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Beyond Environmental Values: Understanding Ecological Practices through Meaning, Competence, and Materiality in an Indonesian Pesantren

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ABSTRACT

Research on pro-environmental behavior shows that ecological values and concerns do not always translate into consistent actions. This article examines how meaning, competence, and materiality interact in shaping ecological practices at Makrifatul Ilmi Islamic Boarding School, South Bengkulu, using Shove et al.'s social practice theory. This qualitative case study employs semi-structured interviews, field observations, and document analysis involving 24 participants: four caregivers, five teachers, and fifteen students. Data were analyzed iteratively following Miles et al. The findings suggest that the Santri Forest, water conservation, and cleanliness and waste management practices gain legitimacy from religious values. However, their continuity depends on specific competencies and material conditions. Tree maintenance is constrained by limited agronomic skills, rocky land, and the lack of permanent water access. Water conservation is hindered by worn taps, while waste sorting is not sustained because sorted waste is mixed again at the temporary disposal site (TPS) and eventually burned. Strengthening ecological practices requires skill development and improved facilities alongside value reinforcement. These context-specific findings cannot be generalized to all Islamic boarding schools.

Keywords: *Pro-Environmental Behavior; Ecological Practices; Islamic Boarding School; Social Practice Theory*

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INTRODUCTION

Environmental sustainability depends not only on ecological knowledge and values but also on how that concern is embodied in daily actions. Studies of pro-environmental behavior show that the relationship between awareness, attitudes, and actions is shaped by psychological, social, and situational factors, so that concern does not always result in consistent behavior (Kollmuss & Agyeman, 2002). This issue becomes tangible when ecological responsibility must be translated into routines that involve resource use, space management, and shared environmental maintenance. Knowing how to conserve water is different from being able to do so, and the intention to keep a place clean differs from the collective routine that makes cleanliness possible. A similar gap between environmental intention and behavior has been documented in waste sorting (Wang & Mangmeechai, 2021).

Islamic boarding schools (*pesantren*) are a relevant setting for studying this problem. As boarding institutions, pesantren combine value learning, social interaction, and daily activities in a relatively organized space, while Islamic teachings provide a moral foundation for environmental responsibility. According to data from the Ministry of Religious Affairs for the 2025/2026 period, Indonesia has more than 42,391 pesantren that house around 4.5 million students. Mubarrok and Sholeh (2026) explained that, at this large communal scale, the pesantren sector has given rise to various sustainability initiatives from the government and religious scholars (*ulama*), such as the Eco Pesantren Program, which aims to bring religious teachings together with environmental insights, and Fatwa No. 41 of 2014 of the Indonesian Ulama Council (MUI) on Waste Management to Prevent Environmental Damage. These initiatives respond to real challenges on the ground. Pesantren are densely populated, which can create ecological pressures, ranging from limited clean water management to a lack of sorting facilities that leads to large amounts of unmanaged waste with the potential to pollute water and soil (Aulia et al., 2024). However, the presence of supportive religious values does not in itself explain how ecological practices are formed, maintained, or changed.

Research on eco-pesantren and Islamic environmental education has developed. Aulia et al., through a qualitative case study at a pesantren in Lamongan, showed that students' environmentally friendly behavior can be shaped through leaders' role modeling, infrastructure and its use, governance systems, and institutional culture (Aulia et al., 2024). Karman et al. examined eco-theology-based Qur'anic learning in a pesantren (Karman et al., 2023), and Syukri et al. examined how Islamic values are integrated with environmental ethics in pesantren education (Syukri et al., 2024). Two systematic reviews highlight, respectively, the role of religiosity, ecological awareness, and social norms in pro-environmental behavior in pesantren (Aksir et al., 2025) and the integration of ecotheology into Islamic religious education (Sapitri et al., 2025). These studies affirm the role of values, curriculum, and role modeling. However, they have paid less attention to how religious meaning, practical skills, and material conditions relationally complement or hinder one another across different ecological practices within the same institution. The existing literature tends to treat these elements separately or in a one-directional way, so it offers limited explanation of why practices within a single institution can differ, such as early waste sorting that is interrupted by burning at the final stage, in an environment that normatively holds a strong environmental commitment.

Social practice theory offers an entry point to this problem because it treats action as part of a configuration of interconnected elements, not merely as the result of individual decisions (Reckwitz, 2002).

It has also been proposed as a critical complement to psychological approaches to pro-environmental action (Sapirti et al., 2025). Shove et al. formulate three elements (meaning, competence, and materiality), so that practice change can be understood as a change in the relationships among the three. This study adopts this perspective as its main framework, while the pro-environmental behavior literature is used as a comparison that helps explain the motivational dimension.

