Nidhomiyyah: Jurnal Manajemen Pendidikan Islam
Volume 7 (2), 2026, 252-266
DOI: 10.38073/nidhomiyyah.v7i2.4402
https://ejournal.uiidalwa.ac.id/index.php/nidhomiyyah
p-ISSN: 2716-3210
e-ISSN: 2716-2591

Construct of Transdisciplinary Curriculum Management in Global Ecotheology-Oriented Islamic Boarding Schools (*Pesantren*)

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Received: 29 January 2026. Revised: 10 April 2026. Accepted: 18 June 2026. Published: 21 June 2026

ABSTRACT
The epistemological dichotomy between religious knowledge (turāth) and modern science remains a fundamental obstacle for Islamic educational institutions in responding to the global climate crisis (planetary crisis). *Pesantren* are often trapped in "green" symbolism without comprehensive scientific integration. This study aims to reconstruct a transdisciplinary curriculum management model in *pesantren* with a global ecotheological perspective as an integrative solution. Employing library research with a qualitative–philosophical approach, this study analyzes authoritative literature related to Basarab Nicolescu's theory of transdisciplinarity, Susan M. Drake's integrative curriculum management, and the concept of Islamic ecotheology. The findings indicate that the construction of transdisciplinary curriculum management is built upon ecotheology as a core value that dissolves disciplinary boundaries. From a managerial perspective, this model requires: (1) a shift in curriculum design from subject-based to issue-based learning; (2) restructuring of organizational management through cross-disciplinary team teaching; (3) implementation of learning based on a living laboratory approach; and (4) authentic evaluation based on ecological behavior (eco-behavior). The implication of this construction is the emergence of a "Green Khalifah" graduate profile, possessing global scientific competence alongside strong spiritual roots as guardians of environmental sustainability.

Keywords: Curriculum Management, Transdisciplinary, Ecotheology, *Pesantren*, Green Khalifah.

ABSTRAK
Dikotomi epistemologis antara ilmu agama (turats) dan sains modern masih menjadi hambatan fundamental bagi lembaga pendidikan Islam dalam merespons krisis iklim global (planetary crisis). Pesantren sering kali terjebak pada simbolisasi "hijau" tanpa integrasi keilmuan yang utuh. Penelitian ini bertujuan untuk merekonstruksi model manajemen kurikulum transdisipliner pada pesantren berwawasan ekoteologi global sebagai solusi integratif. Menggunakan metode penelitian kepustakaan (library research) dengan pendekatan kualitatif-filosofis, penelitian ini menganalisis literatur otoritatif terkait teori transdisiplinaritas Basarab Nicolescu, manajemen kurikulum integratif Susan M. Drake, dan konsep ekoteologi Islam. Hasil penelitian menunjukkan bahwa konstruksi manajemen kurikulum transdisipliner dibangun di atas fondasi ekoteologi sebagai core-value yang meleburkan batas disiplin ilmu. Secara manajerial, model ini menuntut: (1) Pergeseran desain kurikulum dari berbasis mata pelajaran (subject-based) menjadi berbasis isu nyata (issue-based), (2) Restrukturisasi pengorganisasian melalui kolaborasi pengajar (team teaching) lintas rumpun ilmu, (3) Pelaksanaan pembelajaran berbasis living laboratory, dan (4) Evaluasi autentik berbasis perilaku ekologis (eco-behavior). Implikasi dari konstruksi ini adalah lahirnya profil lulusan "Green Khalifah" yang memiliki kompetensi saintifik global sekaligus akar spiritual yang kokoh sebagai penjaga kelestarian bumi.

Kata Kunci: Manajemen Kurikulum, Transdisipliner, Ekoteologi, Pesantren, Green Khalifah.

INTRODUCTION

Pesantren, as the oldest *indigenous* educational institution in Indonesia, is now faced with a fundamental role transformation. No longer functioning merely as a center for the transmission of religious sciences (*tafaqquh fiddin*) and a guardian of traditional morality, *pesantren* are demanded to respond to global humanitarian crises, specifically the ecological crisis that threatens the sustainability of civilization. In global discourse, the issues of climate change and environmental degradation demand concrete theological and educational responses. The strategic position of *pesantren* as an *agent of social change* places it at the forefront of translating the values of *khalifah fil ardh* into real action for environmental preservation. Therefore, the modernization of *pesantren* is not enough with just the adoption of technology; it must touch upon ecological consciousness structured within the education system to produce a generation that possesses spiritual competence as well as global environmental insight (*global eco-literacy*).

