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Research Article

***Eco-pesantren* in Indonesia: A Faith-Based Sustainability Education Model Integrating Islamic Environmental Ethics and Institutional Practices**

Eko-Pesantren w Indonezji: Model edukacji na rzecz zrównoważonego rozwoju oparty na wierze, integrujący islamską etykę środowiskową z praktykami instytucjonalnymi

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Abstract

Environmental degradation has intensified the need for sustainability education that integrates ethical and cultural dimensions. In Indonesia, *pesantren* offer a distinctive institutional context for linking environmental responsibility with Islamic values. This study conceptualizes *eco-pesantren* as a faith-based sustainability education model by developing an integrated framework that connects Islamic environmental ethics with curriculum, pedagogy, daily practices, and institutional governance. Using qualitative library research and thematic content analysis, the study synthesizes literature on sustainability education, Islamic environmental ethics, and *pesantren* studies. The findings propose a four-pillar framework consisting of Green Curriculum, Green Learning, Green Activity, and Green Management, which together form a whole-institution approach to sustainability education. The framework demonstrates how principles such as *khalifah*, *mizan*, and *amanah* can be operationalized within educational and institutional practices. This study contributes to the discourse on faith-based sustainability education by providing an integrated conceptual model of *eco-pesantren*, while also offering a foundation for future empirical research across diverse *pesantren* contexts.

Keywords

eco-pesantren, sustainability education, Islamic environmental ethics, environmental ethics, faith-based education, sustainability governance, whole-institution approach, SDG 4 – Quality Education, SDG 13 – Climate Action

Streszczenie

Postępująca degradacja środowiska nasiliła potrzebę rozwoju edukacji na rzecz zrównoważonego rozwoju, która łączyłaby zarówno wymiar etyczny, jak i kulturowy. Islamskie szkoły *pesantren* w Indonezji stanowią specyficzny kontekst instytucjonalny, w którym odpowiedzialność środowiskowa może być integrowana z wartościami islamu. Niniejsze badanie konceptualizuje *eko-pesantren* jako oparty na wierze model edukacji na rzecz zrównoważonego rozwoju poprzez opracowanie zintegrowanych ram analitycznych łączących islamską etykę środowiskową z programem nauczania, pedagogiką, codziennymi praktykami oraz zarządzaniem instytucjonalnym. W badaniu zastosowano jakościową analizę literatury oraz tematyczną analizę treści w celu syntezy literatury dotyczącej edukacji na rzecz zrównoważonego rozwoju, islamskiej etyki środowiskowej i studiów nad *pesantren*. Przeprowadzona analiza pozwoliła wyodrębnić czterofilarowe ramy obejmujące Zielony Program Nauczania, Zielone Uczenie się, Zieloną Aktywność oraz Zielone Zarządzanie, które wspólnie tworzą zintegrowany model edukacji na rzecz zrównoważonego rozwoju. Ramy te ukazują, w jaki sposób zasady takie jak *khalifah*, *mizan* i *amanah* mogą być implementowane w praktyce edukacyjnej i instytucjonalnej. Niniejsze badanie wnosi wkład do dyskursu nad opartą na wierze edukacją na rzecz zrównoważonego rozwoju poprzez zaproponowanie zintegrowanego modelu koncepcyjnego *eko-pesantren*, a zarazem stanowi podstawę dla dalszych badań empirycznych prowadzonych w różnych kontekstach *pesantren*.

Słowa kluczowe

eko-pesantren, edukacja na rzecz zrównoważonego rozwoju, islamska etyka środowiskowa, etyka środowiskowa, edukacja oparta na wierze, zarządzanie na rzecz zrównoważonego rozwoju, podejście obejmujące całą instytucję, Cel Zrównoważonego Rozwoju 4 – Dobra jakość edukacji, Cel Zrównoważonego Rozwoju 13 – Działania w dziedzinie klimatu

Introduction

Environmental degradation has become one of the defining challenges of the contemporary world. Rising global temperatures, accelerating biodiversity loss, and widespread environmental pollution demonstrate that ecological crises cannot be addressed solely through technological innovation or regulatory mechanisms (WMO 2025; IS-PPoBES 2019; WHO 2021). These challenges also require ethical reorientation, cultural transformation, and educational approaches capable of shaping values and collective responsibility. Consequently, sustainability education is increasingly understood not merely as the transmission of environmental knowledge, but as a transformative process integrating cognitive, ethical, and behavioural dimensions (Goodale, Gilmore, and Griffiths 2025, 364).

Within this discourse, religion has gained growing attention as a source of ecological values and moral motivation (Marshall 2025, 1–2). In Islamic thought, environmental responsibility is grounded in principles such as *khalifah* (stewardship), *mizan* (balance), and *amanah* (trust), which frame nature as a divinely entrusted system that must be protected (Zuhdi, Bilhaq, and Putri 2024, 201–3). These principles position

environmental responsibility not only as a practical concern but also as a moral and spiritual obligation embedded in religious life (Begum et al. 2021; Syukri et al. 2024; Ayu Setianingrum, Setiyo, and Dwiyanto 2024). This relevance has also been recognized in global sustainability initiatives such as the UNEP “Values, Culture and Spirituality for Sustainable Lifestyles” roadmap, which identifies *eco-pesantren* as a values-based educational approach integrating Islamic teachings with environmental conservation and restoration (United Nations Environment Programme 2025, 3–4). In Indonesia, *pesantren*, or Islamic boarding schools, provide a particularly relevant institutional context because their communal structure, moral authority, and emphasis on habituation enable values to be internalized through everyday practices (Supriyono, Ishaq, and Dayati 2023, 35; Subaidi et al. 2023, 541).

Building on this context, the concept of *eco-pesantren* has emerged as an approach integrating Islamic education with ecological awareness and environmentally responsible practices (Hermawansyah 2025, 104–6). Existing studies have examined *eco-pesantren* from perspectives such as environmental programs, institutional management, community empowerment, and Islamic ethical discourse (Hermawansyah 2025; Subaidi et al. 2023; Rohmah 2024; Bintang Kejora et al. 2025; Nursaniah, Maulida, and Sari 2025). However, most studies focus on particular dimensions in isolation and provide limited explanation of how ethical, pedagogical, and institutional dimensions can be systematically connected within a coherent educational framework (Rohmah 2024, 3; Febriani, Syahida, and Taufiq 2023, 120; Taufiqurrochman 2025, 75–76). As a result, *eco-pesantren* is often understood as a collection of environmental initiatives rather than as an integrated model of faith-based sustainability education (Aulia et al. 2024, 227).

