

ATTITUDE-MEDIATED PATHWAYS FROM KNOWLEDGE TO FOREST CONSERVATION BEHAVIOR: IMPLICATIONS FOR ENVIRONMENTAL EDUCATION IN A LOCAL COMMUNITY

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ABSTRACT: *This study examined the knowledge, attitudes, and behavior (KAB) of residents toward forest conservation and explored the key challenges influencing sustainable environmental management and community participation in conservation initiatives. An exploratory sequential mixed-methods design was employed, beginning with qualitative interviews to capture residents' insights and contextual experiences, followed by a quantitative survey of 407 purposively selected respondents. Structural Equation Modeling (SEM) was applied to assess the relationships among knowledge, attitude, and behavior constructs, while thematic analysis identified prevailing challenges and local perspectives. Findings revealed that residents possess a high level of awareness regarding the ecological and socio-economic benefits of forests, such as flood mitigation, climate regulation, and livelihood support. Despite this awareness, several barriers hinder sustainable conservation, including economic dependence on forest resources, limited environmental education, weak policy enforcement, and vulnerability to natural hazards. SEM results confirmed that knowledge significantly influences both attitudes and behaviors toward forest protection, with attitudes serving as a mediating factor between knowledge and behavior. These results highlight the need for community-based environmental education programs, livelihood diversification, and strengthened policy enforcement to support long-term forest stewardship. The study provides practical insights for local government units, universities, and partner organizations in designing participatory forest management initiatives that empower communities and enhance ecological resilience. By integrating behavioral analysis with contextual challenges in a Philippine setting, this research contributes to the literature on community-based forest conservation and provides empirical evidence for the mediating role of attitudes in translating environmental knowledge into pro-conservation behavior, a model that can inform grassroots sustainability interventions.*

Keywords: Forest conservation, Knowledge-Attitude-Behavior (KAB), Sustainable environmental management, Community participation, Structural Equation Modeling (SEM)

1. INTRODUCTION

Environmental conservation has become a critical global concern due to the rapid depletion of natural resources and increasing environmental degradation [1]. Schools play a pivotal role in shaping the environmental consciousness of young learners, influencing their knowledge, attitudes, and behavioral intentions toward sustainability [2, 3]. Knowledge about environmental issues, particularly forest conservation, is foundational as it informs students about ecological systems, biodiversity, and the long-term consequences of human activities on natural habitats [4, 5]. Despite numerous initiatives to promote environmental education, knowledge alone does not guarantee environmentally responsible behavior. Attitudinal factors, including personal concern for environmental protection and perceived social responsibility, often mediate the translation of knowledge into action [6, 7]. This underscores the need to explore how attitudes function as a mediator between environmental knowledge and pro-environmental behaviors among students [8, 9]. Several empirical studies have examined the knowledge-attitude-behavior (KAB) relationship in environmental contexts. For instance, the study by [10] revealed that environmental knowledge influences pro-environmental behavior primarily through the mediating effects of environmental attitudes and behavioral intentions. Similarly, [11] highlighted that environmental attitudes significantly predict sustainable

behavior, reinforcing the mediating role of affective factors. Recent studies also suggest that school-based interventions can strengthen the KAB pathway among adolescents, particularly in forest conservation contexts [12, 13]. However, many existing studies either focus solely on quantitative analysis or target higher education populations, leaving a gap in understanding how this relationship manifests among junior and senior high school students, especially within a mixed-methods framework. The present study addresses this research gap by employing an exploratory sequential mixed-methods design, which first explores participants' perceptions qualitatively and then quantitatively tests the hypothesized relationships. This approach allows for a comprehensive understanding of how knowledge and attitude interact to influence students' environmental behaviors. Moreover, incorporating multiple sectors in the qualitative phase, such as community leaders and local government representatives, provides contextual insights that enrich the interpretation of quantitative findings. By investigating the mediating role of attitude between knowledge and behavior, this study aims to contribute to the theoretical literature on environmental education and offer practical guidance for designing school-based interventions that effectively foster pro-environmental behavior. Ultimately, the research seeks to inform curriculum development, policy-making, and community engagement