However, a literature review indicates that the implementation of eco-*pesantren* is often still partial. Many *pesantren* are trapped in 'green' symbolism without systematic curriculum integration. Many *pesantren* label themselves as "Eco-*Pesantren*" or "Green *Pesantren*," yet their implementation is often stuck in ceremonial and partial activities, such as community cleaning or incidental tree planting, without touching the heart of education itself, namely the curriculum. A sharp dichotomy is still found between the *diniyah* curriculum (yellow books/kitab kuning) which is laden with theological values, and the modern science curriculum which discusses the environment. Consequently, students' (*santri*) understanding of ecology is not built epistemologically; they understand "cleanliness is part of faith" merely as a ritual dogma, not as a foundation for global environmental management ethics. This managerial unpreparedness in blending the curriculum causes ecological programs to be *unsustainable* and fails to form santri characters that have complete ecological resilience.

To deconstruct this educational dualism, a paradigm shift is needed from conventional curriculum management towards Transdisciplinary Curriculum Management. Unlike the interdisciplinary approach which only aligns disciplines, the transdisciplinary approach as postulated by Basarab Nicolescu (2002) works *beyond disciplines* to achieve a *unity of knowledge* between the subject (human) and the object (nature).[1] At the managerial operational level, this design adopts the "Transdisciplinary Integration" model from Susan M. Drake and Rebecca C. Burns (2004), where curriculum organization is no longer based on separate subjects but is centered on a *real-world context*.[2] In this framework, Global Ecotheology functions as the *core theme* that dissolves the boundaries between sacred texts (*turats*) and modern science (*saintek*). Curriculum management here plays a strategic role in engineering a learning ecosystem where santri do not merely study the environment as an object of science, but internalize nature conservation as a theological mandate through a holistic scientific synthesis.

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[1] Basarab Nicolescu, *Manifesto of Transdisciplinarity* (Albany: State University of New York (SUNY) Press, 2002), 44, https://sunypress.edu/Books/M/Manifesto-of-Transdisciplinarity.

[2] Susan M Drake and Rebecca C Burns, *Meeting Standards Through Integrated Curriculum* (Alexandria: Association for Supervision and Curriculum Development (ASCD), 2004), 14, https://books.google.com/books/about/Meeting_Standards_Through_Integrated_Cur.html.

Studies regarding environmental education in *pesantren* have actually been conducted by many previous researchers with various perspectives. A study by Maduningtias (2022) in the journal *Al-Afkar*, for example, discussed the management of *pesantren* and national curriculum integration comprehensively to improve graduate quality, but its focus remained general and had not touched upon the specification of integrating ecological values as a *core value*.[3] More specific research was conducted by Hermawansyah (2025) in *Fitrah: Jurnal Studi Pendidikan*, which explored Islamic education management based on *Eco-Pesantren*.[4] Although this research discussed the institutional strategic approach, the emphasis was on holistic implementation challenges, not on the technical design of the integrative curriculum.

On the other hand, research by Sabtina and Mahariah (2025) in *Halaqa: Islamic Education Journal* highlighted the internalization of ecotheology through *school culture* to form *eco-character*.[5] Similarly, Rifa'i and Yusuf (2025)[6] in the journal *Lisyabab* also discussed the mainstreaming of ecotheology in *pesantren*, but both studies explored aspects of character building and santri habituation more than an integrated academic curriculum management system.[6] The majority of these studies tend to look at practical implementation aspects (downstream) or institutional management broadly, and there are still few that dissect the aspects of curriculum planning and organizing (upstream) which specifically make global ecotheology the paradigm of knowledge integration.

Based on this literature mapping, a crucial epistemological and managerial *research gap* is identified. Most previous studies are still fixated on additive curriculum integration models (adding material) or moderate interdisciplinary models, and have not touched the level of Transdisciplinary Curriculum Management fully. No managerial formulation has been found that systematically dissolves the dichotomous boundaries between science and religion by making global ecotheology issues the *core organizing center* of the curriculum. Therefore, this study offers *novelty* in the form of a construction of a transdisciplinary curriculum management model in *pesantren*, shifting the paradigm from merely "teaching religion and environment side-by-side" to "managing a unity of knowledge" to respond to the planetary crisis.

This study has high urgency considering the increasingly central role of *pesantren* in global discourse. Without improvements in the curriculum management aspect, the "Islam Rahmatan Lil Alamin" agenda in the context of nature conservation will only be jargon without transformative impact. Academically, this research is expected to enrich the treasury of Islamic education management, especially in developing curriculum models based on contemporary issues. Thus, based on this background, this study aims to reconstruct and formulate an ideal transdisciplinary curriculum management model to be applied in global

[3] Lucia Maduningtias, "Manajemen Integrasi Kurikulum *Pesantren* Dan Nasional Untuk Meningkatkan Mutu Lulusan *Pesantren*," *Al-Afkar, Journal for Islamic Studies* 5, no. 4 (2022): 328, https://doi.org/10.31943/afkarjournal.v5i4.323-331.

