

Strengthening Religious Values and Environmental Concerns: A Pro-environmental Behavior Education Program for Adolescent Santri in Indonesia

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Abstract

Climate change and environmental degradation have become urgent global challenges, marked by the significant rise in average global temperatures due to human activity, industrialization, and carbon emissions. The low level of environmental concern in Indonesia worsens this challenge, as reflected by the Environmental Care Behavior Index (ECBI/ IPRLH) of only 0.57 (low category). Furthermore, only 38% of Indonesian adolescents are actively involved in environmental preservation. Initial observations at Pesantren Ar-Raudlatul Hasanah Medan indicate that high institutional compliance does not fully translate into individual pro-environmental actions by santri (students). This is evidenced by inconsistent waste segregation, reliance on single-use plastics, and limited water conservation. This community service activity aimed to enhance religiosity toward environmentally friendly behavior among adolescent santri. The CBPR model was implemented from July to October 2025 at the pesantren. The results indicated that the santri's level of religiosity was in the high category across all dimensions, and their pro-environmental behavior was categorized as good to very good, especially concerning waste disposal discipline and water conservation. Spiritual values (such as amanah and ihsan) have reached affective and behavioral stages. However, personal initiatives, such as sorting waste or reducing single-use plastic, require further strengthening. It is concluded that pesantren hold significant potential as a foundation for forming religiously rooted pro-environmental behavior.

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INTRODUCTION

Global environmental damage has reached a "code red for humanity" (Maruf et al., 2024), leading to widespread ecological impacts, such as drought, floods, clean water crises, loss of biodiversity, and air/soil pollution. The IPCC on 2022 reported that human activities, such as industrialization and excessive resource exploitation, are increasing the average global temperature (Intergovernmental Panel On Climate Change, 2022).

In Indonesia, environmental degradation poses a serious threat. The national waste generation is 24.94 million metric tons per year, with 61% remaining unmanaged (KLHK, 2025). Furthermore, more than 90% of disasters in Indonesia are hydrometeorological (BNPB RI, 2025; Rachman et al., 2024), which is closely linked to environmental damage. The underlying

issue is the low environmental concern among the Indonesian public, evidenced by the IPRLH score of 0.52 (vulnerable) (LP3ES, 2024). Adolescents, as the next generation, exhibit low active involvement in environmental preservation, with only 38% actively participating (UNICEF Indonesia, 2024; Wahyuni et al., 2022).

Environmental conservation efforts require educational institutions to play an important role in developing early awareness of ecological issues (Ambarfebrianti & Novianty, 2021; Anggraini et al., 2024). Religious values, particularly those taught in Islamic boarding schools (pesantren), can provide a strong moral foundation for a country with a Muslim majority (Anshori & Pohl, 2022; Astuti & Winarti, 2026). Islamic concepts such as *khalifah* (steward) and *amanah* (trust/responsibility) emphasize the human

role in maintaining a natural balance (Finnegan, 2005). Previous studies have confirmed that high religiosity correlates with greater pro-environmental action (Sa'id et al., 2024; Yu et al., 2019). Models such as eco-pesantren (Risana et al., 2024) and eco-theology (Karman et al., 2023) demonstrate that spiritual approaches effectively cultivate positive environmental behaviors.

This community service activity emphasizes pro-environmental behavior as a strategic focus, aligning contemporary challenges within the pesantren context with foundational Islamic teachings. In this perspective, issues such as waste management, water use, and sanitation are understood not merely as technical concerns but as moral imperatives embedded in religious values. However, empirical observations reveal a persistent gap between santri's high level of religiosity and the consistency of their everyday environmental practices. Preliminary findings show that high institutional compliance does not fully translate into individual pro-environmental actions, as evidenced by inconsistent waste segregation, reliance on single-use plastics, and limited water conservation. This tension underscores the gap between the theoretical understanding of Islamic environmental tenets and actual daily practices.