This study addresses this gap by conceptualizing *eco-pesantren* as an integrated model of faith-based sustainability education linking Islamic environmental ethics with curriculum, pedagogy, daily practices, and institutional governance. It proposes a four-pillar framework consisting of Green Curriculum, Green Learning, Green Activity, and Green Management as an analytical model for understanding how ecological values may be institutionalized within *pesantren* education. By doing so, the study contributes to the broader discourse on faith-based sustainability education while providing a conceptual foundation for future empirical research across diverse *pesantren* contexts.

1. Methodology

This study employs qualitative library research combined with thematic content analysis to conceptualize *eco-pesantren* as a model of faith-based sustainability education. The study draws on scholarly

literature related to sustainability education, Islamic environmental ethics, *pesantren* studies, and *eco-pesantren*, including peer-reviewed journal articles, academic books, and relevant conceptual works (Creswell 2014, 7). The selected literature was examined through repeated comparative reading and thematic categorization to identify recurring concepts, institutional patterns, and analytical relationships across the existing scholarship (Braun and Clarke 2006, 79, 87, 89). Particular attention was given to the interconnections between ethical principles, pedagogical processes, daily institutional practices, and governance structures within *pesantren* contexts. Through this analytical process, the study identified key thematic dimensions that recur across the literature and examined how these dimensions relate to one another within sustainability education discourse.

Drawing on conceptual framework analysis, the identified themes were subsequently synthesized into an integrated four-pillar framework consisting of Green Curriculum, Green Learning, Green Activity, and Green Management (Jabareen 2009, 51–52). This synthesis aimed to construct a coherent analytical model capable of explaining how Islamic environmental ethics may be institutionalized within *pesantren* education through interconnected curricular, pedagogical, practical, and organizational dimensions. As a conceptual study, this article does not aim at empirical generalization, but at developing a systematic analytical framework intended to enhance understanding of *eco-pesantren* as a model of faith-based sustainability education and to support future empirical and theoretical research in diverse *pesantren* contexts (Jabareen 2009, 51–52, 57).

2. Faith-Based Sustainability Education and *Eco-pesantren*

2.1. Faith-Based Sustainability Education

Sustainability education is increasingly understood not merely as the transmission of environmental knowledge, but as a transformative process that shapes values, behaviours, and collective responsibility (Shahida 2024, 233–34). Within this perspective, faith-based education plays an important role by connecting ecological concerns with spiritual and ethical values, thereby framing environmental responsibility as a moral and religious obligation rather than a purely technical issue (Altmeyer 2021, 57; Pacis and VanWynsberghe 2020, 575–576). This approach is particularly relevant in religious educational institutions where moral formation and everyday discipline constitute central components of the learning process.

2.2. *Pesantren* as a Distinctive Institutional Environment

In the Indonesian context, *pesantren* provide a distinctive institutional environment for faith-based sustainability education because they integrate education, communal life, and moral formation within a unified social system (Rahmansyah 2023, 192; Mujahid 2021, 188). Their pedagogical environment is shaped by the authority of the *kiai*, communal living arrangements, and continuous supervision, enabling values to be internalized through habituation, interaction, and role modelling (Titi Sartini 2025, 78–79). As learning extends beyond formal classroom instruction into everyday routines and collective practices, *pesantren* create a form of “hidden curriculum” through which ethical values are embodied and reinforced in daily life. In this context, values are internalized not only through formal teaching but also through norms, habits, institutional culture, and everyday interactions within the *pesantren* environment (Amin, Abdurrahmansyah, and Fauzi 2024, 148, 150).

This institutional character makes *pesantren* particularly suitable for sustainability-oriented education, where ecological responsibility depends not only on cognitive understanding but also on consistent everyday practices such as cleanliness, waste management, and resource conservation (Syukri et al. 2024; Rohmah 2024; Alam et al. 2024). In addition, many *pesantren* are located within rural or semi-rural communities where environmental issues are closely connected to social and economic life, strengthening their potential role in promoting environmental awareness and community-based ecological responsibility (Karman, Anwar, and Hakim 2023; Subaidi et al. 2023; Bintang Kejora et al. 2025).

2.3. The Emergence of *Eco-pesantren*

Building on this context, *eco-pesantren* has emerged as an approach that integrates Islamic education with ecological awareness and environmentally responsible practices across curriculum, pedagogy, daily activities, and institutional governance, grounded in Islamic ethical principles (Pudjiastuti, Iriansyah, and Yuliwati 2021, 30–31). Since its introduction through initiatives such as the “Muslim Seven-Year Action Plan for Climate Change” (2009), the concept has developed through various local adaptations in Indonesia and gained recognition as a faith-based response to ecological challenges that combines moral, pedagogical, and institutional dimensions (Alam et al. 2024; Aulia et al. 2024; Hermawansyah 2025).

3. *Eco-pesantren* in Indonesia: A Critical Review of Existing Studies

Existing scholarship on *eco-pesantren* can be broadly grouped into four main strands, each reflecting

a different analytical orientation. The first strand consists of program-oriented studies focusing on practical environmental initiatives such as sanitation, waste management, environmental campaigns, and green school practices within *pesantren*. Rozinah et al. (2025), for example, explain how the Go Green Program at Pesantren Attaqwa integrates reforestation, waste management, and plastic-waste charity activities to cultivate ecological behaviour through habituation, experiential learning, and religious value internalization. Meanwhile, Latifah and Suryani (2025) discuss community-based waste management through ecobrick and eco-enzyme programmes, emphasizing participatory training and practical engagement in developing environmental awareness among *santri*. These studies are important because they demonstrate how ecological awareness can be translated into concrete institutional activities and community participation. However, their primary emphasis on practical implementation often limits deeper discussion of the ethical, pedagogical, and institutional dimensions underlying such programmes. As a result, environmental initiatives tend to appear mainly as operational activities rather than as components of a broader sustainability education model.

