia, with its population experiencing a severe decline and currently classified as Critically Endangered (CE) (Goodrich et al., 2022). According to the Directorate General of Natural Resources and Ecosystem Conservation, Ministry of Environment and Forestry, the estimated population in 2022 was only 604 individuals, with 234 residing in their natural forest habitats in Sumatra and 370 maintained in *ex-situ* conservation facilities. The population decline is primarily driven by illegal poaching and extensive habitat destruction, which threaten both their natural environment and prey availability (Goodrich et al., 2022). Furthermore, recurrent human-wildlife conflicts frequently result in tiger fatalities. Conservation measures identified by Lestari (2016) include: (1) management and conservation programs specific to the Sumatran tiger, (2) habitat monitoring and protection, (3) enforcement against illegal trade, (4) confiscation and rehabilitation initiatives, and (5) public awareness and education campaigns. The Sumatran tiger is also listed as a protected species under Indonesian Law No. 5 of 1990 on the Conservation of Biological Natural Resources and Ecosystems, reflecting the government's formal commitment to safeguarding this critically threatened species (Riyadi et al., 2023).

Community involvement plays a crucial role in ensuring the success of wildlife conservation initiatives. Public perceptions and attitudes toward wildlife significantly influence the effectiveness of conservation strategies (Mei & Suryadarma, 2023). Previous studies in Kerinci Seblat National Park demonstrated that local communities possess a high level of awareness regarding the ecological, economic, and cultural importance of the Sumatran tiger, acknowledging its status as a legally protected species (Goodrich et al., 2022). Similarly, research in Renah Kemumu Village, Jambi Province, revealed that local knowledge and cultural values inherently support environmental balance and sustainability. However, negative perceptions and conflicts between humans and wildlife are still frequently reported, often escalating into violent encounters that threaten endangered species (Hamdani, 2020). Therefore, community awareness and positive perception play a pivotal role in shaping conservation outcomes, and these can be fostered effectively through education (Awaludin et al., 2024).

Educational and outreach programs are essential to foster positive perceptions and encourage communities to actively engage in conservation practices (Renninger & Hidi, 2022; Rhamadhani & Solihati, 2024). Enhancing environmental literacy from an early age, particularly through school-based interventions, has the potential to cultivate pro-conservation attitudes and behaviors that can be sustained into adulthood (Chawla, 2020). Innovative pedagogical approaches, such as storytelling and outdoor learning, are particularly effective for engaging students in environmental themes (Vasilaki et al., 2025; Zhang et al., 2025). Storytelling enables complex ecological issues to be communicated in a narrative form that is both accessible and memorable (Gupta & Jha, 2022), while outdoor learning provides direct, experiential engagement with nature (Chawla, 2020).

Nevertheless, existing conservation education studies predominantly emphasize community-based or adult-focused interventions, while empirical investigations targeting elementary school students, particularly within formal educational settings, remain limited. Furthermore, although storytelling and outdoor learning have individually demonstrated positive effects on environmental engagement, studies examining their integrated application as a structured educational intervention for wildlife conservation literacy are still scarce (Mei & Suryadarma, 2023). This gap is especially evident in the context of critically endangered species conservation, such as the Sumatran tiger, and within region-specific settings like Riau Province, where ecological pressures and conservation challenges persist. Consequently, there is a lack of empirical evidence assessing whether early, narrative-based, and experiential learning approaches can significantly enhance conservation literacy among young learners. Addressing this gap, the present study aims to evaluate the effectiveness of storytelling and outdoor learning methods in improving environmental and wildlife conservation literacy

among elementary school students in Riau Province, with a specific focus on the conservation of the Sumatran tiger.

This study hypothesizes that students exposed to integrated storytelling and outdoor learning interventions will demonstrate a significant increase in conservation-related knowledge, awareness, and literacy compared to their baseline levels. Building upon this background, the present study aims to examine the implementation of environmental education, particularly regarding natural resource conservation, and to assess the impact of storytelling and outdoor learning methods on the literacy of elementary school students in Riau Province.

B. Methods

Study design

This study employed a quantitative approach, using a one-group pretest–posttest model, to evaluate the impact of storytelling and outdoor learning on students' conservation literacy (Figure 1).