To address this, the community engagement initiative is designed to optimize pesantren's role as an agent of ecological transformation by shifting behavioral patterns from externally enforced compliance toward internally motivated, self-sustaining actions that contribute to long-term character formation. This community service activity aimed to design and implement an educational program on pro-environmental behavior rooted in religious values at Pesantren Ar-Raudlatul Hasanah, Medan.

The core focus of this community service activity is twofold: first, to assess the extent of Islamic religious values among adolescent santri in relation to environmental responsibility; and second, to determine their current level of awareness and pro-environmental behavior through educational and participatory engagement within the pesantren environment. Given that the pesantren context provides a strong moral and disciplinary foundation, the overarching objective of this program is to enhance the level of religiosity toward environmentally friendly behavior among these adolescent santri. This general objective is realized through specific aims: (1) strengthening the santri's comprehension of the explicit link between Islamic teachings and ecological consciousness; (2) establishing consistent pro-environmental behaviors in their daily life within the pesantren; and (3) cultivating selected santri cadres to act as sustainable agents of change in environmental management rooted in religious values.

MATERIALS AND METHODS

Materials

The primary materials used in this community service activity were educational resources, data collection instruments, and practical action supplies. Educational materials included an integrative curriculum designed to merge core Islamic values, such as *khalifah fil ardh* (stewardship), *amanah* (trust), and *ihsan* (goodness), with practical pro-environmental principles. Data collection relied heavily on standardized questionnaires, which assessed the santri's level of religiosity across five dimensions (belief, practice, experience, knowledge, and consequences) and three aspects (waste reduction, energy/water conservation, and participation/awareness) of their pro-environmental behaviors. Self-reflection sheets were used to gather qualitative feedback from the santri cadres. The main equipment included documentation tools used to record implementation activities, such as tree planting. Supplies for collaborative environmental actions, such as seedlings and tree planting tools, were also essential materials.

Methods

The methodology for this service activity employed a Community-Based Participatory Research (CBPR) approach, emphasizing collaborative engagement between researchers and pesantren stakeholders to co-develop contextually relevant solutions. This method is well-suited to addressing the identified gap between high religiosity and the internalization of pro-environmental behavior, as it integrates institutional structures, local culture, and Islamic values into the intervention process (Israel et al., 2005). In addition, value-based environmental education grounded in Islamic principles was utilized to strengthen intrinsic motivation, consistent with evidence that moral norms significantly influence pro-environmental behavior (Steg & Vlek, 2009). The inclusion of peer-led environmental santri cadres further reinforces behavioral change through social modeling and participatory empowerment, making the approach both contextually appropriate and sustainable.

The activity was conducted at Pesantren Ar-Raudlatul Hasanah, Medan, from July to October 2025, with the core implementation phase being conducted from September 1 to September 25, 2025. The methodology followed a structured, chronological procedure encompassing six strategic steps, adhering to scientific acceptability principles using CBPR, a recognized participatory method. The first stage involved identifying the problems and needs of the participants. The second stage was the Collaborative Team Formation and Program Planning, in which a joint team was established, and the integrative educational curriculum was designed

based on the needs assessment. The third stage, Program Implementation, involved conducting training sessions for santri and accompanying teachers, packaged creatively to appeal to youth. The final stages involved Participatory Evaluation and Community Reflection, followed by a joint reflection forum with pesantren stakeholders to discuss outcomes, obstacles, and next steps for the program's continuity. Univariate analysis was used to describe characteristics, and bivariate analysis with the chi-square test of independence and t-test (Köhler, 2022) was used to compare students' pro-environmental behavior based on their religiosity level.

RESULTS AND DISCUSSION

General Overview of the Location

The community service was conducted at Pesantren Ar-Raudlatul Hasanah, a modern Islamic educational institution established in October 1982 and located in Medan Tuntungan. Since 1986, the pesantren has operated a full boarding system. Its facilities are comprehensive, including a two-story mosque, dormitories, laboratories, and sports fields. The vision of the institution centers on implementing the function of Allah's khalifah (steward) on earth. Its mission is to cultivate an excellent generation with the IQRA personality (combining intellectual aspects [*'ilmy 'alamy*'] and spiritual aspects [*'qur'any rabbany*'] who are ready to implement these values in society.

