

Green Pesantren Towards Zero-Waste Boarding School: Transforming Islamic Education into Ecological Habitus

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Abstract: This article aims to describe and provide an in-depth analysis of Green Pesantren Towards Zero-Waste Boarding School: Transforming Islamic Education into Ecological Habitus at Nurul Jadid Islamic Boarding School Paiton Probolinggo. This study employed a qualitative research approach using a case study design. The research was conducted at Nurul Jadid Islamic Boarding School Paiton Probolinggo from May to July 2026. Data were collected through participant observation, in-depth interviews, and documentation. Informants were selected through snowball sampling comprising caretaker board, pesantren administrators, dormitory managers, educators, educational staff, and santri until saturation (9 informants). Data analysis followed the Miles, Huberman, and Saldana interactive model encompassing data condensation, data display, and conclusion drawing/verification with source and method triangulation. The findings indicate that transformation toward green pesantren and zero-waste is manifested through six interrelated dimensions: (1) Integration of Islamic and ecological values within the pesantren education curriculum still fragmentary and not systemically institutionalized; (2) Transformation of PAI learning paradigm toward green pesantren orientation from cognitive to affective and psychomotor through contextual habituation; (3) Innovation in environmentally based PAI learning innovation linking thaharah, amanah, khalifah with Bank Sampah, compost, biopori; (4) Clean Pesantren through sanitation and environmental hygiene management as structural prerequisite for productive academic climate; (5) Development of Integrated Waste Management Facility (IPST) and Waste Bankas circular economy and zero-waste praxis; and (6) Green Pesantren initiatives through tree planting and garden creation as educative living space.

INTRODUCTION

Global environmental crisis has dominated contemporary discourse with unprecedented challenges. Climate change, pollution, and plastic waste accumulation constitute existential threats (Azyumardi, 2021; Borrong, 2020; Darmayani et al., 2021). Pesantren in Indonesia face serious problems in environmental management, especially waste processing, energy use, and natural resource utilization (Azzahra et al., 2025). Many Islamic boarding schools still implement conventional waste disposal systems without sorting, recycling, or structured environmental education, indicating that Islamic teachings on cleanliness, natural balance, and sustainability have not been fully internalized in learning process and pesantren culture (Haslianti et al., 2025).

Real conditions in various pesantren show that increasing number of santri and daily dormitory activities correlate with increasing waste volume difficult to manage. Nurul Jadid Islamic Boarding School itself still faces challenges in managing liquid waste, plastic, and water because it does not yet have sustainable environmental management system. Santri awareness of environmental cleanliness often still limited to physical aspects, such as maintaining room or yard cleanliness, but has not reached spiritual ecological understanding. Low ecological habitus of students in pesantren-based educational institutions is crucial issue in strengthening character education and environmental sustainability (Akhir & Siagian, 2025; Al Hamid, 2024). Although pesantren has strong theological foundation through concept of khalifah fil ardh and amanah, these values have not been fully internalized into consistent behavioral dispositions (Pudjiastuti et al., 2021; Ayyatullah, 2023).

Islam offers strong theological foundation through eco-theology concept (Rifa & Yusuf, 2025), emphasizing principle of human caliphate (QS. Al-Baqarah:30) to prosper earth and prohibition of doing damage (QS. Ar-Rum:41) (Al Hamid, 2024; Borrong, 2019). Such condition requires collective response from all layers of society (Qian Tang, 2017; Sterling, 2024), not excluding religious institutions such as pesantren (Basri, 2022). Pesantren as traditional Islamic education entity with deep social influence in Indonesia (Herdiansyah et al., 2017), has great potential to become pioneer in sustainability movement (Nurkhin et al., 2023). Pesantren as epitome of Islamic education and center of community civilization in Indonesia (Albar et al., 2024), has unique and strategic position to translate eco-theology values into action (Muin et al., 2025). As miniature of independent society (Ali & Bahtera, 2024), pesantren not only functions as place to produce ulama, but also as social agent having significant influence on surrounding community (Dedi Eko et al., 2025).

Thus green pesantren approach can become bridge between religious teachings and environmental sustainability practices, so pesantren able to become model of environmentally friendly Islamic education oriented to zero waste. Islamic Religious Education (PAI) in pesantren has strategic role in forming character and ecological awareness (Ma'arif & Mawardi, 2024). Islam affirms human as khalifah on earth responsible for preserving nature as form of devotion to Allah SWT.