The second strand emphasizes institutional and managerial dimensions, particularly leadership, governance, infrastructure, and organizational capacity in supporting environmental sustainability within *pesantren*. Ainiyah and Awakachi (2025), for instance, discuss how the *Eco-pesantren* program at Pesantren Darunnajah Bogor institutionalizes environmental care through structured waste management, ecological training, organic farming, and Green Dakwah activities supported by *pesantren* leadership and participatory governance. Similarly, Widiastuti and Ernawati (2024) explain the importance of sustainable facility development, environmental management policies, and institutional collaboration in promoting *eco-pesantren* practices through infrastructure optimization, resource monitoring, and community partnerships. This perspective contributes significantly by highlighting the importance of institutional commitment and administrative structures in sustaining ecological initiatives over time. Nevertheless, these studies generally focus on organizational effectiveness and management practices without sufficiently examining how environmental values are integrated into pedagogical processes, curriculum, or student formation. Consequently, sustainability is often approached as an institutional management issue rather than as an integrated educational process.

A third strand approaches *eco-pesantren* from the perspective of community empowerment and rural social transformation. These studies position *pesantren* as centres of local ecological engagement connected to livelihoods, rural development, and community participation. Musthafa, Wahyudin, and Tresnawaty (2017)

discuss how *pesantren*-based community empowerment extends beyond religious education into social, economic, health, and youth development programs through collaborative engagement between *pesantren* institutions and surrounding communities. Likewise, Purnomo et al. (2024) explain that sustainable *pesantren* development involves integrating environmental education, community participation, and prophetic values to strengthen ecological awareness and community empowerment within rural society. Their contribution lies in demonstrating the social relevance of *eco-pesantren* beyond the institutional level, particularly in strengthening community-based environmental awareness. However, the educational and curricular dimensions of sustainability often remain underdeveloped within this perspective, making it difficult to explain how ecological values are systematically internalized through institutional learning processes.

The fourth strand focuses on ethical and theological perspectives by exploring Islamic environmental values through concepts such as ecospiritualism, stewardship, and Qur'anic environmental interpretation. Fatoni, Irawan, and Iman (2025) explain that ecological responsibility in *pesantren* contexts is cultivated through the internalization of Qur'anic principles such as *amanah*, *mizan*, *anti-israf*, and *anti-fasad*, which are translated into agroecological practices, environmental discipline, and a "Qur'an–practice" pedagogy connecting scriptural interpretation with everyday ecological activities. Similarly, Karman, Yudiantara, and Muhyiddin (2025) discuss how Islamic ecotheological values and environmental ethics provide a moral framework for encouraging sustainable behavior and ecological awareness within Muslim communities. These studies provide an important normative foundation for environmental responsibility within Islamic thought and strengthen the moral legitimacy of ecological engagement in *pesantren* contexts. Yet, many of these discussions remain largely normative and conceptual, with limited explanation of how theological principles are translated into institutional practices, curriculum design, and sustainability-oriented governance.

Taken together, these strands demonstrate that existing studies have made important contributions to understanding *eco-pesantren* from practical, institutional, social, and theological perspectives. However, they remain insufficiently integrated across ethical, pedagogical, and institutional dimensions. Most studies explain specific aspects of *eco-pesantren* effectively, yet few systematically connect Islamic environmental ethics with curriculum, learning processes, daily practices, and institutional governance within a unified analytical framework. This limitation matters because *pesantren* function as holistic educational communities in which values are shaped not only through formal instruction but also through routines, institutional culture, and organizational structures. Without an integrative perspective, *eco-pesantren* risks being understood only as a

collection of environmental initiatives rather than as a coherent model of faith-based sustainability education. Therefore, a more comprehensive analytical framework is needed to explain how ethical principles, pedagogical processes, institutional practices, and governance structures interact within *eco-pesantren* as an integrated sustainability education model.

4. Toward an Integrated *Eco-pesantren* Framework

Eco-pesantren cannot be adequately understood when reduced to isolated environmental programmes or fragmented institutional initiatives, because *pesantren* function as holistic educational communities in which values are shaped through curriculum, pedagogy, daily routines, and governance structures. To address this limitation, this study proposes an *eco-pesantren* framework based on the whole-institution approach (WIA), consisting of four interrelated pillars: Green Curriculum, which defines ecological values within the educational vision; Green Learning, which facilitates the pedagogical internalization of these values; Green Activity, which translates them into daily institutional behaviour; and Green Management, which sustains them through governance, leadership, and organizational structures (Holst 2023; Holst, Grund, and Brock 2024; Figueiró, Neutzling, and Lessa 2022). To clarify the functional distinction among the four pillars, Table 1 summarizes their primary roles and institutional focus within the *eco-pesantren* framework.

Table 1. Functional Distinction among the Four Pillars of *Eco-pesantren*

This table presents the four pillars of the *eco-pesantren* framework and their main institutional functions. The table shows how sustainability education is integrated through curriculum, pedagogy, daily practices, and institutional governance within the whole-institution approach.

No.	Pillar	Primary Function	Main Focus
1	Green Curriculum	Formalizes ecological values within the educational vision	Curriculum orientation and ethical foundation
2	Green Learning	Facilitates the pedagogical internalization of ecological values	Learning processes and student engagement
3	Green Activity	Embeds ecological responsibility in everyday institutional behaviour	Daily routines and communal practices
4	Green Management	Sustains ecological commitments through organizational structures	Governance, leadership, and infrastructure

Source: Author’s elaboration based on Holst (2023), Holst et al. (2024), and Figueiró et al. (2022).

4.1. Green Curriculum

Green Curriculum provides the normative and educational foundation of the *eco-pesantren* framework by embedding sustainability values and Islamic environmental ethics into the educational orientation of *pesantren*. Rather than treating environmental issues as supplementary topics, it integrates principles such as

khalifah, *mizan*, and *amanah* into both religious and general subjects while aligning learning objectives and assessment practices with ecological literacy and ethical responsibility (Muzakki, Moh. Arif, and Mamah 2025, 56; Hajar 2024, 83–84; Rahman et al. 2025, 554–556).