Figure 1: Flowchart of the study design and implementation process

Study Setting and Period

The study was carried out in Riau Province, Indonesia, on February 19, 2025. The activities took place at the Gazebo area of Tesso Nilo National Park.

Population and Sample

The study population consisted of elementary school students aged 8–12 years attending schools located within a 0.5–5 km buffer zone of Tesso Nilo National Park.

Participants were selected through purposive sampling based on the following inclusion criteria: (1) willingness to participate in the study, and (2) written consent provided by parents or guardians. Exclusion criteria included students who were unwilling to attend the storytelling sessions or outdoor learning activities until completion. In cases where selected participants withdrew or did not meet the criteria, replacement respondents were recruited using the same procedure. A minimum sample of 70 students was included in the study.

Flow of Implementation

The study followed a structured sequence beginning with proposal preparation, ethical clearance, and instrument development, followed by the recruitment of respondents. The intervention comprised storytelling and outdoor learning activities, with assessments conducted before and after the intervention. Data were then analyzed and research findings compiled for dissemination.

Data Analysis

Data analysis consisted of two stages, namely univariate and bivariate analysis. In the univariate analysis, descriptive statistics were applied to present the distribution of respondents' demographic characteristics, including age, sex, and grade level, as well as the mean and standard deviation of pretest and posttest literacy scores. This step provided an overview of the sample profile and the general trend of knowledge levels before and after the intervention. In the bivariate analysis, a paired t-test was employed to compare pretest and posttest scores within the same group of students. This analysis aimed to determine whether there was a statistically significant improvement in conservation literacy following the implementation of storytelling and outdoor learning activities.

C. Results And Discussion

The educational storytelling event "*Petualangan Tita si Anak Harimau Sumatra*" (The Adventure of Tita, the Sumatran Tiger Cub), held at Tesso Nilo National Park on February 19, 2025, exemplifies an innovative approach to environmental education through narrative engagement (Figure 2). Organized under the theme "*Proud of Our Forests, Home of Endangered Species*," the activity demonstrates how storytelling can effectively promote ecological awareness and emotional connection to wildlife conservation, particularly concerning the critically endangered Sumatran tiger (*Panthera tigris sumatrae*).

Figure 2: Storytelling activity at the Gazebo area of Tesso Nilo National Park

A total of 71 elementary students participated in the study. The mean age of participants was 11.0 ± 1.1 years, ranging from 9 to 13 years. Slightly more than half of the students were female (54.9%), and most were in grade IV (40.8%). The participant profile reflects a representative distribution of upper elementary school students, an age group considered developmentally receptive to value formation and environmental attitudes. This demographic relevance strengthens the interpretation of the educational impact observed in this study. The detailed distribution of participant characteristics is presented in Table 1.

Table 1. Characteristics of participants

Characteristics	Category	N	%	Mean±SD
Age *(years)*	9	1	1.4	
	10	25	35.2	
	11	22	31.0	
	12	14	19.7	
	13	9	12.7	
	Total	71	100	11.0±1.1
Gender	Male	32	41.5	
	Female	39	54.9	
Grade	IV	29	40.8	
	V	18	25.4	
	VI	24	33.8	

The analysis of literacy scores indicated a substantial improvement after the intervention. The mean pretest score was 59.27 ± 14.08, while the mean posttest score

increased to 75.80 ± 16.79. A paired t-test confirmed that this difference was statistically significant ($t = -8.45$, $df = 70$, $p < 0.001$, two-tailed). The Pearson correlation coefficient between pretest and posttest scores was 0.505, indicating a moderate positive association (Table 2).

Table 2. Descriptive Statistics and Paired t-Test Results for Conservation Literacy Scores

Variable	Mean±SD	n	t(df=70)	p-value (two tailed)	Pearson correlation
Pretest score	59.27 ± 14.08	71			
Posttest score	75.80 ± 16.79	71	–8.45	< 0.001	0.505

The analysis of literacy scores indicated a substantial improvement following the intervention. The statistically significant increase in posttest scores compared to pretest scores ($p < 0.001$) demonstrates that the combined implementation of storytelling and outdoor learning effectively enhanced students' conservation literacy. This finding directly addresses the research gap identified in the introduction, namely the lack of empirical evidence on structured environmental education interventions targeting elementary school students using integrated narrative and experiential learning approaches. The results support the study hypothesis that storytelling combined with outdoor learning can significantly improve conservation-related knowledge and awareness among young learners, particularly in relation to critically endangered species such as the Sumatran tiger. The outdoor setting of Tesso Nilo National Park further contextualized the learning experience, allowing students to associate abstract conservation concepts with real-world ecosystems.