Therefore transformation of PAI learning that is more contextual, integrative, and applicable through green pesantren approach is needed to realize pesantren environment oriented to zero-waste principle (Zaimina & Munib, 2025). Application of sustainability principles in pesantren can be done by integrating Islamic values emphasizing human responsibility toward nature. According to Mafaza et al. (2025), Islamic education should include sustainable environmental management as part of devotion to Allah SWT, with eco-theology concept linking religious teachings with ecological awareness.

Project-based green pesantren learning model can strengthen santri ecological awareness by combining theory and practice. Suryanullah et al. (2025) state that environmental-based education not only provides ecological understanding, but also teaches real actions, such as waste management and energy conservation. Transformation toward sustainable practices in pesantren, often called Green Pesantren, is not just discourse, but necessity (Maghfiroh et al., 2024). However, this transformation does not occur automatically (Prianto et al., 2019), it requires main mover, and in pesantren ecosystem, Kiai figure holds central and crucial role (Mawftiq & Gustanto, 2023; Fuady, 2023; Imaduddin, 2024).

Previous relevant studies: Akhir & Siagian (2025) show sustainability implementation in Islamic educational institutions still faces challenges in awareness, funding, and policy not optimal. Amalia Nur Milla et al. (2025) affirm that holistic education organizers starting from human resources (green mind), curriculum (green curriculum), school management (green management), and all school activities (green activity) conducted to achieve environmentally caring education and culture based on Islamic teachings. Herdiansyah et al. (2017) environmental awareness to realizing green Islamic boarding school (eco-pesantren) in Indonesia through IOP Conference. Nurkhin et al. (2023) Green-Pesantren and environmental knowledge and awareness: case study at Pondok Pesantren As Salafy Al Asror Semarang showing green-pesantren influences awareness. Maghfiroh et al. (2024) promoting green pesantren: change, challenge and contribution of Nahdlatul Ulama. Rini et al. (2022) Islamic education in agricultural pesantren to build ecosophy for environmental salvation. Rifa & Yusuf (2025) mainstreaming ecotheology at PP Langitan Tuban towards environmentally caring pesantren. Sabtina & Mahariah (2025) internalizing Islamic ecotheology through school culture to foster eco-character. However, most previous studies still focus on managerial and policy aspects, not pedagogical dimension in religious learning itself. This study occupies different position emphasizing transformation of PAI learning process, both in terms of material, methods, and religious practices, to align with green pesantren concept (Lazwardi, 2025).

Research gap is (1) Normative-conceptual dominance without empirical transformative pedagogy bridging religious values with zero-waste praxis; (2) Limited examination of operational integration of zero-waste values (Bank Sampah, compost, biopori, IPST) and impact on habitus formation; (3) Absence of integrative model linking PAI transformation with ecological habitus and zero-waste boarding school. From Bourdieu habitus

perspective, dispositional formation requires consistent internalization through structured and repeated pedagogical practices in educational social arena (Bourdieu, 1990; Al Hamid, 2024).

Novelty of this study lies in developing PAI learning model based on green pesantren specifically directed to realize zero-waste boarding school. This model not only emphasizes behavioral change of santri toward environment, but also includes curriculum reconstruction, learning method innovation, and internalization of ecological values in Islamic teachings. Unlike previous studies tending to position environmental program as additional activity, this study positions environmental sustainability as core of PAI learning process. Approach combines eco-theology principle, contextual learning, and project-based learning to grow tauhid-based ecological awareness.

General objective to describe, analyze, and reconstruct transformative model of Green Pesantren Towards Zero-Waste Boarding School through transforming Islamic Education into ecological habitus at Nurul Jadid Islamic Boarding School. Specific: (a) How integration of Islamic values with environmental sustainability principles can be applied in PAI learning; (b) Implementation of green pesantren-based learning; (c) To what extent such learning model can contribute to realizing zero-waste pesantren; (d) Reconstruct integrative IPOOI model.

RESEARCH METHOD

This study uses qualitative approach because main focus is to understand phenomena, situations, or events in depth. Method is suitable for explaining "how" and "why" phenomenon occurs about Green Pesantren Towards Zero-Waste Boarding School: Transforming Islamic Education into Ecological Habitus at Nurul Jadid Islamic Boarding School Paiton Probolinggo. In addition this research emphasizes text-based data such as interviews, observations, or documents, allowing researcher to dig rich details from respondent perspective (Moleong, 2016; Creswell & Poth, 2018; Yin, 2018).