This study examines three ecological practices at Makrifatul Ilmi Islamic Boarding School, South Bengkulu: the development of the Santri Forest and tree planting, water conservation amid limited spring-water sources, and cleanliness and waste management. The three were chosen because they represent three types of pro-environmental activity with different characteristics: tree planting as a periodic collective action, water conservation as a daily routine that demands constant adaptation to resource scarcity, and waste management as a system with a tiered handling chain from upstream sorting to downstream disposal. These differences provide a varied basis for examining how the elements that shape practice operate in different contexts and under different challenges. The main research question is: how do meaning, competence, and materiality interact in shaping and sustaining ecological practices in the pesantren? This question is broken down into three sub-questions: (1) how does religious meaning frame the three practices; (2) what competencies do students have, how are these competencies learned, and where are their limits; and (3) how do material conditions enable and limit each practice?

This article makes contributions at three levels. Empirically, it compares three practices within one institution, showing that the relationships among the elements differ according to the character of the activity. Conceptually, it distinguishes the presence of ecological meaning, the continuity of activities, and the effectiveness of ecological outcomes, three things that are often conflated. Practically, it identifies the skills and facilities needed to support ecological practices in pesantren.

RESEARCH METHODS

Research design

This study uses a qualitative approach with a single case study design to understand how ecological practices are carried out and maintained in the daily life of Islamic boarding schools. The case study is appropriate for investigating contemporary phenomena in a real-life context when the boundary between the phenomenon and its context is not easily separated (Yin & Campbell, 2018). The case boundary is the ecological practices at Makrifatul Ilmi Islamic Boarding School, South Bengkulu, with a focus on the Santri Forest and tree planting, water conservation, and cleanliness and waste management. This study does not aim to produce statistical generalizations but rather contextual analytical explanations.

Research context

This research was carried out at Makrifatul Ilmi Islamic Boarding School, South Bengkulu, which was established in 2013. As a growing educational institution, the pesantren currently accommodates 749 students (399 male and 350 female), along with *asatidz* (teachers) and dormitory mentors. It provides integrated educational services from the Raudhatul Athfal (early childhood) level to the university level. The pesantren complex covers an area of 3 hectares with hilly topography. These geographical conditions directly affect its environmental governance, especially water management. To meet daily domestic needs, the pesantren relies on local spring-water sources and rainwater harvesting.

In response to these environmental conditions, the pesantren has initiated ecological programs,

including the Santri Forest program, which officially started in 2023. Covering an area of 1 hectare, the program was developed through cross-sectoral collaboration with support from the Environment Office, the Ministry of Religious Affairs, and the South Bengkulu Regency Government. This collaboration has resulted in the planting of 1,000 trees in the pesantren area, which also serves as a water conservation area and an ecological education space for students.

The research was conducted from August to October 2025 through 15 field visits for participant observation, in-depth interviews, and direct mapping of material conditions.

Participants

Participants were selected purposively based on their roles, experiences, and involvement in ecological activities. The target consisted of 4 caregivers, 5 teachers, and 15 students, and all 24 were ultimately involved. Table 1 lists all 24 participants. The students were selected by considering class-level representation (Tsanawiyah and Aliyah), gender balance (male and female), length of residence (at least one year, to adequately understand the dormitory routine), and the level of their direct involvement in the Santri Forest program, daily duty rosters (pickets), and water-use regulations. Participant codes were used to maintain anonymity: P for caregivers, G for teachers, and S for students (*santri*).

Table 1. Profile of all research participants (N = 24)

Code	Role	Gender	Remarks
G-01	Teacher	Male	Involved in the initial coordination of the Santri Forest program and daily supervision.
G-02	Teacher	Male	Involved in the initial coordination of the Santri Forest program and daily supervision.
G-03	Teacher	Female	Involved in the initial coordination of the Santri Forest program and daily supervision.
G-04	Teacher	Female	Involved in the initial coordination of the Santri Forest program and daily supervision.
G-05	Teacher	Female	Involved in the initial coordination of the Santri Forest program and daily supervision.
S-01	Student (santri)	Male	Grade XI (Aliyah), boarding for 5 years; coordinator of the boys' dormitory cleanliness duty roster.
S-02	Student (santri	Male	Grade XI (Aliyah), boarding for 5 years; coordinator of the boys' dormitory cleanliness duty roster.
S-03	Student (santri	Male	Grade XI (Aliyah), boarding for 5 years; coordinator of the boys' dormitory cleanliness duty roster.
S-04	Student (santri	Female	Grade XII (Aliyah), boarding for 6 years; in charge of the girls' dormitory water-use schedule.
S-05	Student (santri	Male	Grade VIII (Tsanawiyah), boarding for 2 years; learned to plant and care for trees from senior students.
S-06	Student (santri	Male	Grade VIII (Tsanawiyah), boarding for 2 years; learned to plant and care for trees from senior students.
S-07	Student (santri	Female	Grade X (Aliyah), boarding for 4 years; active in waste management and yard cleaning.
S-08	Student (santri	Female	Grade X (Aliyah), boarding for 4 years; active in waste management and yard cleaning.
S-09	Student (santri	Female	Grade X (Aliyah), boarding for 4 years; active in waste management and yard cleaning.
S-10	Student (santri	Female	Grade X (Aliyah), boarding for 4 years; active in waste management and yard cleaning.