This curricular orientation also extends beyond formal instruction into the hidden curriculum of *pesantren* life, where ecological values are reinforced through routines, communal discipline, and everyday social practices. In this context, moderation in consumption, anti-waste behaviour, and shared responsibility become part of the daily educational environment rather than merely formal learning objectives. By connecting classroom learning with lived institutional practices and local environmental realities, Green Curriculum strengthens the ethical foundation of ecological responsibility within *pesantren* education (Syukri et al. 2024, 4–5; Marshall 2025, 2–3).

4.2. Green Learning

Green Learning represents the pedagogical dimension of the framework by focusing on how ecological values are internalized through learning processes. While Green Curriculum defines what environmental values should be taught, Green Learning emphasizes how those values are experienced, practiced, and reflected upon by *santri* (students in Islamic boarding schools). This approach utilizes experiential, problem-oriented, and project-based learning approaches to connect Islamic ethical principles with concrete ecological issues such as waste management, water use, and environmental conservation (Kricsfalusy, George, and Reed 2018, 2–4; Hajar 2024, 88).

Within this process, teachers and *kiai* function not only as instructors but also as moral exemplars whose behaviour reinforces ecological responsibility in everyday educational interaction (Titi Sartini 2025, 72–75). Green Learning also encourages interdisciplinary engagement and reflective assessment practices that allow students to critically connect environmental knowledge, ethical reasoning, and practical action. In this way, pedagogy becomes the primary mechanism through which ecological awareness is internalized before being expressed in institutional practice (Granit-Dgani, Kaplan, and Flum 2017, 2, 7–9).

4.3. Green Activity

Green Activity refers to the domain of lived institutional behaviour in which ecological values are expressed through the daily practices of *pesantren* life. This pillar includes activities such as waste management, environmental cleanliness, water and energy conservation, organic farming, and local ecological

initiatives integrated into communal routines and student responsibilities (Rodríguez-Guerreiro, Torrijos, and Soto 2024, 1–2).

Unlike Green Learning, which focuses on pedagogical internalization, Green Activity emphasizes habitual practice and collective behaviour. Through repeated routines and communal discipline, ecological responsibility becomes part of everyday institutional culture rather than merely an educational topic (AlAli et al. 2025, 1–3, 5, 18–19). The significance of this pillar lies not only in its environmental function but also in its formative role in embedding ecological awareness within lived social practice (Anesito L. Cutillas et al. 2025, 1–2, 7).

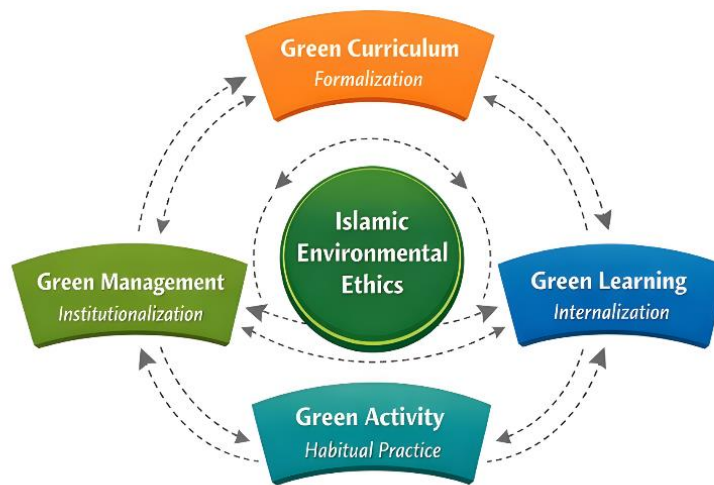
4.4. Green Management

Green Management sustains ecological commitments through institutional governance, leadership, and organizational support. This pillar integrates environmental responsibility into planning, decision-making, administration, infrastructure, and resource management within *pesantren* life (Christou et al. 2024, 2–4; Altassan 2023, 9, 18, 20).

Leadership constitutes a central component of this process, particularly through the role of the *kiai* in shaping institutional priorities and legitimizing sustainability as part of the educational and religious mission of *pesantren* (Titi Sartini 2025, 72–75). At the organizational level, Green Management includes environmental policies, institutional coordination, resource allocation, sanitation systems, and infrastructural support such as water conservation and energy efficiency. By aligning governance structures with ecological values, this pillar provides the institutional continuity necessary for sustaining environmental commitments over time (Leal Filho et al. 2021, 1–2, 13–14).

4.5. Interrelationship among the Four Pillars

The four pillars of *eco-pesantren* function as a mutually reinforcing system rather than as separate components. Green Curriculum defines ecological values within the educational vision, Green Learning facilitates their pedagogical internalization, Green Activity embeds them into daily communal behaviour, and Green Management sustains them through institutional governance and organizational structures. Within this framework, Islamic environmental ethics function as the normative reference shaping curriculum orientation, pedagogical practice, institutional behaviour, and governance priorities.

Figure 1. Interrelationship among the Four Pillars of *Eco-pesantren*

Source: Author's elaboration based on Holst (2023), Holst et al. (2024), and Figueiró et al. (2022).

Figure 1 illustrates the cyclical relationship among the four pillars within the whole-institution approach framework. Rather than operating linearly, the pillars interact continuously through processes of formalization, internalization, enactment, and institutional support. Through this interaction, *eco-pesantren* functions not merely as an environmental programme, but as a comprehensive model of faith-based sustainability education grounded in ethical values, educational processes, communal practices, and institutional structures.

5. *Eco-pesantren* as a Faith-Based Sustainability Education Model

The framework developed in this study positions *eco-pesantren* as a model of faith-based sustainability education in which ecological responsibility is embedded across curriculum, learning processes, daily practices, and institutional governance. Within *pesantren* contexts, sustainability is understood not merely as a technical or environmental concern, but as part of moral and spiritual formation shaped through habituation, communal life, and shared institutional culture (Ayu Setianingrum, Setiyo, and Dwiyanto 2024, 2–4, 5–6). In this respect, ecological responsibility is framed within Islamic theological understandings of stewardship, balance, and moral accountability toward creation, which provide the ethical basis for sustainability-oriented educational practices.