Research type is case study because aims to explore deeply phenomena suitable for explaining "how" and "why" phenomenon occurs about transformation. This helps researcher understand dynamics, context, and factors influencing case more holistically.

Research subjects are caretaker board (dewan pengasuh), pesantren administrators, dormitory managers, educators and educational staff in educational institutions, and santri of Nurul Jadid Islamic Boarding School Paiton Probolinggo who become target of transformation. Research conducted in range May to July 2026, allowing researcher to observe PAI and ecological awareness transformation process.

This study uses snowball sampling technique in determining informants, given contextual focus and need for depth of information. Data collection process begins with determination of key informants having strategic role in Nurul Jadid Islamic Boarding School namely caretaker board, pesantren administrators, dormitory managers, educators and educational staff, then gradually develops based on previous informant recommendations until data saturation namely educators, educational staff,

and santri. Total 9 informants.

Table 1. Informant Codes at Nurul Jadid Islamic Boarding School

CODE	ROLE	DESCRIPTION
INF-01	Supervisors	Moral authority & visionary leadership green pesantren
INF-02	Administration	Policy maker & management
INF-03	Dormitory Management	Daily habituation & dormitory cleanliness
INF-04	Instructors PAI	Curriculum integration Fiqh al-Bi'ah
INF-05	Staff	Facilities, sanitation, IPST management
INF-06	Waste Bank Coordinator	Bank Sampah, circular economy, 3R
INF-07	Compost and Garden Coordinator	Compost, maggot BSF, tree planting
INF-08	Senior Santri	Active in clean pesantren & green activities
INF-09	Junior Santri	Participant in ecological projects

Data collection techniques done through three main methods namely participant observation, in-depth interviews and document study. Use of participant observation to directly observe learning activities, pesantren ecological activities, ecological culture, teacher and santri interaction, and religious practices taking place at Nurul Jadid Islamic Boarding School.

Data collection through in-depth interviews with exploratory qualitative approach. Informants selected purposively including caretaker board, pesantren administrators, dormitory managers, educators and educational staff, and several santri at Nurul Jadid Islamic Boarding School involved directly in PAI learning process and pesantren ecological activities.

Document study used as data collection technique to support and validate findings. Analysis conducted systematically toward official pesantren documents including vision-mission, lesson implementation plans (RPP), pesantren ecological activity documents, religious activity journals, and evaluation notes of santri ecological attitude and character development.

Data analysis uses Miles and Huberman interactive analysis model implemented simultaneously and continuously from data collection stage to conclusion drawing. Analysis process includes three main stages: data reduction, data display, and conclusion drawing and verification. Data reduction done by summarizing, sorting, and focusing data from observation, in-depth interviews, and documentation relevant to transformation. Reduced data then presented in descriptive-narrative and thematic form to facilitate understanding of patterns and relationships. Final stage done through conclusion drawing accompanied by continuous

verification process using source and method triangulation to ensure validity.

Trustworthiness through source triangulation (comparing data from caretaker, administrators, educators, santri), method triangulation (observation, interview, documentation), member check, prolonged engagement (3 months), peer debriefing, audit trail. Ethical considerations: informed consent, confidentiality, anonymity using codes, voluntary participation.

RESULTS AND DISCUSSION

This section elaborates on research findings and discussion obtained through participant observation, in-depth interviews, and document study on Green Pesantren Towards Zero-Waste Boarding School: Transforming Islamic Education into Ecological Habitus at Nurul Jadid Islamic Boarding School Paiton Probolinggo. Subsequently these findings are analyzed and discussed in light of relevant theoretical frameworks including Bourdieu's habitus, Lickona's character education, Mezirow's transformative learning, Kolb's experiential learning, and Nasr's eco-theology. The research findings and discussion are presented as follows:

Integration of Islamic and Ecological Values in Pesantren Education Curriculum

Integration of Islamic values with ecological principles in Islamic Religious Education (PAI) curriculum at Nurul Jadid Islamic Boarding School still shows fragmentary character and not systemically institutionalized. Although there is normative awareness about importance of environmental sustainability as part of religious responsibility, ecological dimension has not been explicitly articulated in curriculum structure, formulation of learning outcomes, nor pedagogical strategy of PAI. Curriculum still dominated by strengthening classical aspects of *furud al-'ainiyyah* such as *aqidah*, *fiqh*, and *akhlak* presented normatively, while contemporary ecological issues have not been positioned as integral part of Islamic discourse contextual and responsive to global challenges.