S-11	Student (santri	Male	Grade IX (Tsanawiyah), boarding for 3 years; technical officer for water taps and dormitory reservoirs.
S-12	Student (santri	Male	Grade IX (Tsanawiyah), boarding for 3 years; technical officer for water taps and dormitory reservoirs.
S-13	Student (santri	Male	Grade XII (Aliyah), boarding for 6 years; knows of and has directly observed waste burning at the TPS.
S-14	Student (santri	Male	Grade XII (Aliyah), boarding for 6 years; knows of and has directly observed waste burning at the TPS.
S-15	Student (santri	Male	Grade XII (Aliyah), boarding for 6 years; knows of and has directly observed waste burning at the TPS.
P-01	Caregiver	Male	Main policymaker on water management and initiator of the Santri Forest.
P-02	Caregiver	Female	Supervises hygiene and water-use regulations in the girls' dormitory complex.
P-03	Caregiver	Male	Manages cooperation with external parties (Environment Office, regional government).
P-04	Caregiver	Male	Monitors the integration of environmental conservation values (fiqh al-bi'ah) into students' routines.

Data collection

Data were collected through semi-structured interviews, field observations, and document analysis. The interviews explored participants' understanding of ecological activities, the knowledge and skills required, the resources used, and the way the activities are integrated into daily life. A total of 24 interview sessions with the main participants were conducted, each lasting 45 to 60 minutes on average, in addition to one supplementary on-site interview with a TPS worker. The interviews were conducted in Indonesian, naturally interspersed with the local language (Bengkulu Malay/Serawai), to build rapport and explore contextual meaning. All conversations were audio-recorded based on the participant*'s informed consent* and then transcribed verbatim.

Field observations focused on the implementation of practices, including participant actions, interactions, resource use, and material conditions. During the 15 field visits, the researchers directly observed key activities, including the planting and care of tree seedlings in the Santri Forest area; queuing routines and water-use strategies at dormitory sanitation facilities during peak hours (morning and evening); the implementation of daily cleanliness duty rosters (pickets) and weekly community service (Friday clean-up); and the actual conditions and final handling of waste piles at the temporary disposal site (*Tempat Pembuangan Sementara*, TPS).

Document analysis covered the pesantren profile and code-of-conduct handbook, the dormitory duty-roster schedule, and the program proposal and memorandum of understanding (MoU) for developing the Santri Forest between the pesantren and the South Bengkulu Regency Government. Using several sources allowed the researchers to compare participants' accounts with observed practice, so that statements of environmental concern were not automatically treated as evidence that values are consistently realized in action.

Data analysis

The analysis was carried out iteratively through the stages of data condensation, data display, and conclusion drawing and verification (Miles et al., 2014). Transcripts, observation notes, and documents were organized according to the three practices. Data were coded using a combination of a deductive approach (the three elements of social practice theory) and an inductive approach for themes that emerged outside the initial categories. To reduce overlap between elements, boundary rules were established:

statements about the interpretation and reasons behind values were coded as meaning; statements about the ability to perform actions (*know-how*) as competence; and statements about objects, spaces, or infrastructure that enable or hinder action as materiality. Statements touching on more than one element were double-coded and discussed explicitly. The coded data were compiled in a matrix of practices × elements to compare the three practices. Coding was carried out by the principal investigator to maintain analytical consistency, using NVivo 12 to facilitate data organization and cross-categorization. Participant quotations containing local terms or regional language were carefully translated by the researchers into English, with light editing for grammatical clarity and without altering the original meaning or cultural nuance.

Validity and reflexivity

Validity was maintained through triangulation of interviews, observations, and documents; documentation of the analytic process so that it can be traced; and examination of data that support or contradict the initial patterns. Drawing on the criteria of qualitative *trustworthiness* of Lincoln and Guba (1985), these steps were strengthened by an *audit trail* documenting each methodological decision and code change. In addition, the researchers conducted *member checking* by reconfirming a summary of the findings with several key participants to verify the accuracy of interpretation, and applied negative *case analysis* to examine anomalous data that deviate from the dominant pattern, such as students who continue to mix waste even though they know the sorting rules.

A contextual description of the pesantren is provided so that readers can judge the transferability of the findings to other contexts. The researchers recognize that students were interviewed in an environment of strong religious authority, so their answers may be influenced by social expectations; therefore, interview data were compared with observations. As *outsiders* with no structural affiliation or primordial ties to Makrifatul Ilmi Islamic Boarding School, the researchers sought to navigate their position by building rapport without losing analytical distance. To mitigate subjectivity bias and the tendency to idealize pesantren values, the researchers routinely wrote reflexive field notes (*reflexive journals*) after each observation. This helped to separate theoretical presumptions brought from outside from the empirical realities and contradictions of practice experienced by participants in the field.