[4] Hermawansyah, "Eco-*Pesantren*-Based Islamic Education Management," *Fitrah: Jurnal Studi Pendidikan* 16, no. 1 (2025): 108, https://doi.org/10.47625/fitrah.v16i1.982.

[5] Desi Sabtina and Mahariah, "Internalizing Islamic Ecotheology through School Culture to Foster Eco-Character," *Halaqa: Islamic Education Journal* 9, no. 2 (2025): 30, https://doi.org/10.21070/halaqa.v9i2.1754.

[6] Bakhtiar Rifa'i and Muhammad Yusuf, "Pengarusutamaan Ekoteologi Di PP. Langitan Tuban Menuju *Pesantren* Peduli Lingkungan," *Lisyabab: Jurnal Studi Islam Dan Sosial* 6, no. 1 (2025): 265, https://doi.org/10.58326/jurnallisyabab.v6i1.339.

ecotheology-oriented *pesantren*, to produce graduates who possess spiritual intelligence and capable ecological competence.

METHOD

This study employs a library research method with a qualitative-philosophical approach to explore and construct a transdisciplinary curriculum management model in ecotheology-oriented *pesantren*. This approach was chosen because the research aims to deeply analyze and synthesize theoretical concepts, philosophical foundations, and management principles related to the fusion of religious and scientific disciplines without relying on empirical field data.

Data sources consist entirely of secondary data collected through a comprehensive literature review. The primary references analyzed include authoritative literature related to Basarab Nicolescu's theory of transdisciplinarity, Susan M. Drake's integrative curriculum management, and theoretical texts on Islamic ecotheology. Data collection techniques involved documentation studies of books, peer-reviewed journal articles, and theoretical frameworks relevant to the research focus.

Data analysis was performed using qualitative content analysis and philosophical synthesis, adopting the logic of the interactive model which includes data condensation, data display, and conclusion drawing. In the condensation stage, researchers sorted and synthesized management concepts specifically related to transdisciplinary patterns and discarded irrelevant paradigms. Data validity was ensured through theoretical triangulation—cross-referencing various authoritative texts and perspectives to guarantee that the constructed curriculum management model is academically credible, robust, and objectively aligned with the philosophical spirit of eco-*pesantren*.

RESULTS AND DISCUSSION

Epistemological Foundation: Ecotheology as Transdisciplinary "Core-Value"

Based on the synthesis of the literature, the construction of curriculum management in ecotheology-oriented *pesantren* cannot be built upon a fragile epistemological foundation. The crucial initial step proposed in this conceptual model is to deconstruct the scientific dichotomy and instill ecotheology as a *core-value* that binds all disciplines. Referring to the typology of science and religion relations mapped by Ian G. Barbour, literature suggests that *pesantren* must move from an "independence" pattern towards a solid "integration" pattern.[7] In this pattern, the curriculum is designed so that science material substantively supports the truth of revelation. This is reinforced by Rahmawati[9], who emphasizes that the development of teaching materials in madrasas/*pesantren* must explicitly link scientific concepts with spiritual values to prevent the secularization of knowledge.[8] Furthermore, Agus Purwanto, in the concept of "Reason of Universal Verses" (*Nalar Ayat-Ayat Semesta*) asserts that the

[7] Ian G Barbour, *When Science Meets Religion: Enemies, Strangers, or Partners?* (San Francisco: HarperOne, 2000), 34, https://books.google.com/books/about/When_Science_Meets_Religion.html.
[8] Ika Rahmawati, "The Integration of Science and Religion in Material Development of Islamic Education," *Jurnal Pendidikan Islam* 8, no. 2 (2022): 210, https://doi.org/10.14421/jpi.2022.82.201-216.

universe is an open book that must be read with strict scientific methodology as a form of devotion to God.[9]

1. Deconstructing Dualism: Restitching the Yellow Book and Science

The biggest obstacle in contemporary Islamic education, according to M. Amin Abdullah (2006)[11], is the "epistemological crisis" that diametrically separates *religious sciences* and *modern sciences.*[10] In *pesantren*, this often manifests in the separation of the *diniyah* curriculum (based on yellow books/turats) from the formal curriculum (science/biology/chemistry). This separation creates a perception that the yellow book only deals with "ritual piety" while science deals with "worldly life".