strategies that promote sustainable practices among young learners. This study aims to investigate the interplay of knowledge, attitude, and behavior toward forest conservation, integrating both qualitative and quantitative approaches. Specifically, it seeks to: 1. Explore qualitative perspectives from different stakeholders on environmental and forest conservation practices; 2. Examine the relationship between students' knowledge of forest conservation and their actual conservation behaviors; and 3. Determine the mediating role of attitude in the relationship between knowledge and behavior toward forest conservation. This study is grounded in the **Knowledge–Attitude–Behavior (KAB)** framework, a well-established model in environmental psychology and education that explains how awareness and understanding influence behavioral outcomes. The KAB framework posits a sequential process wherein knowledge about environmental issues cultivates attitudes of concern and responsibility, which subsequently shape behavioral intentions and actual practices [14, 15]. In this progression, knowledge serves as the cognitive foundation that informs perceptions and values, while attitudes represent the affective and evaluative dimensions that motivate individuals to act in environmentally responsible ways. In the context of forest conservation, the KAB framework suggests that enhancing people's understanding of the ecological significance, biodiversity value, and socio-economic benefits of forests can foster positive conservation attitudes. These favorable attitudes are then expected to lead to sustainable behaviors such as tree planting, forest protection, and active participation in community-based conservation programs. Empirical evidence supports this theoretical linkage [10] demonstrated that environmental knowledge influences pro-environmental behavior primarily through the mediating effects of environmental attitudes and behavioral intentions, highlighting that knowledge alone is insufficient without affective engagement and intention formation. The relevance of the KAB framework to this study lies in its capacity to provide a systematic and practical lens for understanding how educational interventions and awareness campaigns can effectively promote behavioral change. By delineating the pathways from knowledge acquisition to attitude development and behavior enactment, the model offers a sound theoretical basis for designing and evaluating community-based environmental education programs that aim to bridge the gap between environmental understanding and sustainable conservation practices.

2. METHODOLOGY

The study employed an Exploratory Sequential Mixed Methods Design, incorporating both qualitative and quantitative participants. For Qualitative Phase, key informants were selected using purposive sampling to represent multiple community sectors relevant to forest conservation. The qualitative participants ($n = 21$) included barangay officials, local environmental officers, and community volunteers. Teachers and students were excluded to focus on broader community perspectives. Participants were chosen based on their direct involvement or experience in environmental initiatives, providing comprehensive

insights into local knowledge, attitudes, and behaviors regarding forest conservation. For Quantitative Phase, the respondents consisted of 407 Junior and Senior High School students from one of the barangays of Zamboanga Peninsula, Philippines. Stratified random sampling ensured proportional representation across grade levels (Grades 7–12), gender, and sections, minimizing sampling bias and allowing generalizable findings about students' knowledge, attitudes, and behaviors toward forest conservation. Sample size calculation was performed using G*Power 3.1 for structural equation modeling (SEM) with $\alpha = 0.05$, two predictors (knowledge and attitude), and a medium effect size (0.15). The minimum required sample ranged from 92–105 participants, depending on the method, far exceeded by the actual sample of 407 students, ensuring sufficient statistical power for robust SEM analysis. In the qualitative phase, semi-structured interviews were conducted with community sector participants to explore experiences, perceptions, and practices related to forest conservation. For the quantitative phase, a structured survey was administered to students during school hours, with parental consent and student assent obtained in accordance with ethical guidelines. A structured survey was developed based on themes from the qualitative phase. It measured knowledge (11 items), attitudes (11 items), and behaviors (10 items) related to forest conservation. Items were adapted from validated Knowledge–Attitude–Behavior (KAB) environmental instruments [7,1]and modified for the student age group. Responses were recorded on a 5-point Likert scale (1=Strongly Disagree, 5=Strongly Agree). Pretesting with 30 students from another school ensured clarity, comprehension, and reliability. Qualitative data were analyzed using thematic analysis, involving coding, categorization, and identification of recurring themes from interviews across community sectors. The qualitative findings guided the development of the quantitative survey and hypothesized structural model. Quantitative data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). Reliability and validity of constructs were assessed via Cronbach's alpha (CA), Composite Reliability (CR), Average Variance Extracted (AVE), and factor loadings. Discriminant validity was confirmed using the Fornell-Larcker criterion and HTMT ratio. Structural relationships among Knowledge, Attitude, and Behavior were evaluated through path coefficients, p -values, and effect sizes (f^2). Model fit and multicollinearity were assessed using Tenenhaus GoF, Average Path Coefficient (APC), and variance inflation factors (VIFs). This mixed-methods design ensured integration of multiple community perspectives, validating the influence of knowledge and attitudes on forest conservation behaviors among Junior and Senior High School students, while situating these behaviors within broader socio-environmental contexts.