RESULT AND DISCUSSION

RESULTS

1) Overview of ecological practices

Ecological practices at Makrifatul Ilmi Islamic Boarding School take place in three domains with different characteristics. The Santri Forest is a tree-planting activity on hilly land around the pesantren complex. Water conservation takes place in routine activities such as ablution, washing clothes, and using sanitation facilities. Environmental cleanliness is maintained through duty rosters and community service, with waste collection as the final part. For each domain, the results are presented according to meaning, competence, and materiality and then closed with the configuration of relationships among the three; a cross-practice summary is presented in Table 2.

2) Santri Forest and tree planting

Meaning

Tree planting is interpreted through the concepts *of ihya' al-mawat* (reviving barren land), *sadaqah jariyah* (continuing charity), and human responsibility to protect the earth. A teacher involved in the initial coordination of the program explained:

"So it's not just a physical project, but the formation of student character." (G-01)

A student stated something similar:

"For me, this is charity. The ustaz said, the tree we plant will provide oxygen, and it is counted as alms." (S-01)

Both statements suggest that the religious legitimacy conveyed by the teacher is accepted and re-expressed by the students, so that tree planting is seen as having moral and spiritual value, not only ecological benefit.

Competencies

In the planting session observed, 12 male students were divided into groups for digging holes, distributing seedlings and fertilizer, and planting and watering. They planted 25 seedlings of hardy trees (including mahogany and trembesi) and several fruit-tree seedlings. The students demonstrated basic skills: digging, removing polybags without damaging the roots, placing seedlings, and compacting the soil around them. These skills were learned through demonstration and informal mentoring, including from senior to junior students:

"I was taught by my upperclassmen during the greening of the pesantren. At first, I didn't know how to open the seedling polybags, but after seeing the practice firsthand, I was able to do it." (S-05)

However, the ability to plant is not synonymous with the ability to maintain. A teacher expressed limitations in recognizing plant diseases and determining treatment, and one student explained:

"In the dry season, many seedlings wither. We are confused about what fertilizer to give because we have never been taught how to make special compost or treat leaf pests." (S-04)

This statement marks the boundary between basic planting competence and advanced agronomic competence, which includes pest handling, fertilization, and water requirements. The maintenance of the Santri Forest was reported to continue when supervisors are absent. According to field observation notes from August 20, during the afternoon self-study hours, the student duty group was seen continuing to water seedlings on the slopes of the Santri Forest without a supervisor present. S-01, as the dormitory duty coordinator, also emphasized the consistency of this routine: "Even if the ustaz is absent or has a meeting outside, the afternoon watering schedule continues, because it is automatically the responsibility of the daily duty squad" (Interview, August 21). This suggests that the practice does not fully depend on direct supervision, but continuity of activity is not the same as adequacy of competence to solve maintenance problems.

Materiality

The hilly terrain, rocky soil, limited equipment, and absence of irrigation installations are the main obstacles. Watering during planting relies on water carried by bucket from a reservoir about 40 meters from the site. Regarding longer-term maintenance, the teacher explained:

"No pipes have been extended to the hills of the Santri Forest. As a result, the trees rely only on rainfall." (G-01)

Thus, watering at the planting stage and subsequent maintenance have different material requirements: the former can be met in a joint activity with manual water carrying, while the latter requires repeated access to water. Field observations in mid-August confirmed that, without piping infrastructure, the duty squad had to water the seedlings manually using used 5-liter jerry cans. This watering routine was originally targeted for every afternoon, but observations showed that in practice it had shrunk to only twice a week because of the physical fatigue of students carrying water uphill. When the discharge of the water source decreased or the activity clashed with study obligations, the ability to care for all of the plants was affected.

Configuration

In the Santri Forest, strong religious meaning and sufficient planting skills meet material conditions that make maintenance difficult, together with limited advanced competencies. The result is a practice that is active at the planting stage and continues in the form of maintenance, but whose long-term success cannot yet be assessed. This study did not measure the survival *rate* of the planted seedlings, so the effectiveness of the practice remains undocumented. The accounts of G-01 and S-04 indicate that seedlings wither in the dry season; this appears to be related not to a lack of intention but to the lack of water access and to students' limited advanced agronomic competence.

3) Water conservation

Meaning

Water conservation is associated with the prohibition *of israf* (wastefulness) and with concern for other users:

"Saving water avoids *israf* (wastefulness), as taught in the fiqh chapter on taharah. In addition, we feel sorry for friends who are queuing behind us." (S-07)

This statement shows two complementary orientations: obedience to religious principles and solidarity with friends. Obedience to religious principles refers directly to the study of *Fathul Qarib* and *Safinatun Najah*, basic fiqh texts of the Shafi'i school used in pesantren, which regulate in detail the procedures of purification (*taharah*) and prohibit excessive water use. The two orientations converge in situations where water availability directly affects other students' opportunity to meet their personal needs and the conditions required for valid worship.

Competencies

Students adjusted the way they performed ablution and washing to the availability of water: using a small-volume dipper, adjusting tap openings, re-closing dripping taps, reusing the last rinse water, and, according to the interviews, applying a three-bucket washing method in the girls' dormitory. Senior students in charge of facilities and infrastructure (*sarpras*) reportedly learned minor repairs such as replacing tap washers and connecting PVC pipes. These skills are embodied skills and action management rather than formal scientific knowledge. Such adaptive skills remain limited when damage requires replacing components or technical handling beyond students' skills.