The model also highlights the tension between normative ideals and institutional realities, as differences in resources, organizational capacity, and infrastructure may affect the consistency of implementation across *pesantren* contexts (Holst 2023, 1015). In this framework, *pesantren* function as

mediating institutions by translating Islamic environmental ethics such as *khalifah*, *mizan*, and *amanah* into concrete educational practices, institutional routines, and governance structures (Taufikin 2025, 1–5, 8, 11). Their mediating role lies in connecting ethical principles with lived institutional practices, although its effectiveness depends on the alignment between moral discourse and everyday organizational realities (Ibrahim et al. 2024, 2, 8, 10–12).

6. Implications for Sustainability Education and Green Society

The significance of the *eco-pesantren* framework extends beyond institutional design to its broader implications for sustainability education and the formation of a green society in Indonesia. A green society is not defined solely by technological efficiency or environmental regulation, but also by the internalization of ecological responsibility within ethical consciousness, collective action, and everyday cultural practices (Wahyuningsih and Masyhuri 2024, 2–3, 9). In this respect, *eco-pesantren* contributes to sustainability education by embedding environmental responsibility within religious values, institutional practices, and community engagement, thereby strengthening the moral and cultural dimensions of ecological transformation (Marouli 2021, 1–2, 6; Wamsler et al. 2024, 1587–1588). Figure 2 illustrates the multi-level transformative role of *eco-pesantren* from individual formation to broader social engagement.

Figure 2. Multi-Level Transformation Model of *Eco-pesantren*



Source: Developed by the author, adapted from Sarid and Goldman (2021).

At the individual level, *eco-pesantren* cultivates environmentally aware and ethically grounded *santri* by linking ecological responsibility with personal piety and disciplined conduct. At the institutional level, sustainability is embedded within curriculum, pedagogy, daily practices, and governance structures, reinforcing environmental responsibility within Islamic educational settings. At the societal level, *eco-pesantren* extends its influence through community engagement, local leadership, and environmentally

oriented social initiatives, enabling ecological values to diffuse beyond institutional boundaries. This multi-level dynamic reflects broader frameworks of environmental citizenship in which education contributes to the formation of individuals and communities capable of shaping social and ecological transformation (Sarid and Goldman 2021, 2, 8–10).

6.1. Theoretical and Practical Contributions

This study contributes theoretically to sustainability education, Islamic environmental ethics, and *pesantren* studies by conceptualizing *eco-pesantren* as a systematic model of faith-based sustainability education rather than as fragmented environmental initiatives. The proposed four-pillar framework provides an analytical structure linking ethical principles, pedagogy, daily practices, and institutional governance, thereby offering a conceptual foundation for future research on faith-based sustainability education. More broadly, the framework contributes to international discussions on religion, education, and sustainability by demonstrating how faith-based institutions can operationalize ecological ethics through interconnected educational and organizational practices.

Practically, the study highlights the importance of aligning curriculum, pedagogy, leadership, institutional routines, and community engagement in implementing sustainability within *pesantren* contexts. The framework suggests that environmental programmes are likely to remain partial when implemented separately from broader educational and organizational processes. Consequently, sustainability initiatives within *pesantren* require coordination across educational, institutional, and community dimensions.

6.2. Limitations and Future Research

This study remains conceptual in nature and is based on thematic synthesis rather than empirical validation. Therefore, the proposed framework should be understood as an analytical model rather than a universally applicable blueprint. Given the diversity of *pesantren* in terms of institutional capacity, resources, and socio-cultural context, the implementation of the framework may vary significantly across settings.

Future research is needed to examine how the proposed framework operates in practice through case studies, comparative analysis, and field-based investigation across diverse *pesantren* contexts. Such studies would help evaluate the applicability, adaptability, and institutional challenges of *eco-pesantren* as a model of faith-based sustainability education.

Conclusions

This study argues that *eco-pesantren* should be understood not merely as an environmental initiative, but as a model of faith-based sustainability education that connects Islamic environmental ethics with curriculum, learning processes, daily practices, and institutional governance through four interrelated pillars. The proposed framework demonstrates that ecological responsibility in *pesantren* is cultivated not only through formal instruction, but also through communal routines, moral formation, and organizational practices grounded in principles such as *khalifah*, *mizan*, and *amanah*. In this respect, *pesantren* provide a distinctive educational environment in which sustainability becomes part of lived ethical and institutional practice.

Although the framework offers a conceptual contribution to sustainability education, Islamic environmental ethics, and *pesantren* studies, it remains theoretical and requires further empirical examination across diverse *pesantren* contexts. Differences in institutional capacity, socio-cultural conditions, and organizational resources may influence how the framework is implemented in practice. Future research is therefore needed to examine the applicability and adaptability of *eco-pesantren* through case studies, comparative research, and field-based investigation. The study also suggests that *eco-pesantren* may be understood as part of a broader global movement of faith-based sustainability education that seeks to connect ecological responsibility with ethical, spiritual, and institutional transformation.

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References

- Ainiyah, Nuhzatul, and Arfal Awakachi. 2025. "Green Transformation in Islamic Education Institutions: Eco-pesantren Innovation in Shaping Santri's Environmental Care Character." *Ijibs* 3 (1): 1–12. <https://ijibs.uinkhas.ac.id/ijibs/article/view/50>.
- AlAli, Rommel, Ali Al-Barakat, Tahani Alrosaa, Sarah Alotaibi, Ali Abdullatif, and Sultan Almuhyirah. 2025. "Science Education and Environmental Identity: An Integrative Approach to Fostering Sustainability Practices in Primary School Students." *Sustainability* 17 (19): 8883. <https://doi.org/10.3390/su17198883>.