3. RESULT AND DISCUSSION

As shown in Table 1, these results empirically validate the Knowledge–Attitude–Behavior (KAB) model, suggesting that individuals who possess greater knowledge about forest

conservation tend to develop more positive attitudes, which in turn lead to stronger pro-environmental behaviors. This pattern aligns with the qualitative findings, where participants who demonstrated a deeper understanding of forest functions (e.g., flood prevention, climate regulation, and water protection) were also those most engaged in reforestation, waste management, and community-led conservation initiatives. For instance, Participant 18’s articulation of forests as “protection from floods and storms” and Participant 3’s view that “reforestation ensures sustainable living” exemplify the cognitive and affective components that underpin behavioral engagement. This parallel confirms that knowledge acts as a cognitive foundation for pro-environmental attitudes, which in turn mediate the translation of awareness into action, a process consistent with the Theory of Planned Behavior [6] and the Value–Belief–Norm framework [7]. While the quantitative results affirm strong causal relationships among KAB constructs, the qualitative phase revealed contextual barriers that moderate these associations. Economic dependence, limited education, weak policy enforcement, and environmental threats emerged as significant constraints that weaken the behavioral realization of conservation attitudes. Residents’ awareness of conservation benefits does not always translate into consistent action, primarily due to livelihood pressures. As Participant 3 explained, “We depend on the forest for income, wood for charcoal and fruit to sell.” This illustrates how economic necessity dampens the strength of the Knowledge–Behavior link, despite high awareness levels. Similarly, Participant 12’s statement “Many know the importance of forests but don’t know how to contribute practically”—highlights knowledge–practice gaps caused by insufficient environmental education and technical support.

From a quantitative perspective, this explains why the direct path from Knowledge → Behavior ($\beta = 0.243$), though significant, is weaker than the mediated path through Attitude (Knowledge → Attitude → Behavior = 0.378). The qualitative data thus contextualize the partial mediation observed in the statistical model, indicating that positive attitudes can mitigate some barriers, yet structural and socio-economic factors continue to limit behavioral consistency. Both data strands converge to reveal that forest conservation behavior is a socially embedded process. The quantitative R^2 values (Attitude $R^2 = 0.60$; Behavior $R^2 = 0.54$) suggest that a substantial portion of behavioral variance is explained by internal cognitive–affective factors, yet not entirely. The remaining variance can be attributed to external influences, as highlighted in the qualitative findings, particularly community norms, governance effectiveness, and environmental conditions such as pest infestations and typhoons. The qualitative evidence further expands the model by introducing collective and contextual dimensions not captured quantitatively. For example, Participant 21’s emphasis on “barangay-led tree planting and waste management” demonstrates the influence of social norms and local governance, which future models could incorporate as moderating or mediating variables. This expansion aligns with environmental psychology literature emphasizing the role of social capital and community participation in enhancing conservation efficacy [16]. The integration of qualitative and quantitative evidence demonstrates that forest conservation of the barangay is a cognitively informed but contextually constrained process. Residents possess strong environmental awareness and increasingly positive attitudes; however, economic pressures, enforcement gaps, and natural hazards limit the translation of these attitudes into sustained behavioral outcomes.