Materiality

Fluctuating water supply, pipelines, reservoirs, and taps shape the way students use water. Teachers in charge of facilities and infrastructure explained that water distribution is restricted by schedule when supply decreases, and students adjust their actions by using water more sparingly. However, material conditions do not only encourage adaptation: worn or damaged taps can hinder water saving even when users try to limit the flow.

Configuration

In water conservation, limited supply triggers adaptation, which combines the meaning of *israf* and solidarity with students' practical skills. This practice appears to be the most integrated of the three, but it still depends on the functioning of infrastructure: individual efforts are not enough to solve problems that originate in the condition of facilities.

4) Cleanliness and waste management

Meaning

Cleanliness is associated with faith, worship, and discipline. A student explained:

> "There is a room duty roster every morning and evening, plus community service every Friday. Cleanliness is part of faith, so we do it with the intention of worship." (S-11)

The duty roster and community service provide a form of organization for activities, while religious values provide the reasons why they are considered important. Although the popular saying "cleanliness is part of faith" (*an-nazhafatu minal iman*) is often classified by hadith scholars as a scholarly maxim or a weak (*da'if*) hadith, its substance is rooted in the authentic hadith narrated by Muslim: *ath-thuhuru syathrul iman* ("purification is half of faith"). Regardless of the debate over the transmission status of the text, the saying circulates widely in pesantren oral tradition. Participants' use of such expressions shows a dynamic process of meaning-making, in which religious texts that literally concern individual ritual purity (*taharah*) are extended into a social ethos that legitimizes and mobilizes collective cleaning of physical space.

Competencies

Students sweep yards, clean hallways, collect leaves, and transport waste with the available equipment; they know how to sweep, mop, and carry leaves, with a clear division of labor and regular repetition. More advanced competencies, such as sustained waste sorting and composting, remain limited. One student stated:

> "We know that sorting plastic and leaves is good, but the bins are just ordinary drums, and in the end the waste is burned at the TPS anyway." (S-13)

This statement needs to be read carefully. The student shows knowledge of what is good (*knowing that*), but the obstacles mentioned are mainly material (ordinary drums) and structural (the final fate of the waste). Therefore, this quotation was double-coded for competence and materiality, with the analytical weight on materiality.

Materiality

Brooms, shovels, and carts allow duty rosters and community service to run in an orderly way and help with waste collection and transport. The waste management system shows limitations at the final stage:

based on accounts from teachers and students and on the researchers' observations, waste collected or separated at the early stages is finally mixed at the TPS. One teacher stated: "The children have actually started sorting plastic waste and leaves in the classroom area, but when it is taken to the TPS at the back, everything has to be put together again because there is only one final container" (Teacher interview, October 12). Observation at the site on October 14 reinforced this: a cleaner was seen pouring the entire contents of the carts, from various bins (organic and inorganic), into one large pile in the TPS area.

In addition to mixing, S-13 referred to burning as the final fate of waste. Field observations corroborated this claim: ash residue, melted plastic piles, and open-*burning* marks were found in a corner of the TPS site. A cleaner assigned to manage the TPS (W-01) confirmed that both practices take place: "All the waste that comes in is indeed mixed together. If the pile gets too high, we burn it twice a week to reduce the volume, because the village garbage trucks rarely come here" (Interview with TPS worker, October 15). Mixing and burning are two different things with different ecological implications, and both indicate a break in the chain between initial sorting and final handling.

Configuration

With regard to cleanliness, the meaning of worship and duty-roster discipline produce the most regular routine of the three practices. However, regularity at the cleaning stage does not indicate that waste management as a whole is successful: adequate equipment for sweeping and transporting does not automatically provide the infrastructure needed to sustain sorting, composting, or processing of inorganic waste. The data collected do not show whether the mixing has a logistical or an institutional cause.

5) Cross-practice summary

Table 2. Configuration of meaning, competence, and materiality in three practices

Practice	Meaning	Competencies	Materiality	Configuration
Santri Forest and tree planting	Ihya' al-mawat; *sadaqah* jariyah; character formation (G-01, S-01).	Digging, removing polybags, planting, compacting; learning from senior students (S-05). Limited: pest handling, fertilization, composting, dry-season care (S-04).	Hilly, rocky land; no pipelines; water carried by bucket from a reservoir about 40 m away; rain-dependent (G-01).	Strong meaning and basic skills are present, but maintenance is constrained by water access and advanced skills. Activity continues; plant survival was not measured.
Water conservation	Israf (fiqh of taharah) and solidarity with others in the queue (S-07).	Small dipper, adjusting taps, reusing the last rinse water, three-bucket washing; *sarpras* students repair taps and pipes.	Fluctuating supply; distribution schedule; reservoirs and tanks; worn or damaged taps.	Supply constraints trigger adaptation; facility damage limits individual efforts.
Cleanliness and waste management	Cleanliness as part of faith; intention of worship; discipline (S-11).	Duty rosters, community service, use of tools; limited sorting and composting (S-13).	Brooms, shovels, carts, ordinary drums; waste mixed at the TPS; burning mentioned by S-13 and confirmed by observation and W-01.	Regularity in the early stages, but sorting is not maintained until the final stage.