Process of Community Service Implementation

The service utilized the CBPR approach, positioning the community as an equal partner throughout all stages. The procedure began with the identification of problems and community needs, which included coordination with pesantren leadership, a focus group discussion (FGD) with the Environmental and Administration Sections and Environmental Santri Cadres, and initial surveys to assess existing pro-environmental practices.

The service activity adhered to the CBPR approach, which mandates the active collaboration of all stakeholders (santri, ustadz, and the service team). The process was executed in four strategic steps:

- Initial Assessment, Community Needs and Assets Mapped:** The activity commenced with the identification of problems and community needs. The team performed literature reviews and policy studies, established initial communication with pesantren leadership, and conducted an FGD with the Environmental and Administration Sections, Ustadzah, and existing Environmental Santri Cadres to map community needs and potential assets. This stage involved observing the physical pesantren environment and conducting a survey to understand the santri's existing

attitudes and practices related to pro-environmental behavior and its correlation with their religious understanding (Fig. 1a).

- Collaborative Design, Educational Interventions Integrating Islamic Values** A Collaborative Team involving faculty, pesantren caregivers, teachers, and santri representatives was formed to design the intervention. Based on the initial mapping, a participatory educational curriculum was developed for the project. This design specifically integrates core Islamic teachings with practical, daily, and environmentally friendly practices. The selected learning methods included interactive lectures, group discussions, and creative activities, ensuring that the intervention was contextually relevant and engaging for the adolescent santri (Fig. 1b).
- Implementation, santri training, and environmental actions.** The central activity was the training of santri and mentors on pro-environmental behavior based on Islamic teachings, delivered creatively for adolescents. Subsequently, collaborative actions were carried out, including the *Gerakan Santri Hijau* (Green Santri Movement) campaign, routine environmental work (part of the "green day"), and a tree planting action in front of the female dormitory. Active santri were trained as environmental cadres to drive sustainable behavior within the pesantren (Fig. 1c).
- Evaluation, Reflection Forum** The final stage involved participatory evaluation and reflection with the community. Evaluation was primarily conducted using questionnaires, then the process concluded with a reflection forum involving all pesantren stakeholders to discuss achievements, constraints, and strategies for program continuity (Fig. 1d).



Fig. 1. Community service implementation

Table 1. Solutions and outputs of the service activity

Problem Addressed	Solution (Intervention)	Output/Process
Low personal initiative among santri in pro-environmental behaviors (e.g., waste sorting, reducing single-use plastic).	Implementation of a pro-environmental behavior education program based on religious values using a community-based participatory research approach	Increased understanding of environmental care concepts and practices in the daily life of <i>santriwati</i> in the <i>pesantren</i> area.
There is a need to internalize religious values (<i>khalifah fil ardh, amanah</i>) into tangible environmental actions and link them to global issues.	Implementation of training and formation of environmental santri cadres, supported by a tree planting action and a "green dormitory" campaign.	<i>Santri</i> possess strong moral awareness regarding the spiritual and social impact of environmental actions and understand the connection between local environmental issues and national/international issues.

The problems addressed, interventions, and immediate outputs of this structured process are summarized in Table 1.

Santri Characteristics

The average age of the participating santri was 14 years (early adolescent category). Most respondents were equivalent to the 2nd–3rd year of Tsanawiyah (Junior High) or early Aliyah (Senior High). The average length of stay at the *pesantren* was 2–3 years, indicating that they were well-adapted to *pesantren* culture. This homogeneous characteristic, combined with their open-mindedness at this stage of identity formation, made the group highly receptive to interactive and participatory educational programs.