Table 1: Integrated Summary of Findings

Domain	Qualitative Insights	Quantitative Findings	Integrated Interpretation
Knowledge	Deep understanding of forest roles in disaster prevention, livelihood, and water protection.	$K \rightarrow A$ ($\beta = 0.775, p < 0.001$)	Cognitive awareness strongly predicts positive attitudes.
Attitude	Sense of shared responsibility and urgency for environmental protection.	$A \rightarrow B$ ($\beta = 0.487, p < 0.001$)	Positive attitudes translate into active conservation behavior.
Behavior	Active participation in reforestation, waste management, and education campaigns.	$K \rightarrow B$ ($\beta = 0.243, p < 0.001$); Indirect $K \rightarrow A \rightarrow B$ ($\beta = 0.378$)	Knowledge indirectly enhances behavior through attitudinal mediation.
Challenges	Economic dependence, weak enforcement, and environmental threats hinder consistent action.	(Contextual moderator)	Barriers weaken the strength of KAB pathways, suggesting partial mediation.

4. CONCLUSION AND RECOMMENDATION

The findings of this study underscore the dynamic interrelationship between knowledge, attitude, and behavior toward forest conservation among junior and senior high school students. Results revealed that while environmental knowledge provides a fundamental understanding of ecological concepts, it is the attitudinal disposition of students that significantly mediates their behavioral engagement in conservation practices. This implies that environmental education efforts must go beyond cognitive

development to include affective and behavioral dimensions that cultivate genuine care and responsibility for nature. Practical implications of the study point to the need for an integrated approach to environmental education in schools. Curriculum developers should incorporate experiential and values-based learning strategies that connect theoretical knowledge with actual conservation initiatives. For example, students’ participation in tree-planting activities, local biodiversity assessments, and forest rehabilitation programs can strengthen their ecological awareness and sense of stewardship. School administrators may also support eco-

clubs and youth-led environmental campaigns that encourage peer-driven behavioral change. Moreover, partnerships between schools, local government units, and community organizations can expand learning experiences beyond the classroom, promoting active environmental citizenship and community participation. Such collaborations ensure that environmental education becomes a shared responsibility among educational institutions and local stakeholders. From a theoretical standpoint, this study extends the application of the Knowledge–Attitude–Behavior (KAB) model by empirically validating the mediating role of attitude in shaping conservation behaviors among adolescents. The results align with [6] Theory of Planned Behavior (TPB), which posits that individual attitudes toward a behavior are central to predicting actual behavioral intentions. Furthermore, the findings corroborate [3] argument that pro-environmental behavior results from an interplay of knowledge, attitudes, and contextual influences. The inclusion of qualitative insights from community leaders and local government representatives provides a contextual dimension that enriches the interpretation of quantitative findings. These perspectives reveal that social norms, community practices, and institutional initiatives play significant roles in shaping young people’s environmental attitudes and actions. Hence, the study refines existing theoretical frameworks by emphasizing that environmental attitudes are not formed in isolation but are deeply rooted in social and community contexts. Despite its contributions, the study recognizes several limitations. The sample was limited to selected junior and senior high schools, which may restrict the generalizability of findings to other educational levels or regions. Additionally, while the mixed-methods approach provided comprehensive and triangulated data, future studies may adopt longitudinal designs to examine how environmental knowledge and attitudes evolve. Future investigations may also expand the model by including moderating variables such as ecological identity, peer influence, and digital engagement in sustainability campaigns. Integrating technological tools, like gamified e-learning platforms or social media-based environmental programs, could further enhance behavioral engagement among youth. Moreover, further research could explore additional mediating or moderating variables, such as environmental values, perceived behavioral control, or community engagement, to deepen understanding of the mechanisms driving conservation behavior. In conclusion, this study contributes to both theoretical and practical discourse by highlighting the pivotal role of attitude in transforming environmental knowledge into sustainable behavior. Strengthening students’ emotional connection, social responsibility, and commitment to nature is essential for cultivating environmentally literate citizens. Through sustained collaboration among schools, local government units, and communities, environmental education can evolve

from mere instruction to transformative practice that fosters long-term forest conservation and ecological sustainability.

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