In the context of the global ecological crisis, this dualism is dangerous. The science curriculum teaches about ozone depletion technically but lacks an ethical footing; while the fiqh curriculum teaches purity (*thaharah*), but stutters in responding to the issue of microplastics in water. Therefore, transdisciplinary curriculum management must deconstruct this boundary. The curriculum no longer views Biology as a secular entity, but as a tool to read *sunnatullah* (God's laws in nature). As emphasized in a recent study by Fawaid (2023)[12], this integration requires a paradigm shift from *isolation* (standing alone) towards *entanglement* (interconnectedness), where the text of revelation and the text of nature are read in one academic breath.[11]

2. Nicolescu's Transdisciplinary Logic: Unity of *Ayat Qauliyah* and *Kauniyah*

To go beyond mere *patchwork* integration, this study adopts the logic of transdisciplinarity by Basarab Nicolescu (2002). Nicolescu asserts that transdisciplinarity concerns what is *between* disciplines, *across* disciplines, and *beyond* all disciplines, to achieve a *Unity of Knowledge*[12] William C. Chittick calls this unity a harmony between the "Science of the Cosmos" and the "Science of the Soul," where understanding the outer world (*macrocosm*) cannot be separated from understanding the inner world (*microcosm*).[13]

In this perspective, reality is not singular. The universe (*Ayat Kauniyah*) and the Qur'an (*Ayat Qauliyah*) are viewed as two faces of *The One Reality*. *Pesantren* curriculum management must translate this philosophy into learning praxis: when santri study photosynthesis in biology, they are essentially studying the manifestation of the attributes of *Al-Musawwir* (The Fashioner) and *Al-Razzaq* (The Provider). Thus, modern science is validated as having an ontological status equal to religious science. Research by Huda and Sabani (2024)[15] reinforces this by stating that in reconstructed Islamic epistemology, preserving the environment through science is a form of *ghairu mahdhah* worship equal in value to ritual worship,[14] because both are efforts to draw closer to the Creator.

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[9] Agus Purwanto, *Nalar Ayat-Ayat Semesta: Menjadikan Al-Qur'an Sebagai Basis Konstruksi Ilmu Pengetahuan* (Bandung: Mizan, 2015), 55, https://mizanpublishing.com/buku/nalar-ayat-ayat-semesta.

[10] M Amin Abdullah, *Islamic Studies Di Perguruan Tinggi: Pendekatan Integratif-Interkonektif* (Yogyakarta: Pustaka Pelajar, 2006), 88, https://books.google.co.id/books?id=IslamicStudies.

[11] Achmad Fawaid, "*Pesantren* and the Preservation of Nature: Epistemological Construction of Eco-*Pesantren*," *Jurnal Pendidikan Islam* 12, no. 2 (2023): 195, https://doi.org/10.14421/jpi.2023.122.189-205.

[12] Nicolescu, *Manifesto of Transdisciplinarity*, 52.

[13] William C Chittick, *Science of the Cosmos, Science of the Soul: The Pertinence of Islamic Cosmology in the Modern World* (Oxford: Oneworld Publications, 2007), 89, https://oneworld-publications.com/work/science-of-the-cosmos-science-of-the-soul/.

[14] Miftahul Huda and Nurdin Sabani, "Reconstructing Islamic Epistemology in the Age of Environmental

3. Ecotheology as "The Glue" and Curriculum Axis

So that the fusion between *turats* and science does not lose direction, a *core-value* is needed that functions as a binding axis, namely Ecotheology (Environmental Theology/Global Environmental Fiqh). Oztekin defines Islamic ecotheology as a perspective that places nature protection as a logical consequence of *tauhid* (monotheism).[15] Ecotheology is not just additional material or an insert in moral lessons, but the main "lens" in reading the entire curriculum.

In this management model, Ecotheology functions as *The Included Middle* (quoting Nicolescu's term) that bridges the rationality of science and the dogmatism of religion. Environmental issues become the *real-world context* of learning. For example, lessons on Fiqh Muamalah (Islamic Economic Law) and Economics (Market Mechanisms) are united by the value of Ecotheology: that economic transactions are morally invalid if they destroy ecosystem balance. Seyyed Hossein Nasr (1996) calls this a return to the human role as *Khalifah fil Ardh* (God's vicegerent on earth) who has a mandate to maintain the sacred balance of nature.[16] By making ecotheology a *core-value*, *pesantren* curriculum management produces graduates who possess global scientific competence while firmly holding prophetic ethics in their interactions with nature.