In pesantren educational practice, environmental caring values more reproduced through habituation mechanism and institutional culture, not through structured conceptual internalization in learning. Activities maintaining cleanliness and environmental order carried out as discipline routine, without accompanied by epistemological and theological strengthening regarding relation between environmental ethics, ecological sustainability, and Islamic teachings. Absence of pedagogical framework integrating Islamic ecological principles—such as sustainable natural resource management, consumption ethics, and ecological responsibility—causes such practices stop at physical action level, not yet developed into reflective awareness forming santri worldview and life attitude.

This condition shows gap between Islamic theological values, especially concept of *khalifah fi al-ardh* and *amanah*, with knowledge construction and educational praxis developed in pesantren environment. When ecological principles not integrated conceptually in PAI curriculum, Islamic education potentially loses its transformative power in responding to global environmental crisis. Therefore reorientation of PAI curriculum

placing environmental ethics as part of Islamic spirituality is needed, so pesantren education not only forms ritual and moral piety, but also sustainable ecological piety oriented to socio-religious responsibility.

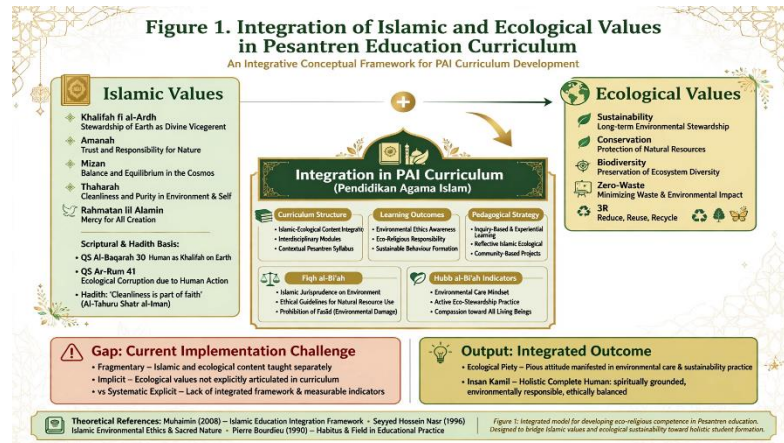
Phenomenon aligns with finding Habibi (2025) affirming that Islamic education practice in many institutions still tends to focus on strengthening formal ritual dimension and personal moral, while social and ecological dimensions have not been optimally developed in contextual framework. Such education pattern causes Islamic values more understood as individual obligation, not as ethical system having social and environmental implications. As result, santri awareness of ecological issues often not built reflectively, but stops at normative obedience level separated from daily life experience.

In Islamic eco-theology perspective, human-nature relation cannot be separated from human-God relation, because nature viewed as kauniyah verses representing signs of Divine power. Therefore maintaining cleanliness and environmental sustainability should be interpreted as part of social worship (ibadah ghairu mahdhah) having deep spiritual and theological value (Zulfikar, 2025). However, without systematic and reflective pedagogical explanation, such theological values potentially only function as normative discourse. This condition causes religious messages not fully internalized in santri awareness as ethical principle guiding ecological attitude and behavior.

Furthermore, Mutiara (2025) affirms that internalization of religious values in education requires strong integration between cognitive (knowledge), affective (value appreciation), and psychomotor (real practice) aspects. When cleanliness and environmental caring practices only positioned as disciplinary obligation without deep theological reflection, then religious learning risks losing its transformative power. Thus urgency of integration of Islamic values such as concept of khalifah fi al-ardh, rahmatan lil 'alamin, and amanah into PAI learning explicitly, systematically, and contextually. Such integration expected to make daily practices of santri at Nurul Jadid Islamic Boarding School not merely routine and mechanical, but based on critical religious awareness and sustainable ecological responsibility.

From Ornstein & Hunkins (2018) curriculum foundations, integration requires philosophical (Islamic eco-theology), psychological (habitus formation), sociological (pesantren as community) bases. Currently philosophical base exists but psychological and sociological operationalization weak. From Muhaimin (2012) paradigm, pesantren education transformation from Tradisional to Neo-Modernis requires integrative paradigm Bayani-Irfani-Burhani placing ecology as burhani. Interpretation: Need explicit syllabus formulation with hubb al-bi'ah indicators: KD Thaharah able to practice waste sorting as part of cleanliness; KD Amanah able to manage Waste Bankas trust; KD Israf able to reduce food waste.