- Alam, Lukis, Meredian Alam, Abdunorma Samaalee, and Suyatno Suyatno. 2024. "Environmental Sustainability in Indonesian Pesantren: Integrating Pious Principles and Da'wah Efforts." *Jurnal Ilmu Dakwah* 44 (2): 311–28. <https://doi.org/10.21580/jid.v44.2.23607>.
- Altassan, Abdulrahman. 2023. "Sustainable Integration of Solar Energy, Behavior Change, and Recycling Practices in Educational Institutions: A Holistic Framework for Environmental Conservation and Quality Education." *Sustainability* 15 (20): 15157. <https://doi.org/10.3390/su152015157>.
- Altmeyer, Stefan. 2021. "Religious Education for Ecological Sustainability: An Initial Reality Check Using the Example of Everyday Decision-Making." *Journal of Religious Education* 69 (1): 57–74. <https://doi.org/10.1007/s40839-020-00131-5>.
- Amin, Khoirul, Abdurrahmansyah Abdurrahmansyah, and Muhammad Fauzi. 2024. "Internalisation of Religious Moderation Values through Hidden Curriculum at Pondok Pesantren Modern Al-Fahd Jakabaring Palembang." *FIKROTUNA: Jurnal Pendidikan Dan Manajemen Islam* 13 (01): 148–63. <https://doi.org/10.32806/jf.v13i01.7609>.
- Anesito L. Cutillas, Ruby Ann B. Maniwang, Kyza L. Quimpan, Syra C. Cinco, Niño Jerry M. Basaca, Jao V. Duran, Rocky A. Marco, Jr. Enrique E. Balili, and Ybony C. Cutillas. 2025. "The Power of Real Experience: Self-Driven Contributions for Sustainable Environment." *Journal of Environmental & Earth Sciences* 7 (7): 304–20. <https://doi.org/10.30564/jees.v7i7.8342>.
- Aulia, Rihlah Nur, Hafid Abbas, Nurhattati, Faisal M. Jasin, and Mushlihin. 2024. "Eco-pesantren Modeling for Environmentally Friendly Behavior: New Lessons from Indonesia." *International Journal of Evaluation and Research in Education* 13 (1): 223–29. <https://doi.org/10.11591/ijere.v13i1.25930>.
- Ayu Setianingrum, Diah, Setiyo, and Agus Dwiyanto. 2024. "Environmental Education through Islamic Lens: Values and Practices." Edited by A. Saregar, R. Umam, and A. Rahmat. *E3S Web of Conferences* 482 (January):04014. <https://doi.org/10.1051/e3sconf/202448204014>.
- Begum, Abida, Liu Jingwei, Maqsood Haider, Muhammad Maroof Ajmal, Salim Khan, and Heesup Han. 2021. "Impact of Environmental Moral Education on Pro-Environmental Behaviour: Do Psychological Empowerment and Islamic Religiosity Matter?" *International Journal of Environmental Research and Public Health* 18 (4): 1604. <https://doi.org/10.3390/ijerph18041604>.
- Bintang Kejora, Muhamad Taufik, Aan Komariah, Endang Herawan, and Asep Sudarsyah. 2025. "Ekopesantren: An Ecology-Based Education Model with Local Wisdom Supports the Sustainable Development Goal's." *AL-ISHLAH: Jurnal Pendidikan* 17 (1): 291–306. <https://doi.org/10.35445/alishlah.v17i1.6246>.
- Braun, Virginia, and Victoria Clarke. 2006. "Using Thematic Analysis in Psychology." *Qualitative Research in Psychology* 3 (2): 77–101. <https://doi.org/10.1191/1478088706qp063oa>.
- Christou, Odysseas, Dimitra B. Manou, Stefano Armenia, Eduardo Franco, Anastasia Blouchoutzi, and Jason Papatasiou. 2024. "Fostering a Whole-Institution Approach to Sustainability through Systems Thinking: An Analysis of the State-of-the-Art in Sustainability Integration in Higher Education Institutions." *Sustainability* 16 (6): 2508. <https://doi.org/10.3390/su16062508>.
- Creswell, John W. 2014. *Research Design, Qualitative, Quantitative and Mixed Method Approaches*. Edited by Achmad Fawaid. Yogyakarta: Pustaka Pelajar.
- Fatoni, Ahkmad, Bambang Irawan, and Muhamad Tamamul Iman. 2025. "Ecological Piety Based on the

- Qur'an: A Study of the Implementation of Environmental Verses at the Pesantren of Ath-Thaariq, West Java." *Ushuluna: Jurnal Ilmu Ushuluddin* 11 (2 SE-Articles): 1–28. <https://doi.org/10.15408/ushuluna.v11i2.50078>.
- Febriani, Nur Arfiyah, Ahmad Ridla Syahida, and Thiyas Tono Taufiq. 2023. "Eco-Sufism in the Light of the Qur'ān: A Thematic Study of Tafsir Al-Misbah by Muhammad Quraish Shihab." *Teosofia: Indonesian Journal of Islamic Mysticism* 12 (1): 119–42. <https://doi.org/10.21580/tos.v12i1.17844>.
- Figueiró, Paola Schmitt, Daiane Mülling Neutzling, and Bruno Lessa. 2022. "Education for Sustainability in Higher Education Institutions: A Multi-Perspective Proposal with a Focus on Management Education." *Journal of Cleaner Production* 339 (March):130539. <https://doi.org/10.1016/j.jclepro.2022.130539>.
- Goodale, Ava Y., Michael P. Gilmore, and Brian M. Griffiths. 2025. "21st-Century Stewardship: Infusing Environmental Stewardship Education with Global Citizenship." *Environmental Education Research* 31 (2): 364–89. <https://doi.org/10.1080/13504622.2024.2335614>.
- Granit-Dgani, Dafna, Avi Kaplan, and Hanoch Flum. 2017. "Theory-Based Assessment in Environmental Education: A Tool for Formative Evaluation." *Environmental Education Research* 23 (2): 269–99. <https://doi.org/10.1080/13504622.2016.1144172>.
- Hajar, Andi. 2024. "Transforming Islamic Education for Environmental and Social Sustainability." *Sinergi International Journal of Islamic Studies* 2 (2): 82–95. <https://doi.org/10.61194/ijis.v2i2.601>.
- Hermawansyah, Hermawansyah. 2025. "Eco-pesantren-Based Islamic Education Management." *Fitrah: Jurnal Studi Pendidikan* 16 (1): 102–14.
- Holst, Jorrit. 2023. "Towards Coherence on Sustainability in Education: A Systematic Review of Whole Institution Approaches." *Sustainability Science* 18 (2): 1015–30. <https://doi.org/10.1007/s11625-022-01226-8>.
- Holst, Jorrit, Julius Grund, and Antje Brock. 2024. "Whole Institution Approach: Measurable and Highly Effective in Empowering Learners and Educators for Sustainability." *Sustainability Science* 19 (4): 1359–76. <https://doi.org/10.1007/s11625-024-01506-5>.
- Ibrahim, Molina, Shahidullah Islam, Okundaye Zohriah, and Menezes Azid. 2024. "Addressing Contemporary Ethical and Moral Issues through Islamic Education." *Journal on Islamic Studies* 1 (1): 36–51. <https://doi.org/10.35335/kbbzar83>.
- IS-PPoBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services). 2019. "Nature's Dangerous Decline 'Unprecedented'; Species Extinction Rates 'Accelerating.'" Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). 2019. <https://www.ipbes.net/news/Media-Release-Global-Assessment>.
- Jabareen, Yosef. 2009. "Building a Conceptual Framework: Philosophy, Definitions, and Procedure." *International Journal of Qualitative Methods* 8 (4): 49–62. <https://doi.org/10.1177/160940690900800406>.
- Karman, Karman, Rosihon Anwar, and Lukman Hakim. 2023. "The Qur'anic Learning Based on Islamic Eco-Theology at Pesantren." *Jurnal Pendidikan Islam* 9 (2): 169–86. <https://doi.org/10.15575/jpi.v9i2.24933>.
- Karman, Karman, Rully Agung Yudiantara, and Asep Muhyiddin. 2025. "The Qur'an and the Earth: Qur'anic Reception Among Pesantren Residents toward Environmental Conservation." *Ulumuna* 29 (1): 310–38.