Curriculum Design: Shifting from *Subject-Based* to *Issue-Based*

After the epistemological foundation of ecotheology is built, the next managerial step is to reconstruct the curriculum design structure. Sue L. T. McGregor asserts that transdisciplinary curricula must be designed to solve complex problems that cannot be solved by a single discipline alone.[17] Transdisciplinary curriculum management demands a paradigm shift in material organization from being originally *Subject-Based* to *Issue-Based*.

1. Adaptation of Susan M. Drake's Transdisciplinary Model

In conventional *pesantren* curriculum models, teaching materials are often arranged linearly following the sequence of chapters in textbooks or books (*textbook-driven*). Santri study the Chapter on *Thaharah* (purification) in Fiqh in the first hour, then study the Chapter on the Hydrological Cycle in Biology in the second hour, without any bridge connecting the two. Criticizing this fragmented approach, this study adopts the "Transdisciplinary Integration" model developed by Susan M. Drake and Rebecca C. Burns (2004). According to Drake, a curriculum relevant to 21st-century challenges (including the climate crisis) must be organized around essential questions or *real-world contexts*, not around rigid academic disciplines.[18] From a managerial perspective, this means dismantling lesson schedule partitions. The focus of learning is no longer "What

Crisis: An Ecotheological Perspective," *Indonesian Journal of Islam and Muslim Societies (IJIMS)* 14, no. 1 (2024): 67, https://doi.org/10.18326/ijims.v14i1.55-78.

[15] Oztekin, "Islamic Eco-Theology: From the Perspective of the Quran and Sunnah," *Journal of Academic Social Science Studies* 6, no. 1 (2013): 1250, https://doi.org/10.9761/JASSS_568.

[16] Seyyed Hossein Nasr, *Religion and the Order of Nature* (Oxford: Oxford University Press, 1996), 130, https://global.oup.com/academic/product/religion-and-the-order-of-nature-9780195108231.

[17] Sue L T McGregor, "Transdisciplinary Curriculum: Educational Philosophy and Rationale," *Journal of the American Association for Family and Consumer Sciences* 102, no. 2 (2015): 28, https://www.aafcs.org/resources/publications-products/journal.

[18] Drake and Burns, *Meeting Standards Through Integrated Curriculum*, 16.

is written in this chapter?", but "What problems is the earth facing, and what sciences do we need to solve them?".

2. Theme Construction: "Clean Water Crisis" as *Organizing Center*

In its implementation in ecotheology-oriented *pesantren*, the curriculum is arranged based on crucial environmental preservation themes. Technically, curriculum developers can use the "Webbed Model" initiated by Robin Fogarty, where one environmental theme is bound by various subjects.[19] As a concrete example, this construction takes the theme "Clean Water Scarcity" as the center of learning.

In this theme, disciplinary boundaries are dissolved simultaneously to solve the problem. Hakim and Mubarok provide a concrete example of this implementation through a nature-based curriculum, where santri learn directly from ecological phenomena around the *pesantren* as the main learning source.[20]

From the theological-normative perspective (*fiqh* and *turats*), santri do not merely memorize the requirements of two *qullah* water or the types of water used for purification. More broadly, they study *Fiqh al-Bi'ah* or Environmental Fiqh, which discusses the prohibition of *israf* or excessiveness in using ablution water, as well as the legal status of polluting river flows that serve as community water sources. At the same time, from the scientific perspective, particularly chemistry and biology, santri are invited to laboratories or rivers around the *pesantren* to test water quality using modern chemical and biological parameters, such as pH, turbidity levels, and the presence of *E. coli* bacteria. From the social-managerial perspective, santri also learn to map water consumption patterns in dormitories and design appropriate technological solutions, such as rainwater harvesting systems or water treatment, as part of managerial efforts to address water-related problems in the *pesantren* environment.

3. Learning Synthesis

This approach aligns with the findings of research by Prasetia and Ulfiani (2023) stating that project-based curriculum integration (*Project-Based Learning*) in Islamic educational environments is able to improve students' critical thinking skills and ecological awareness far more effectively than textual learning.[21] Thus, santri understand water not only as a ritual tool (fiqh) or H2O compound (chemistry), but as a vital resource that must be managed with divine accountability and scientific competence.

Curriculum Management Construction: Implementation of POAC Functions in Transdisciplinary Frame

Translating the philosophical concept of ecotheology and transdisciplinary curriculum design into educational praxis requires a solid managerial framework. This study

[19] Robin Fogarty, *The Mindful School: How to Integrate the Curricula* (Palatine: Skylight Publishing, 1991), 22, https://books.google.com/books/about/The_Mindful_School.html.