Discussion

1) Connection of meaning, competence, and materiality

The findings suggest that ecological practices at Makrifatul Ilmi are not adequately explained by the presence of religious values or environmental awareness alone. Islamic meaning provides a consistent moral foundation for all three practices, but their implementation depends on practical competence, the availability of facilities, and the organization of daily activities. Table 2 shows that the three practices have different configurations: in the Santri Forest, the greatest obstacles lie in water access and advanced competence; in water conservation, adaptation is shaped by limited supply and the condition of facilities; in cleanliness, regular routines are interrupted at the final stage of waste handling. Thus, the relationships among the elements are practice-specific rather than following a single pattern.

Competencies in this pesantren are learned mainly through habituation, demonstration, and peer learning, with senior students acting as carriers of skills for junior students. This mechanism is important in an environment with regular generational turnover of students, but it appears effective mainly for basic skills, while advanced competencies (agronomy, composting, integrated sorting) require more structured mentoring and training. Other social dimensions are also visible, although they were not analyzed in depth: planting on the hill was carried out by male students in the session observed, the three-bucket washing method was mentioned in the girls' dormitory, and the authority of the *ustaz* is a source of legitimacy for meaning (S-01). These gender differences and authority relations deserve further study.

2) Three distinctions: meaning, continuity and effectiveness

The phrase beyond environmental values in the title refers to a shift in focus from the question of whether pesantren residents hold ecological values to the question of how those values are connected to skills, routines, physical facilities, and the organization of activities. This shift leads to three things that need to be distinguished. First, the presence of ecological meaning, which is strong in all three practices. Second, the continuity of activities, for example, the maintenance of the Santri Forest that continues without supervisors and regular cleanliness duty rosters. Third, the effectiveness of ecological outcomes, which this study could not establish: plant survival was not measured, and waste sorting is not maintained through to the final stage. Continuity of activity should not be read as evidence of effectiveness, and strong meaning should not be read as evidence of sustainability.

3) Comparison with literature

The findings on the limits of religious meaning are in line with studies showing that values and intentions are insufficient without attention to contextual and situational factors (Ling & Xu, 2020; Wang & Mangmeechai, 2021). This study extends that discussion to the pesantren setting, where religious meaning provides a reason for action, but implementation still has to contend with rocky land, limited water, and waste-handling systems. The findings are also consistent with Aulia et al., who place infrastructure and governance as part of the formation of students' environmentally friendly behavior (Aulia et al., 2024); an additional contribution of this study is to show how infrastructure works together with meaning and competence in different practices.

Furthermore, these findings offer a cautious complement to part of the eco-pesantren literature. Reviews such as Aksir et al. and Sapitri et al. emphasize religiosity, social norms, and the integration of eco-theology into religious education as pathways to pro-environmental behavior (Aksir et al., 2025; Sapitri et al., 2025), and studies of learning and curriculum integration in pesantren (Karman et al., 2023) likewise

foreground values and pedagogy (Destriani & Warsah, 2022; Syukri et al., 2024). Our findings do not contradict these contributions, but they suggest that, even where theological awareness is strong, the chain of ecological practices can still be broken, as when early sorting ends in burning, if it is not supported by adequate physical facilities and skills. Likewise, when compared with work that documents eco-pesantren initiatives, such as the case reported by Wijaya Mulya and Salvi (Wijaya Mulya & Salvi, 2025), this study suggests that the internalization of environmental *fiqh* teachings may need to be accompanied by attention to material conditions and students' technical skills in daily dormitory life. Because this is a single-case study, these interpretations are offered as analytical propositions for further testing rather than as conclusions about the eco-pesantren literature as a whole.

The role of competence as a skill that is learned and maintained through engagement in practice is in line with Salovaara and Soini and Munir, who connect competence with meaning and materiality (Salovaara & Soini, 2021; Sapitri et al., 2025). On materiality, the findings about worn taps and the absence of pipelines support the argument that sociomaterial arrangements can simultaneously enable and limit sustainable practices (Bäckman, 2024), as well as the view that infrastructure is not a passive background (Affolderbach & O'Neill, 2024; Suski et al., 2021). In waste management, Katan and Gram-Hanssen showed that waste sorting can be disrupted by social norms and interaction situations (Katan & Gram-Hanssen, 2021); this study adds a dimension of process continuity, namely that sorting carried out at an early stage can lose its effect when later stages do not maintain the separation. Beatson et al. and Scheurenbrand et al. show that materials, meanings, and competencies can hinder sustainable practices (Beatson et al., 2020; Scheurenbrand et al., 2018), in line with the pattern found here, while Luo et al. show that environmental education can contribute to waste sorting, a contribution that in this pesantren appears to be limited by implementation conditions (Destriani et al., 2024; Luo et al., 2025).