Figure 1. Integration of Islamic and Ecological Values in Pesantren Education Curriculum



Transformation of PAI Learning Paradigm Towards Green Pesantren

Transformation of Islamic Religious Education (PAI) learning based on green pesantren at Nurul Jadid Islamic Boarding School does not take place instantly, but result of collective awareness process developing gradually in pesantren environment. Awareness departs from understanding that environmental damage problem not merely technocratic or public policy, but has strong moral, ethical, and spiritual dimensions.

In this perspective, Islamic teachings understood not only as ritual and normative system, but also as ecological ethics guideline placing human as moral subject responsible for natural sustainability. Therefore PAI learning at Nurul Jadid Islamic Boarding School directed to build integrative religious paradigm, namely interpreting worship and obedience to Allah SWT as real commitment in maintaining and caring for earth as divine mandate.

Such paradigm change reflected concretely in daily life practices of santri, where Islamic values such as thaharah (cleanliness), amanah (responsibility), and ihsan (doing good to all creatures) not stop at conceptual level, but internalized through habituation and exemplary (Mawftiq & Gustanto, 2023). Routine activities such as cleaning dormitory environment, sweeping yard, and sorting organic and anorganic waste before learning activities begin become pedagogical medium to instill religious values as well as ecological awareness.

Such practice shows cleanliness positioned not merely as administrative obligation, but as manifestation of obedience to Allah SWT having worship value. Pattern of value internalization through real action affirms that religious learning will be more effective when contextualized in santri daily life experience (Pudjiastuti et al., 2021).

PAI learning in this pesantren does not stop at conceptual introduction about khalifah fi al-ardh doctrine, but realized through active involvement of santri in various ecological programs (Rifa & Yusuf, 2025). Activities such as greening, integrated waste management, and making compost fertilizer from food remnants become contextual learning vehicle enabling santri to experience, reflect, and practice Islamic values directly.

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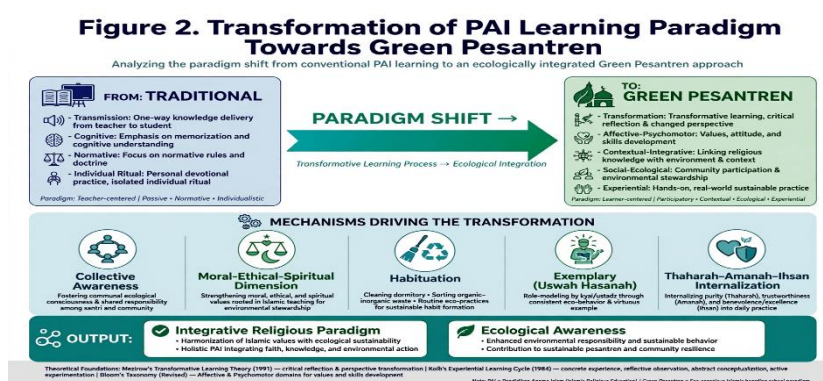
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This condition shows that PAI learning at Nurul Jadid has surpassed cognitive realm and reaches affective and psychomotor domains of santri, which significantly role in formation of ecological awareness and responsibility.

Findings align with Bloom taxonomy (1956) about integration of cognitive, affective, and psychomotor domains in education, and strengthened by Islamic education and ecotheology studies affirming that internalization of religious values will be more effective in forming character when realized through direct experience and sustainable socio-ecological praxis (Aziz et al., 2025). From Mezirow transformative learning perspective, disorienting dilemma (waste crisis) triggers critical reflection shifting from anthropocentric to eco-centric frame. From Kolb experiential learning, concrete experience (cleaning, sorting) → reflective observation (reflection on khalifah responsibility) → abstract conceptualization (understanding amanah concept) → active experimentation (maintaining green environment).

Transformation from transmission paradigm to transformation paradigm requires three shifts: (1) From teacher-centered to student-centered through project-based; (2) From textual to contextual linking PAI material (thaharah, sedekah, amanah) with daily ecological practices (cleaning dormitory, managing canteen waste, saving water); (3) From individual piety to social-ecological piety (hablum min al-bi'ah).

Figure 2. Transformation of PAI Learning Paradigm Towards Green Pesantren



Innovation in Environment-Based PAI Learning (Ecological)

Innovation in environment-based Islamic Religious Education learning places santri daily activities as strategic medium in internalization of Islamic values. Practice of maintaining environmental cleanliness such as cleaning pesantren facilities and managing Waste Bank constructed as manifestation of religious teachings having spiritual and ethical dimensions.