[20] Lukman Hakim and Fahrul Mubarok, "Implementasi Kurikulum Berbasis Alam Dalam Membentuk Karakter Peduli Lingkungan Di *Pesantren*," *Jurnal Pendidikan Agama Islam (Journal of Islamic Education Studies)* 11, no. 2 (2024): 118, https://doi.org/10.15642/jpai.2024.11.2.112-130.

[21] Aris Prasetia and Ulfiani, "Project-Based Learning Dalam Kurikulum Terpadu Di Madrasah: Upaya Membangun Keterampilan Abad 21," *Cendekia: Jurnal Kependidikan Dan Kemasyarakatan* 21, no. 1 (2023): 45–50, https://doi.org/10.21154/cendekia.v21i1.45-60.

adapts classical management functions (Planning, Organizing, Actuating, Controlling) reconstructed to accommodate the flexibility and complexity of cross-disciplinary learning.

1. Strategic Planning: Vision and Syllabus Reorientation

The planning stage begins with a fundamental shift in institutional vision. If traditional *pesantren* generally envision producing *faqih* (experts in Islamic law), then transdisciplinary curriculum management demands a vision reorientation to become a "Revelation-Based Earth Conservation Center". This global vision is then derived through a *Need Analysis* which is glocal (global-local). Nurochim Hidayat adds that future Islamic education planning must include climate change mitigation as mandatory material to build the resilience of the young generation.[22]

In syllabus preparation, curriculum managers do not only refer to national Core Competencies (KI/KD), but incorporate crucial issues. As found by Hermawansyah (2025), effective planning in *Eco-Pesantren* must be able to combine local issues (such as *pesantren* waste management) with global issues (climate change) into learning planning documents.[23] The Fiqh syllabus, for example, is redesigned by inserting the competency indicator "Able to analyze the impact of waste on water purity," which demands understanding of science as well as religious law.

2. Collaborative Organizing: Removing Teacher and Time Partitions

The biggest challenge of transdisciplinarity lies in the compartmentalized organizational structure. Therefore, the organizing stage is carried out through two main strategies. The first strategy is HR restructuring through *team teaching*, in which management must eliminate academic isolation among teachers. Science teachers, such as Biology and Chemistry teachers, and *ustadz* who teach the Yellow Book are organized into one teaching team to address a single theme collaboratively. They do not teach separately or alternately at different hours, but work together in the same space and time to present a more complete and integrated perspective. The second strategy is schedule flexibility through *block scheduling*. By adopting Heidi Hayes Jacobs' curriculum management theory, the fragmented 45-minute lesson schedule is transformed into a block system, for example, three to four lesson hours at once. This arrangement is crucial for facilitating project-based learning, which requires longer periods of engagement in the field and cannot be effectively implemented within conventional scheduling schemes.

3. Actuating Learning: *Living Laboratory* Method

At the implementation stage, theoretical synthesis suggests that the *pesantren* must be positioned as a Living Laboratory. Wijaya and Hidayat emphasize the importance of the Project-Based Learning (PjBL) method in this stage, where curriculum design necessitates santri to be actively involved in waste management or greening projects as part of effective lesson hours. Referring to the concept of contextual learning, the theoretical ideal is to transform the entire *pesantren* ecosystem—from dormitories, kitchens, to agricultural land—into a functional classroom. In its proposed practice,

[22] Nur Hidayat, "Faith-Based Environmental Education: Preparing the Next Generation for Climate Resilience," *Indonesian Journal of Islam and Muslim Societies (IJIMS)* 15, no. 1 (2025): 50, https://doi.org/10.18326/ijims.v15i1.45-68.

[23] Hermawansyah, "Eco-*Pesantren*-Based Islamic Education Management," 110.

santri activities managing organic waste into fertilizer or designing simple solar panels should not be treated merely as extracurricular activities, but as an integral part of effective lesson hours.[24] Referring to the concept of contextual learning, the entire *pesantren* ecosystem—from dormitories, kitchens, to agricultural land—is a classroom.

In practice, santri activities managing organic waste into fertilizer or designing simple solar panels are not just extracurricular activities, but an integral part of effective lesson hours. This is where value internalization occurs: when santri plant trees, they are practicing Biology (photosynthesis) while performing *ghairu mahdhah* worship (oxygen charity). This unification confirms Lubis's (2025) finding that integrative learning management is able to eliminate dichotomous perceptions in santri's minds, [25] making science and religion one breath of devotion.