Overview of Santri Religiosity Level

The santri's religiosity level, measured across four dimensions (Koenig et al., 2012), was overall in the high category.

- 1) Belief Dimension: Nearly all santri showed a very high level of belief. The majority agreed or strongly agreed that maintaining the environment is part of religious command (*khalifah fil ardh and amanah*).
- 2) Practice & Experience Dimension: Most santri demonstrated active religious practice, where spiritual conviction drives environmentally friendly actions. They felt a spiritual responsibility to protect the environment, which motivated practical actions such as maintaining dormitory cleanliness. This indicates that the internalization of Islamic values has reached the affective and behavioral stages.
- 3) Knowledge Dimension: The santri possessed good religious knowledge related to environmental themes, understood the importance of cleanliness, and applied the principle that "cleanliness is part of faith."
- 4) Consequences Dimension: Santri demonstrated strong moral awareness. The majority reported

feeling guilty if they failed to maintain cleanliness or damaged the environment, as this contradicted their religious beliefs. This moral consciousness served as a primary driver of positive behavior.

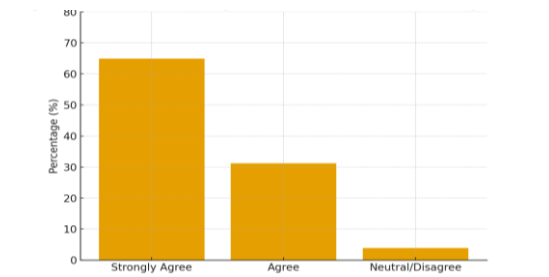


Fig. 2. Distribution of religiosity values among students

The descriptive analysis showed that the majority of students demonstrated a strong agreement with religious values related to environmental preservation. A substantial majority of respondents (64.9%) strongly agreed and 31.2% agreed with statements linking religious teachings to environmental responsibility. Only a small proportion (< 5%) expressed neutrality or disagreement (Fig. 2).

The highest levels of agreement were observed in statements such as "I believe that humans are entrusted as stewards (*khalifah*) of the Earth to protect God's creation" and "Cleanliness is part of faith, and I apply this principle in maintaining the environment."

This indicates that the religious dimension of environmental awareness is strongly internalized among students, aligning with previous studies that highlight the influence of spirituality on pro-environmental attitudes.

Overview of Santri Pro-Environmental Behavior

Overall, the pro-environmental behavior of the santri at Pesantren Ar-Raudlatul Hasanah was in the good to very good category.

1. Waste Reduction & Recycling: Behavior was very good regarding waste disposal in designated places ("always" and "often"). However, behaviors requiring personal initiative and lifestyle changes, such as sorting waste, reducing single-use plastic, or bringing their own containers, showed varied levels of compliance.
2. Energy & Water Conservation: Conservation behavior was quite high, especially in water usage during wudu and bathing, aligning with Islamic values on water efficiency. The habit of turning off lights and electronics was also good. Behavior related to reducing air pollution (e.g., walking/cycling) was low, likely due to the limited mobility within the pesantren.
3. Participation & Environmental Awareness: Santri were frequently involved in routine collective cleaning activities (work service), demonstrating the success of the collective system in fostering discipline. However, participation in self-initiated actions, like creative environmental competitions or actively seeking global environmental information, was more varied. Santri were active when activities were institutionally programmed (top-down) but showed less self-initiative (bottom-up).

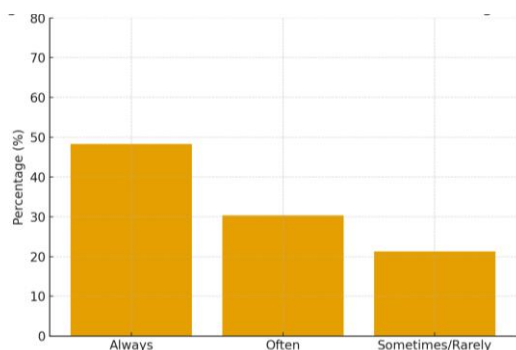


Fig. 3. Distribution of pro-environmental behavior among students

Respondents also demonstrated positive engagement in environmentally friendly actions based on the behavioral indicators. A substantial proportion of respondents reported consistently practicing pro-environmental behavior, with 48.3% indicating "always" and 30.4% "often" (Fig. 3).