Such activities understood not merely as technical routine, but as implementation of Islamic teachings based on syar'i arguments, both from Al-Qur'an and hadith, especially emphasizing principles of thaharah, amanah, and human responsibility as khalifah on earth (Kementerian Agama RI, 2025). Thus environmental concern not positioned as merely worldly problem, but as integral part of worship and socio-ecological piety.

Clean, orderly, and sustainable pesantren environment further functions as living educative space in PAI learning process. Environmental

preservation efforts such as tree planting and green space maintenance interpreted as form of moral and spiritual commitment to life sustainability.

Ecological values understood as part of jariyah charity and long-term virtue, thus growing religious awareness oriented to sustainability (Muntaha, 2021). This approach shows that environmental education in PAI context not only builds ecological awareness, but also strengthens santri spiritual orientation through integration between worship value and ecological responsibility.

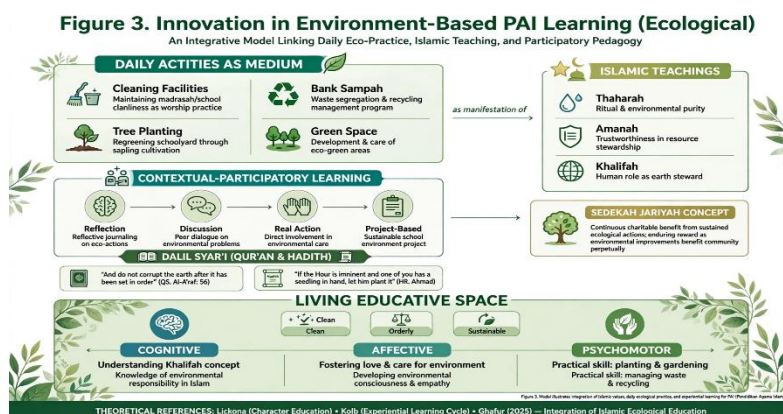
PAI learning developed through contextual and participatory approach making surrounding environmental reality as relevant and meaningful learning source. Integration of Islamic material with environmental issues such as waste management and pollution encourages santri to be actively involved in reflection, discussion, and real action process (Dedi Eko et al., 2025).

This approach aligns with finding Ghafur (2025) affirming that contextual learning plays important role in forming santri character and mindset. In addition humanistic and dialogical approach in PAI learning, as argued by Utami & Khoiriyah (2024), strengthens internalization of religious values because delivered through empathy and exemplary.

Thus environment-based PAI learning not only enriches santri cognitive understanding, but also forms religious-ecological character internalized in daily attitudes and behaviors sustainably. From Lickona character education, moral knowing (understanding khalifah concept), moral feeling (loving environment), moral action (planting, managing waste). From Bourdieu, repeated practices in pesantren arena form stable disposition.

Innovation examples at Nurul Jadid Islamic Boarding School: (1) Fiqh al-Bi'ah module containing Qur'anic verses, Hadith, and contemporary environmental issues; (2) Integration of ecological values in lesson plans (RPP) with learning objectives covering cognitive (knowing khalifah concept), affective (loving environment), psychomotor (planting, managing waste); (3) Project-based learning: tree planting, waste management (3R), green learning space, eco-pesantren, Bank Sampah, compost, biopori; (4) Alignment with Love-Based Curriculum and the Freedom Curriculum.

Figure 3. Innovation in Environment-Based PAI Learning (Ecological)



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Clean Pesantren Through Sanitation and Environmental Cleaning

Implementation of Clean Pesantren program through improvement of sanitation cleanliness and environment at Pondok Pesantren Nurul Jadid Paiton Probolinggo significantly impacts health and comfort of santri and pesantren civitas. Interventions conducted such as routine cleaning of dormitory, classroom, and public facility areas, integrated waste management, increased access to handwashing facilities with soap, and education on clean and healthy living behavior (PHBS), have reduced incidence of skin disease, diarrhea, and respiratory disorders among santri.

In addition, clean environment increases collective awareness about importance of sanitation, strengthens santri participation in cleanliness activities, and creates more conducive learning atmosphere. Qualitative evaluation results also show that managers and santri feel more proud and responsible for pesantren environment, which in turn supports achievement of pesantren educational goals holistically.

Conceptualization of Clean Pesantren through sanitation management and environmental cleanliness represents paradigm reorientation of Islamic education management toward formation of hygienic, healthy, and sustainable learning ecosystem as structural prerequisite for productive academic climate (Barlian et al., 2024).