<https://doi.org/10.20414/ujis.v29i1.1127>.

- Kricsfalusy, Vladimir, Colleen George, and Maureen G. Reed. 2018. "Integrating Problem- and Project-Based Learning Opportunities: Assessing Outcomes of a Field Course in Environment and Sustainability." *Environmental Education Research* 24 (4): 593–610. <https://doi.org/10.1080/13504622.2016.1269874>.
- Latifah, Sri, and Yani Suryani. 2025. "ECO-FRIENDLY PESANTREN: STRATEGI PENGELOLAAN SAMPAH BERBASIS KOMUNITAS MELALUI ECOBRICKS DAN ECO-ENZYME." *Kumawula: Jurnal Pengabdian Kepada Masyarakat* 8 (3): 757–65. <https://doi.org/10.24198/kumawula.v8i3.59477>.
- Leal Filho, Walter, Amanda Lange Salvia, Fernanda Frankenberger, Noor Adelyna Mohammed Akib, Salil K. Sen, Subarna Sivapalan, Isabel Novo-Corti, Madhavi Venkatesan, and Kay Emblen-Perry. 2021. "Governance and Sustainable Development at Higher Education Institutions." *Environment, Development and Sustainability* 23 (4): 6002–20. <https://doi.org/10.1007/s10668-020-00859-y>.
- Marouli, Christina. 2021. "Sustainability Education for the Future? Challenges and Implications for Education and Pedagogy in the 21st Century." *Sustainability* 13 (5): 2901. <https://doi.org/10.3390/su13052901>.
- Marshall, Heather. 2025. "Integrating Sustainability into Religious Education." *Journal of Beliefs & Values*, May, 1–20. <https://doi.org/10.1080/13617672.2025.2504983>.
- Mujahid, Imam. 2021. "Islamic Orthodoxy-Based Character Education: Creating Moderate Muslim in a Modern Pesantren in Indonesia." *Indonesian Journal of Islam and Muslim Societies* 11 (2): 185–212. <https://doi.org/10.18326/ijims.v11i2.185-212>.
- Musthafa, Izzuddin, Dedih Wahyudin, and Betty Tresnawaty. 2017. "The People Empowerment Pattern In Pesantren Environment: A Case Study about Community Around Pesantren in West Java, Indonesia." In *Proceedings of the Unhas International Conference on Social and Political Science (UICoSP 2017)*. Paris, France: Atlantis Press. <https://doi.org/10.2991/uicosp-17.2017.15>.
- Muzakki, Hawwin, Moh. Arif, and Manavavee Mamah. 2025. "Integration of Islamic Education Values and Fiqh Al-Bi'ah in Cultivating Environmentally Responsible Character." *Cendekia: Jurnal Kependidikan Dan Kemasyarakatan* 23 (1): 55–70. <https://doi.org/10.21154/cendekia.v23i1.10272>.
- Nursaniah, Cut, Sitti Sausan Maulida, and Laina Hilma Sari. 2025. "IMPLEMENTATION OF ECO-PESANTREN THROUGH GREEN BUILDING CONCEPT AT PESANTREN MODERN INSHAFUDDIN, BANDA ACEH, INDONESIA." *Malaysian Journal of Sustainable Environment* 12 (1): 205–24. <https://doi.org/10.24191/myse.v12i1.1695>.
- Pacis, Margarita, and Robert VanWynsberghe. 2020. "Key Sustainability Competencies for Education for Sustainability." *International Journal of Sustainability in Higher Education* 21 (3): 575–92. <https://doi.org/10.1108/IJSHE-12-2018-0234>.
- Pudjiastuti, Sri Rahayu, Herinto Sidik Iriansyah, and Yuliwati Yuliwati. 2021. "Program Eco-pesantren Sebagai Model Pendidikan Lingkungan Hidup." *Jurnal Abdimas Prakasa Dakara* 1 (1): 29–37. <https://doi.org/10.37640/japd.v1i1.942>.
- Purnomo, Joko, Sapja Anantanyu, Haryani Saptaningtyas, and Fachruddin Majeri Mangunjaya. 2024. "Prophetic Approach in Environmental Education and Community Empowerment: A Case Study of Sustainable Pesantren Development." *Revista de Gestão Social e Ambiental* 18 (8): e06259. <https://doi.org/10.24857/rgsa.v18n8-047>.