4) Practical implications

The findings point to four ways of strengthening ecological practices in pesantren. First, training in plant care, pest handling, and composting, so that planting skills develop into the ability to maintain plants. Second, provision of adequate irrigation infrastructure or water access at the Santri Forest site. Third, routine maintenance of taps and water networks so that students' efforts to save water are not undermined by damaged facilities. Fourth, development of a system that can maintain the waste sorting chain through to the final stage.

Given that the TPS worker reported that burning is carried out because village garbage trucks rarely collect waste, pesantren need to build strategic coordination with external parties, such as village waste-truck managers or the local Environment Office, to ensure that waste transport is scheduled routinely and managed well.

In addition, future evaluations of environmental programs need to distinguish between the implementation of activities and their actual ecological impact, for example by tracking tree survival rates, measuring the volume of water actually saved, and assessing the effectiveness of the waste management chain holistically from the dormitory to final disposal.

5) Limitations

This study has several limitations. First, it examined only one pesantren, so the findings are analytical-contextual and not intended to be generalized. Second, plant survival in the Santri Forest was not measured and no systematic quantitative data on it were available, so the continuity of activities cannot be

equated with the effectiveness of ecological outcomes; the accounts of withering seedlings reported by participants are indicative only. Third, the data do not allow the cause of waste mixing at the TPS (logistical or institutional) to be determined; further research needs to involve TPS management and the village waste-transport authority in more depth. Fourth, authority relations among caregivers, teachers, and students may have led participants to give normative answers that meet institutional social expectations; although this bias was mitigated through cross checking (triangulation) with field observations and reflexive journals, it cannot be fully eliminated. Comparative research across pesantren and longitudinal studies can test whether the configurations found here recur in other institutions.

CONCLUSION

This study analyzes how meaning, competence, and materiality are interconnected in shaping ecological practices at Makrifatul Ilmi Islamic Boarding School, South Bengkulu. Three main findings can be formulated. First, the religious meanings of charity (*sadaqah jariyah*) and *ihya' al-mawat* in tree planting, the prohibition of *israf* in saving water, and cleanliness as worship provide strong moral legitimacy for the three practices, but do not by themselves guarantee their sustainability or effectiveness. Second, students' competence is activity-specific: basic skills (planting, saving water, sweeping) are acquired through habituation and peer learning, while advanced competencies (caring for plants, handling pests, sorting and composting waste) remain limited. Third, materiality works as a condition that both enables and limits: rocky land and the absence of pipelines at the Santri Forest site, fluctuating water supply and worn taps, and waste mixing at the TPS that breaks the chain of early sorting. Theoretically, this study suggests that research on ecological practices in Islamic educational institutions should distinguish the presence of ecological meaning, the continuity of activities, and the effectiveness of ecological outcomes; activities that continue without supervision, for example, do not in themselves demonstrate that plants survive. Practically, strengthening ecological practices in pesantren requires advanced skills training, water access at the Santri Forest, maintenance of water facilities, and a system that maintains waste sorting through to the final stage. As a single case study, these findings are not generalizable; comparative research across pesantren and longitudinal studies on plant survival and the consistency of waste sorting are logical follow-ups.

AUTHOR CONTRIBUTIONS

The first author contributed to the conceptualization of the study, development of the research methodology, data collection, data analysis, and preparation of the initial manuscript. The second author contributed to data processing, interpretation of the research findings, and substantive revision of the manuscript. The third author contributed to the critical review, editing, and refinement of the manuscript. The fourth author contributed to the validation of the research findings, supervision, and final revision of the manuscript. All authors participated in discussions of the research findings, reviewed and approved the final version of the manuscript, and accept responsibility for the integrity and accuracy of the work.

CONFLICT OF INTEREST

The authors declare that there are no financial or non-financial conflicts of interest that could have influenced the conduct of the research, data analysis, preparation, or publication of this article.

ARTIFICIAL INTELLIGENCE (AI) USE STATEMENT

The authors declare that no artificial intelligence (AI) technology was used in the research process or in the preparation of this article.

REFERENCES

Affolderbach, J., & O'Neill, K. (2024). Everyday sustainability transitions through using green buildings: Spatial perspectives on materialities, discourses, and lived sustainability. European Urban and Regional Studies, 31(2), 168–183. https://doi.org/10.1177/09697764231216407

Aksir, R. P., Madjid, Abd., Rahmatullah, A. S., Suud, F. M., & Pasandalan, S. N. (2025). Pro-environmental behavior in Islamic boarding schools: A systematic literature review on religiosity, ecological awareness, and social norms. ANFUSINA: Journal of Psychology, 8(2), 131–154. https://doi.org/10.24042/AJP.V8I2.30696