Sanitation management includes governance of essential pesantren facilities—such as bathrooms, toilets, wudu places, drainage systems, and waste management—while environmental cleanliness realized through arrangement of dormitory space, yard, and public facilities free from pollution residues and pathological risks. Cleanliness practices not reduced as technical-operational activity, but positioned as institutionalized and long-term pedagogical intervention in forming habitus of clean, orderly, and healthy living through habituation mechanism, collective discipline, and internalization of social responsibility rooted in Islamic normative values.

In epistemology horizon of Islamic education, Clean Pesantren has theological and pedagogical significance that is convergent, because cleanliness understood as manifestation of faith (*al-nazafah min al-iman*) as well as prerequisite for ritual purity (*thaharah*) in worship praxis (Rahayu, 2025).

Sanitation and environmental cleaning activities function as contextual learning vehicle transmitting and internalizing amanah values, social piety, and santri ecological awareness as *khalifah fi al-ardh* having ethical mandate to maintain relational balance between humans and environment (Rini et al., 2022). Through structured, reflective, and repeated cleanliness practices, pesantren not only forms physical discipline of santri, but also grows transformative spiritual-ethical awareness, so pesantren institution functions as production space for humanistic, ecological, and sustainability-oriented religious character.

Sustainability of Clean Pesantren implementation supported by adaptive institutional configuration and strategic role of educators as agents of value internalization and moral exemplar. Existence of internal regulation, community-based cleanliness program, and integration of ecological values in learning reflects institutional commitment to

environmental ethics and holistic santri character formation (Prianto et al., 2019).

In this context, Islamic Religious Education teacher not merely acts as transmitter of normative knowledge, but as cultural actor presenting authentic exemplary (uswah hasanah) through real praxis in pesantren life (Nashihin et al., 2022). Synergy between institutional policy, pedagogical praxis, and organizational culture shows that transformation of PAI learning based on green pesantren has undergone established institutionalization process, forming santri habitus that is religious, moral, having ecological sensitivity, and sustainable social responsibility in responding to contemporary global dynamics.

Development of Integrated Waste Management Facility (IPST) and Waste Bank Towards Zero-Waste

Transformation of Islamic Religious Education (PAI) learning based on green pesantren at Nurul Jadid Islamic Boarding School shows significant contribution to formation of pesantren culture institutionally. Integration of environmental caring values actualized through systematic cleanliness governance, green space development, waste sorting habituation, and strengthening of santri collective discipline. Ecological concern no longer positioned as programmatic activity, but internalized as core pesantren value. Practice understood as part of Islamic teachings practice, especially amanah and khalifah fi al-ardh values, so PAI learning experiences shift from cognitive orientation toward sustainable socio-religious praxis.

At social-institutional level, pesantren acts as agent of change in transmitting Islamic values with environmental insight to broader social space. Findings align with view of Muhammadiyah (2022) affirming pesantren position as strategic institution in responding to contemporary challenges, including ecological crisis. Although in implementation still found adaptation dynamics and supporting facilities limitations, strengthening internal regulation, continuous assistance, and collective exemplary able to maintain consistency of value internalization. This strengthens finding of Shobri (2025) that transformation of educational culture demands long-term process supported by visionary leadership, institutional commitment, and participation of all educational community.

Based on discussion, practice of green pesantren-based PAI learning at Nurul Jadid Islamic Boarding School represents application of integrative learning principle linking religious knowledge, value internalization, and real action in one whole learning experience. Santri not only understands human-nature relation normatively, but also actualizes it in daily pesantren life, in line with transformative learning framework.

Thus green pesantren-based PAI learning proven effective in forming religious character accompanied by ecological concern and social responsibility (eco-religious character). This model can be positioned as strategic approach in development of contextual Islamic education, responsive to global challenges, and sustainability-oriented.

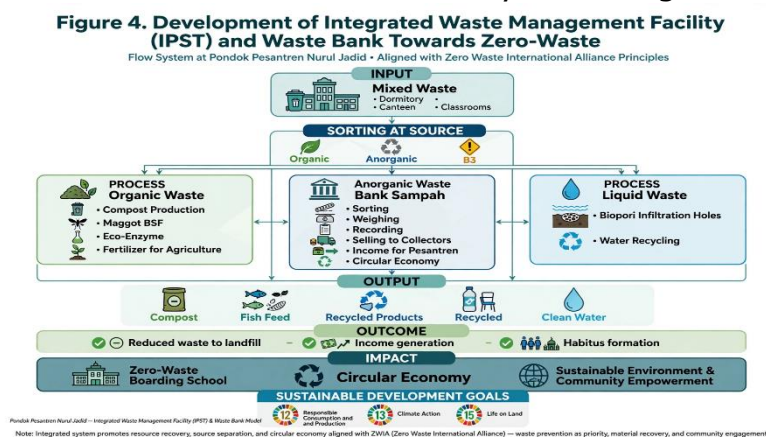
Specifically, IPST and Waste Bank at Nurul Jadid Islamic Boarding School: Organic waste 60% processed into compost, maggot BSF for catfish and chicken feed, fertilizer for pesantren agriculture, creating circular loop;