4. Authentic Evaluation (Controlling): Measuring *Eco-Literacy* and *Eco-Behavior*

The final function is controlling or evaluation. The weakness of conventional management is reliance on cognitive written tests which fail to capture character changes. Jon Mueller in the *Authentic Assessment Toolbox* suggests using portfolios and performance assessments to measure students' real abilities.[26] In this model, evaluation is shifted towards *Authentic Assessment*. Saputra and Marzuki prove that authentic assessment is very effective for measuring students' *eco-literacy* levels in Islamic religious education.[27]

Curriculum success indicators are not seen from how much santri memorize arguments on cleanliness, but on real *Eco-Behavior*. The assessment instrument uses participatory observation: Do santri dispose of trash in its place without being told?. Are santri frugal in using ablution water in accordance with sunnah and conservation principles? This behavior-based assessment aligns with Daniel Goleman's[30] concept of *Ecological Intelligence*, which in the context of Islamic education is interpreted as a concrete manifestation of piety.[28]

To clarify the flow of transdisciplinary curriculum management construction starting from the epistemological foundation to the POAC implementation, the conceptual framework of this model can be visualized as seen in Figure 1.

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[24] Candra Wijaya and Rahmat Hidayat, "Manajemen Pembelajaran Berbasis Proyek (PjBL) Dalam Mengembangkan Karakter Peduli Lingkungan," *Jurnal Pendidikan Islam Indonesia* 8, no. 2 (2024): 155, https://doi.org/10.23887/jpi.v8i2.150-165.

[25] Syahrul A Lubis, "Transdisciplinary Islamic Education Management: Bridging the Gap between Science and Religion," *AL-TANZIM: Jurnal Manajemen Pendidikan Islam* 9, no. 1 (2025): 18, https://doi.org/10.33650/al-tanzim.v9i1.12-25.

[26] Jon Mueller, "The Authentic Assessment Toolbox: Enhancing Student Learning through Online Assessment," *Journal of Online Learning and Teaching* 1, no. 1 (2005): 3, https://jolt.merlot.org/vol1no1/mueller.htm.

[27] Yudha Saputra and Marzuki, "Authentic Assessment in Islamic Religious Education: Fostering Eco-Literacy among Students," *International Journal of Evaluation and Research in Education (IJERE)* 12, no. 3 (2023): 1455, https://doi.org/10.11591/ijere.v12i3.25000.

[28] Daniel Goleman, *Ecological Intelligence: How Knowing the Hidden Impacts of What We Buy Can Change Everything* (New York: Broadway Books, 2009), 98, https://books.google.com/books/about/Ecological_Intelligence.html.

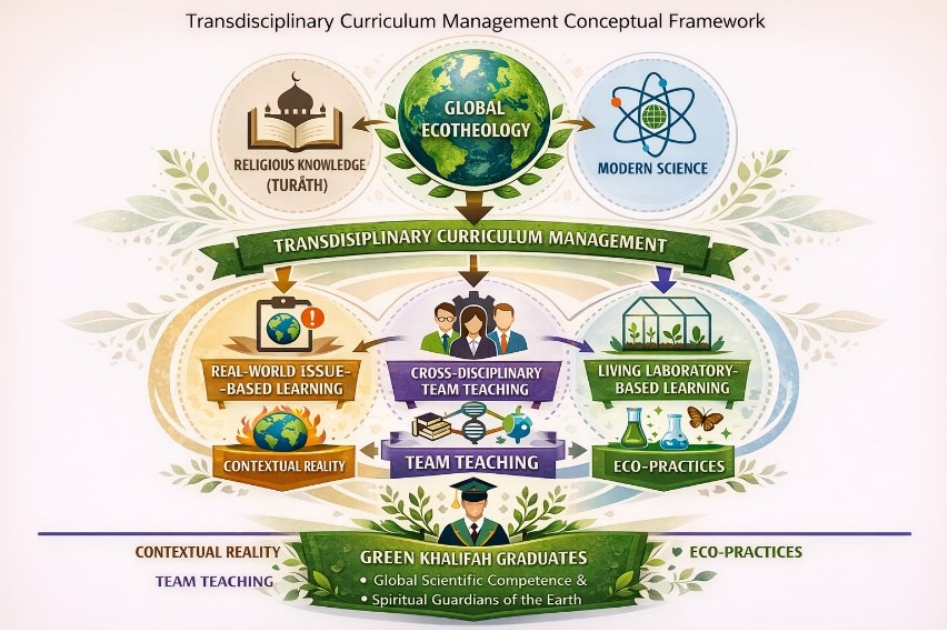

Figure 1. Conceptual Framework of Ecotheology Transdisciplinary Curriculum Management

Figure 2. Curriculum Management Reconstruction Flow

Graduate Profile: "Green Khalifah" Generation as a Response to Planetary Crisis

The final estuary of transdisciplinary curriculum management construction is not merely the completion of teaching materials, but the birth of a graduate profile that can be conceptualized as the "Green Khalifah" Generation. This profile is a synthesis of humans who possess global scientific competence as well as strong spiritual roots, filling the leadership void amidst the threat of the global climate crisis.