Aulia, R. N., Abbas, H., Nurhattati, N., Jasin, F. M., & Mushlihin, M. (2024). Eco-pesantren modeling for environmentally friendly behavior: New lessons from Indonesia. International Journal of Evaluation and Research in Education (IJERE), 13(1), 223. https://doi.org/10.11591/ijere.v13i1.25930

Bäckman, M. (2024). (Un)sustainable everyday practices sociomateriality shaping sustainability in an urban district. Journal of Consumer Culture, 24(1), 100–119. https://doi.org/10.1177/14695405231199306

Beatson, A., Gottlieb, U., & Pleming, K. (2020). Green consumption practices for sustainability: An exploration through social practice theory. Journal of Social Marketing, 10(2), 197–213. https://doi.org/10.1108/JSOCM-07-2019-0102

Corsini, F., Laurenti, R., Meinherz, F., Appio, F. P., & Mora, L. (2019). The advent of practice theories in research on sustainable consumption: Past, current and future directions of the field. Sustainability, 11(2), 341. https://doi.org/10.3390/su11020341

Destriani, D., & Warsah, I. (2022). Pemanfaatan model pembelajaran flipped classroom pada pembelajaran pendidikan agama Islam di sekolah dasar Islam terpadu. SITTAH: Journal of Primary Education, 3(2), 175–190. https://doi.org/10.30762/sittah.v3i2.557

Destriani, Warsah, I., Karolina, A., Sutarto, & Krzic, G. (2024). The analysis of 4C-based learning implementation for Islamic religious education students. TADRIS: Jurnal Pendidikan Islam, 19(1). https://doi.org/10.19105/tjpi.v19i1.9917

Karman, K., Anwar, R., & Hakim, L. (2023). The Qur'anic learning based on Islamic eco-theology at pesantren. Jurnal Pendidikan Islam, 9(2), 169–186. https://doi.org/10.15575/jpi.v9i2.24933

Katan, L., & Gram-Hanssen, K. (2021). 'Surely I would have preferred to clear it away in the right manner': When social norms interfere with the practice of waste sorting: A case study. Cleaner and Responsible Consumption, 3, 100036. https://doi.org/10.1016/J.CLRC.2021.100036

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? Environmental Education Research, 8(3), 239–260. https://doi.org/10.1080/13504620220145401

Ling, M., & Xu, L. (2020). Relationships between personal values, micro-contextual factors and residents' pro-environmental behaviors: An explorative study. Resources, Conservation and Recycling, 156, 104697. https://doi.org/10.1016/J.RESCONREC.2020.104697

Luo, L., Yang, Q., Qiao, D., Cao, Y., Ding, J., Ma, H., & Wei, J. (2025). How does environmental education affect college students' waste sorting behavior: A heterogeneity analysis based on educational background. Journal of Environmental Management, 389, 126064. https://doi.org/10.1016/J.JENVMAN.2025.126064

Reckwitz, A. (2002). Toward a theory of social practices. European Journal of Social Theory, 5(2), 243–263. https://doi.org/10.1177/13684310222225432

Salovaara, J. J., & Soini, K. (2021). Educated professionals of sustainability and the dimensions of practices. International Journal of Sustainability in Higher Education, 22(8), 69–87. https://doi.org/10.1108/IJSH-09-2020-0327

Sapitri, E. Y., Hamami, T., & Muttakin, K. (2025). Integrating eco-technology into Islamic religious education: A systematic literature review on students' spiritual, social, and cognitive character development. DAYAH: Journal of Islamic Education, 8(2), 178–201. https://doi.org/10.22373/jie.v8i2.34136

Scheurenbrand, K., Parsons, E., Cappellini, B., & Patterson, A. (2018). Cycling into headwinds: Analyzing practices that inhibit sustainability. Journal of Public Policy and Marketing, 37(2), 227–244. https://doi.org/10.1177/0743915618810440

Suski, P., Speck, M., & Liedtke, C. (2021). Promoting sustainable consumption with LCA - A social practice based perspective. Journal of Cleaner Production, 283, 125234. https://doi.org/10.1016/J.JCLEPRO.2020.125234

Syukri, S., Amir, S. M., Fitriani, F., & Pane, S. (2024). Integration of Islamic values with environmental ethics in pesantren education: A case study at Darularafah Raya Pesantren. Jurnal Pendidikan Islam, 13(1), 1–12. https://doi.org/10.14421/jpi.2024.131.1-12

Wang, H., & Mangmeechai, A. (2021). Understanding the gap between environmental intention and pro-environmental behavior towards the waste sorting and management policy of China. International Journal of Environmental Research and Public Health, 18(2), 757. https://doi.org/10.3390/ijerph18020757

Wijaya Mulya, T., & Salvi, F. (2025). 'Grass, rice, and aubergine': A case study of an Islamic eco-pesantren in Indonesia. Pedagogy, Culture & Society, 33(4), 1437–1455. https://doi.org/10.1080/14681366.2024.2385049

Yin, R. K., & Campbell, D. T. (2018). *Case study research and applications: Design and methods*. SAGE Publications.