Common actions included throwing garbage in proper bins, conserving water and electricity, and participating in community cleanup activities. However, lower frequencies were observed for activities such as creative environmental campaigns and consistent waste segregation. These findings indicate that although students have high environmental awareness, further reinforcement is needed to expand participation in collective environmental actions.

Table 2 Association between religiousness and pro-environmental behaviour

Religiuosness	Pro-Environmental Behaviour				p-value
	Strong		Weak		
	n	%	n	%	
High	101	62.3	61	37.7	<0.001
Low	61	39.1	95	60.9	
Total	162	50.9	156	49.1	

The results presented in Table 2 show a significant association between religiousness and pro-environmental behavior ($p < 0.001$). Among individuals with high religiousness, 62.3% exhibited high pro-environmental behavior, while 37.7% showed low pro-environmental behavior. In contrast, among those with low religiousness, only 39.1% demonstrated high pro-environmental behavior, whereas 60.9% fell into the low pro-environmental behavior category.

These findings indicate that individuals with higher religiousness are more likely to engage in pro-environmental behavior than those with lower religiousness. The statistically significant confirms that this relationship is unlikely to be due to chance.

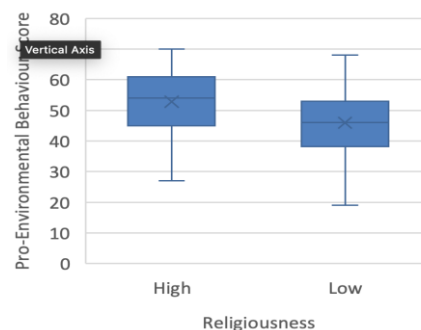


Fig. 4. Differences in pro-environmental behaviour by level of religiousness

The boxplot illustrates the differences in Pro-Environmental Behavior Scores between individuals with high and low levels of religiousness. Overall, the group with high religiousness shows a noticeably higher median score, along with a wider distribution of values that generally lies above the scores of the low-religiousness group. This pattern suggests that individuals with stronger religious commitments tend to exhibit more consistent and higher levels of pro-environmental behavior. In contrast, the low-religiousness group demonstrates a lower median score and a distribution indicating comparatively weaker engagement in environmentally responsible actions (Fig. 4).

Furthermore, the independent t-test revealed a statistically significant difference between the two

Table 3 Changes resulting from the service activities

Initial Condition	Intervention	Condition Change
Although religiosity was high, consistency varied in behaviors requiring personal initiative.	Community Service Activity "Strengthening Religious Values and Environmental Concern" implemented from September 1–25, 2025.	Increased understanding of environmental concepts and practices in the daily life of <i>santriwati</i> regarding dormitory and <i>pesantren</i> area cleanliness.
Need to link the <i>santri</i> 's responsibility within the <i>pesantren</i> to broader (global) environmental issues.	Creative and interactive education on pro-environmental behavior, including material presentation and a tree planting action.	Increased awareness of the importance of maintaining plants and vegetation from both religious and general scientific perspectives.
Participation level was primarily instructional (<i>top-down</i>) rather than self-initiated (<i>bottom-up</i>).	Cadre training and formation of a collaborative team to encourage program continuity.	Provided a comprehensive understanding linking <i>pesantren</i> -based environmental stewardship with broader issues while preserving core values.

groups ($p < 0.001$). This confirms that the higher pro-environmental behavior observed among individuals with high religiousness is not due to random variation but represents a meaningful and significant difference in behavioral tendencies. The analysis matrix highlights that the system effectively promotes collective behavior but requires a focus on personal initiative.