The observed improvement is consistent with previous studies, which indicate that storytelling is a powerful pedagogical tool in environmental education (Ardoin et al., 2020; Shaikh, 2024). Narratives allow complex ecological issues to be conveyed in a form that is accessible and memorable for children, thereby promoting deeper understanding and retention of knowledge (Solichah & Suminar, 2020). In this study, the character-driven storyline of a Sumatran tiger cub functioned not only as an instructional medium but also as an affective bridge that fostered empathy and moral concern for wildlife conservation. Similarly, outdoor learning has been shown to enhance experiential engagement (Fan et al., 2024; Mallette et al., 2025; Vasilaki et al., 2025), encouraging learners to actively interact with their environment rather than passively receive information (Gupta & Jha, 2022).

The integration of outdoor learning with storytelling in this study likely amplified cognitive and emotional learning outcomes by reinforcing narrative messages through direct sensory experiences in a natural conservation area (Mallette

et al., 2025). This synergy may explain the magnitude of improvement observed in post-intervention literacy scores. The moderate positive correlation between pretest and posttest scores indicates that students with higher baseline literacy tended to benefit more from the intervention. However, meaningful gains were also observed among students with lower initial scores. This suggests that the intervention was inclusive and adaptable across varying levels of prior knowledge, reinforcing its suitability for heterogeneous classroom settings typical of public elementary schools.

These findings align with global evidence highlighting the role of environmental education in shaping pro-environmental attitudes and behaviors (Gunawardena & Brown, 2021). Programs that integrate storytelling and outdoor learning have been reported to increase ecological awareness, empathy toward wildlife, and willingness to engage in conservation actions (Shaikh, 2024; Solichah & Suminar, 2020). Importantly, this study extends existing literature by providing region-specific empirical evidence from Riau Province, an area of high ecological importance that has been underrepresented in conservation education research. From a conservation perspective, early exposure to wildlife conservation concepts through formal education may contribute to long-term societal support for species protection initiatives. In the Indonesian context, where human–wildlife conflict remains a persistent challenge, embedding conservation literacy within primary education could serve as a preventive strategy by fostering understanding and positive perceptions from an early age (Bartan, 2020).

Nevertheless, this study has limitations. The one-group pretest–posttest design without a control group limits causal inference, and the short-term assessment does not capture long-term retention or behavioral change. Additionally, the study focused primarily on cognitive literacy outcomes, while affective and behavioral dimensions of conservation awareness warrant further exploration. Future research should incorporate control groups, longitudinal designs, multi-site implementation, and mixed-method approaches to strengthen the evidence base and assess sustained impacts.

D. Conclusion

This study demonstrates that the integration of storytelling and outdoor learning is an effective approach to enhancing wildlife conservation literacy among elementary school students. The significant improvement in post-intervention literacy scores indicates that narrative-based and experiential learning can successfully engage young learners both cognitively and emotionally, particularly in understanding conservation issues related to critically endangered species such as the Sumatran tiger (*Panthera tigris sumatrae*). By addressing the lack of empirical evidence on structured conservation education for children, especially within formal educational settings in ecologically important regions like Riau Province, this study highlights the importance of early environmental literacy as a foundation

for long-term conservation awareness and societal support for biodiversity protection.

Despite these promising findings, further research necessary to strengthen causal inference and evaluate the long-term effects of such interventions. Future studies should incorporate control groups, longitudinal designs, and broader geographic coverage to evaluate the sustainability of learning outcomes and their translation into pro-conservation attitudes and behaviors. Additionally, integrating affective and behavioral indicators, as well as qualitative approaches, would provide a more comprehensive understanding of how storytelling and outdoor learning influence conservation values among young learners.

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F. Contributors

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