- Rahman, Rini, Feiby Ismail, Nurhayati Nurhayati, and Irfan Abu Nazar. 2025. "Ecological Ethics in Islamic Religious Education Textbooks: A Qualitative Representation Analysis." *Tafkir: Interdisciplinary Journal of Islamic Education* 6 (3): 844–61. <https://doi.org/10.31538/tijie.v6i3.1995>.
- Rahmansyah, Imam Toriqor. 2023. "Pesantren and Community Development." *Jurnal Syntax Transformation* 4 (11): 192–205. <https://doi.org/10.46799/jst.v4i11.860>.
- Rodríguez-Guerreiro, María-Jesús, Verónica Torrijos, and Manuel Soto. 2024. "A Review of Waste Management in Higher Education Institutions: The Road to Zero Waste and Sustainability." *Environments* 11 (12): 293. <https://doi.org/10.3390/environments11120293>.
- Rohmah, Fitri Nur. 2024. "Integration Of Ecological Principles in the Pesantren System: An Analysis Of Sustainability and Environmental Conservation Practices In Islamic Educational Institutions." *Molang: Journal Islamic Education* 2 (02). <https://doi.org/10.32806/jm.v2i02.813>.
- Rozinah, Siti, Saiful Bahri, M. Abd. Rahman, Hunaidah Hunaidah, and Ahmad Syafiudin. 2025. "Transforming the Ecological Behavior of Santri through the Go Green Program Based on the Eco-pesantren Model." *Santri: Journal of Pesantren and Fiqh Sosial* 6 (2): 187–204. <https://doi.org/10.35878/santri.v6i2.1933>.
- Sarid, Ariel, and Daphne Goldman. 2021. "A Value-Based Framework Connecting Environmental Citizenship and Change Agents for Sustainability—Implications for Education for Environmental Citizenship." *Sustainability* 13 (8): 4338. <https://doi.org/10.3390/su13084338>.
- Shahida. 2024. "From Micro-Rituals to Macro-Impacts: Mapping Eco-Ethics via Religious/Spiritual Teachings into Higher Education." *Ethics and Education* 19 (2): 233–54. <https://doi.org/10.1080/17449642.2024.2339165>.
- Subaidi, Ahmad Tantowi, Nur Cholid, Mahfudz Junaedi, Waluyo, Mukh Nursikin, Feti Fatimatuzzahroh, Oekan S Abdoellah, and Sunardi Sunardi. 2023. "Eco-pesantren: Islamic Education in Forest Conservation Landscapes." *Fudan Journal of the Humanities and Social Sciences* 16 (4): 541–67. <https://doi.org/10.1007/s40647-023-00386-w>.
- Supriyono, M. Ishaq, and Umi Dayati. 2023. "Character Education through Philosophical Values in Traditional Islamic Boarding Schools." *Kasetsart Journal of Social Sciences* 45 (1): 31–42. <https://doi.org/10.34044/j.kjss.2024.45.1.04>.
- Syukri, Syukri, Sulaiman Muhammad Amir, Fitriani Fitriani, and Sarmalina Pane. 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>.
- Taufikin, Taufikin. 2025. "Integrating Eco-Theology In Islamic Education: A Case Study On Fostering Ecological Awareness Through Religious Pedagogy." *El-Tarbawi* 18 (1): 1–37. <https://doi.org/10.20885/tarbawi.vol18.iss1.art1>.
- Taufiqurrochman, Raden. 2025. "Linking Environmental Education and Arabic Language Teaching: Curriculum Analysis of Madrasa and Pesantren in Indonesia." *Studia Ecologiae et Bioethicae* 23 (2): 73–85. <https://doi.org/10.21697/seb.5845>.
- Titi Sartini. 2025. "Kyai as Moral Authority: Negotiating Religious Discipline and Cultural Identity in Pesantren." *Managere: Indonesian Journal of Educational Management* 7 (1): 70–81. <https://doi.org/10.52627/managere.v7i1.756>.

- United Nations Environment Programme. 2025. "Values, Culture and Spirituality for Sustainable Lifestyles - A Roadmap for People and the Planet: Driving Values-Based Actions Across the Faith Actors Network." Nairobi, Kenya. <https://wedocs.unep.org/handle/20.500.11822/47876>.
- Wahyuningsih, Sri, and Muhammad Masyhuri. 2024. "Eco Green: Upaya Kiai Dalam Mewujudkan Karakter Santri Akan Peduli Terhadap Lingkungan Pondok Pesantren." *Nusantara: Indonesian Journal of Islamic Studies* 4 (2): 93–102. <https://doi.org/10.54471/nusantara.v4i2.63>.
- Wamsler, Christine, Gustav Osberg, Jeroen Janss, and Liane Stephan. 2024. "Revolutionising Sustainability Leadership and Education: Addressing the Human Dimension to Support Flourishing, Culture and System Transformation." *Climatic Change* 177 (1): 4. <https://doi.org/10.1007/s10584-023-03636-8>.
- WHO (World Health Organization). 2021. "Air Pollution." World Health Organization. 2021. https://www.who.int/health-topics/air-pollution#tab=tab_1.
- Widiastuti, Mega Ayu, and Rita Ernawati. 2024. "Promoting Eco-pesantren: Islamic Boarding Schools' Role in Sustainable Facility Development and Environmental Management." *Emara: Indonesian Journal of Architecture* 9 (1): 2024. <https://doi.org/10.29080/eija.v0i1.2100>.
- WMO (World Meteorological Organization). 2025. "State of the Global Climate 2024." World Meteorological Organization. 2025. <https://wmo.int/publication-series/state-of-global-climate/state-of-global-climate-2024>.
- Zuhdi, Ahmad, M. Agus Muhtadi Bilhaq, and Lusiana Rahmadani Putri. 2024. "Islamic Philosophy's Approach to Environmental Ethics: An Analysis of the Teachings of the Qur'an and Hadith." *Journal of Noesantara Islamic Studies* 1 (4): 198–213. <https://doi.org/10.70177/jnis.v1i4.1392>.