Discussion

The results demonstrate that religious values serve as a powerful intrinsic motivator for pro-environmental behavior among adolescent *santri*, affirming previous research findings (Sa'id et al., 2024; Yu et al., 2019). The core Islamic concepts of *khalifah* and *amanah* are deeply internalized, transforming environmental care from a social norm into a spiritual obligation. The *santri*'s self-reported high level of moral consequence indicates that their religiosity reinforces the consistency between their spiritual convictions and their tangible actions (Fua et al., 2018), confirming that the values have moved beyond knowledge to the affective and behavioral stages.

These findings are consistent with prior studies indicating that religious values, such as *amanah* (trustworthiness) and *ihsan* (moral excellence), can encourage students to engage in environmental conservation (Tabtila et al., 2024). Integrating ecological education with local and religious values has also been shown to support the achievement of the Sustainable Development Goals (SDGs), particularly in education, environmental awareness, and socially responsible behavior (Athoillah et al., 2024). This suggests that strengthening religious values enhances not only moral and spiritual development but also promotes tangible pro-environmental actions.

The CBPR methodology proved effective, facilitating strong collaboration that leveraged the

pesantren's institutional strengths, such as discipline and collective system management. This is reflected in the high compliance with collective tasks, such as cleanliness and water conservation, aligning with the principles of *qana'ah* (simplicity) and efficiency taught in Islam.

However, the discussion must address the primary limitation: the gap between strong collective compliance and weak personal initiative. While *santri* adhere well to institutional rules (*top-down* actions), individual actions like waste sorting and reducing plastic (which require sustained self-control and often better infrastructure) are still varied. This challenge necessitates shifting the focus from instruction to empowerment. The measurable changes confirmed by *pesantren* leadership (Table 3) underscore the immediate positive impact; however, long-term sustainability hinges on addressing the need for enhanced personal autonomy.

Future success requires *pesantren* to strengthen the role of the Environmental *Santri* Cadres, integrate "Islam and Ecology" thematically, and improve supporting infrastructure (such as segregated bins), thereby ensuring that pro-environmental behavior becomes a self-driven, sustainable component of their religious identity.

CONCLUSION

The service successfully implemented the CBPR method, which began with initial communication, needs assessment via FGDs and surveys to map community practice and potential, followed by the collaborative design of educational interventions integrating Islamic values. Implementation included *santri training* (*pelatihan santri*), *tree planting actions* (*aksi penanaman pohon*), and the formation of environmental *santri* cadres, concluding with an evaluation using questionnaires and interviews and a reflection forum with the community. The primary measurable contribution and community impact of

this program is reflected in the santri's attainment of a high level of religiosity alongside good to very good pro-environmental behavior. Their internalized spiritual values serve as a driving force for tangible actions, including maintaining dormitory cleanliness, proper waste disposal, conserving water and electricity, minimizing the use of single-use plastics, and actively engaging in the implementation of the green pesantren program (tree planting activities). The success of this community engagement program was strongly supported by institutional commitment from pesantren stakeholders, particularly through the establishment of internal policies regulating dormitory and yard cleanliness in pesantren. Additionally, the proactive initiative to appoint Bataling cadres as key actors and implementers played a crucial role in ensuring effective program execution. Despite these successes, a key limitation remains: behaviors that demand personal initiative, such as actively sorting waste, reducing single-use plastic, or participating in external campaigns, are still only practiced by a small fraction of the santri. Based on this limitation, recommendations for further service activities include the need to increase supporting facilities, such as segregated waste bins, and strengthen the role and leadership of the Environmental Santri Cadres to drive bottom-up change. The scope for future work involves performing longitudinal evaluations to assess the long-term sustainability of the santri's pro-environmental behavior and establishing a comprehensive Eco-Pesantren model based on public health science through fortified academic synergy between STIT Ar-Raudlatul Hasanah and FKM UINSU.

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