anorganic waste through Waste Bank sorting, weighing, recording in Waste Bankbook, selling to collectors, income recorded and distributed for pesantren needs or student savings, teaching financial literacy and environmental literacy; liquid waste through biopori infiltration holes filled with organic waste, improving soil infiltration, preventing flooding, producing compost. This circular economy aligns with Islamic principle of israf prohibition and concept of barakah. Analysis using circular economy theory shows waste as resource, not problem.

Zero-Waste Strategy Flow: Input: Mixed waste from dormitory, canteen, classrooms; Process: Sorting at source into organic, anorganic, B3; Organic → compost, maggot BSF, eco-enzyme; Anorganic → Waste Bank → recycle, upcycle; Liquid → biopori, water recycling; Output: Compost, fertilizer, fish feed, recycled products, clean water; Outcome: Reduced waste to landfill, income generation, habitus formation; Impact: Zero-Waste Boarding School, circular economy, SDGs 12, 13, 15. This model provides operational framework for pesantren.

IPST and Waste Bank are not just technical facilities but pedagogical arena forming ecological habitus through experiential learning, financial literacy, and collective responsibility. They embody *fiqh al-bi'ah* and eco-theology praxis.

Figure 4. Institutional-Cultural Pathway to Ecological Habitus



CONCLUSION

Based on results and discussion above, this study shows that Islamic Religious Education and Ecological Awareness: Transformation of Green Pesantren Education in Realizing Zero-Waste Boarding School at Nurul Jadid Islamic Boarding School Paiton Probolinggo through integration of Islamic and ecological values in pesantren education curriculum, transformation of PAI learning paradigm toward Green Pesantren, innovation in environmentally based PAI learning, Clean Pesantren through sanitation and environmental cleaning, Development of Integrated Waste Management Facility (IPST) and Bank Sampah, and Green Pesantren through tree planting and garden creation.

Based on synthesis, integration of Islamic and ecological values in Islamic Religious Education learning at Nurul Jadid Islamic Boarding School shows paradigm shift toward more contextual and sustainability-oriented Islamic education, although curricularly still not fully systemically

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institutionalized. Environmental caring values more dominantly internalized through pesantren culture, habituation, and exemplary, while conceptual-theological strengthening in formal PAI curriculum structure still requires reorientation. This condition affirms gap between Islamic theological values—such as khalifah fi al-ardh, amanah, rahmatan lil 'alamin, israf prohibition—with formal pedagogical construction, so Islamic education risks losing its transformative power in responding to global ecological crisis.

Nevertheless, transformation of green pesantren-based PAI learning at Nurul Jadid Islamic Boarding School shows integrative educational practice through greening, sanitation management, ecological learning innovation, and strengthening clean and sustainable culture. Learning does not stop at cognitive realm, but reaches affective and psychomotor domains of santri through direct experience, in line with transformative and integrative learning principles.

RECOMMENDATION

This study recommends: (1) Explicit formulation of Fiqh al-Bi'ah and zero-waste values in PAI syllabus with hubb al-bi'ah indicators and zero-waste competencies; (2) Development of integrative zero-waste module (Bank Sampah, compost, maggot BSF, eco-enzyme, biopori) containing Qur'anic verses, Hadith, circular economy; (3) Institutionalization of Green Pesantren and Clean Pesantren and IPST as systemic program with long-term evaluation, Adiwiyata standards, and circular economy accounting; (4) Strengthening teacher capacity in transformative eco-pedagogy and zero-waste management; (5) Integration of zero-waste habitus assessment using authentic assessment (project, portfolio, observation, waste audit kg reduced, income from Bank Sampah); (6) Collaboration with DLH, Bank Sampah Induk, KLHK, and replication to other pesantren; (7) Policy support from Kemenag for KBC hubb al-bi'ah and Kemendikbud for Adiwiyata, and from Bappenas for circular economy roadmap..

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