Table 1. Conceptual Framework of Curriculum Management Reconstruction Flow

Curriculum Management Aspect	Conventional Paradigm / Traditional *Pesantren*	New Construction (Ecotheology Transdisciplinary)
Epistemology	Dichotomous/Separated: Religious sciences (*turats*) and science walk separately without connection (*isolation*).	Integrative-Transdisciplinary: *Unity of Knowledge* with Ecotheology as a *core-value* that dissolves sacred texts and science (*entanglement*).
Curriculum Design	Subject-Based: Material arranged sequentially by textbook/kitab chapters. No bridge between Fikih and Biology.	Issue-Based (Real Issue-Based): Material organized around crucial themes (e.g., "Clean Water Crisis") that solve complex problems.
Planning	Vision to produce religious experts (*faqih*). Syllabus refers solely to national standards.	Vision "Revelation-Based Earth Conservation Center". Syllabus incorporates glocal (global-local) issues & climate mitigation.
Organizing	Teachers teach individually (*isolated*). Rigid/fragmented schedule per lesson hour (45 minutes).	Collaborative: *Team Teaching* (Science Teacher + Ustadz teach together). Flexible: *Block Scheduling* (3-4 hours) for deep projects.
Actuating	Classroom-based learning. Theoretical-textual nature.	"Living Laboratory": *Pesantren* (dormitory/kitchen/garden) is a living laboratory. *Project-Based Learning* (PjBL) method.
Controlling	Cognitive Tests: Measuring memorization of arguments or theories.	Authentic Assessment: Measuring *Eco-Behavior* and *Eco-Literacy* through portfolios and real observation.
Graduate Profile	Religious Expert / Santri who is ritually pious but passive towards environmental issues.	"Green Khalifah": Santri who possess global scientific competence alongside strong spiritual roots as guardians of the earth.

1. Competence Integration: Global and Spiritual

Graduates of ecotheology-oriented *pesantren* are formed to possess a positive dual or hybrid personality. On the one hand, they are equipped with scientific-global competence through modern environmental literacy. They understand contemporary ecological issues such as climate change, the Sustainable Development Goals (SDGs), energy conservation, and waste management mechanisms, all of which are developed through a strong science curriculum. On the other hand, their commitment to conservation is grounded in faith-based awareness. Environmental preservation is not driven merely by fear of disaster or secular reasoning, but by theological consciousness as *Khalifah fil Ardh*, or God's vicegerent on earth. Therefore, they view nature as an *amanah* or trust that must be protected through the principle of *hifdz al-bi'ah*, namely the

preservation of the environment. This synthesis produces what Fachruddin Mangunjaya (2023) calls "Faith-Based Conservationists.[29] These graduates differ from secular environmental activists because for them, picking up trash is a sufistic practice, and guarding the forest is ecological jihad.

2. Urgency in the *Anthropocene* Era

The presence of the *Green Khalifah* profile has high urgency in the *Anthropocene* era—an era where human activity becomes the main cause of earth's damage. Purely technical-political environmental approaches have proven slow in arresting the rate of global warming. This is where the strategic role of *pesantren* graduates lies. As future community leaders or religious figures in society, they have moral legitimacy to mobilize the *ummah*. As found by Mufid and Asnawi (2024), when a religious leader (Kyai/Ustadz) with ecotheological insight speaks about the environment, the level of community compliance is much higher compared to government appeals.[30] Therefore, transdisciplinary curriculum management in *pesantren* is essentially a long-term investment to mold "Actors of Change" capable of translating the language of the sky (revelation) into earthly action (conservation) for the sustainability of planetary life.

3. Limitations of the Study

Despite offering a comprehensive conceptual model, this study has several limitations that must be acknowledged. Because it is entirely based on library research and philosophical synthesis, the proposed transdisciplinary curriculum management construction is currently limited to the epistemological and managerial planning levels. This conceptual model has not been empirically tested in a real-world *pesantren* setting. Consequently, the study lacks quantitative data and direct observational evidence to measure the actual effectiveness of its implementation, the practical challenges during execution, or the definitive impact on the santri's tangible ecological behavior (eco-behavior). Therefore, future empirical studies, such as field trials or comprehensive case studies in pioneering Eco-*Pesantren*, are highly recommended to empirically validate this theoretical framework, measure its practical efficacy, and refine its operational details.

CONCLUSION

Based on the results of the literature search and analysis, this study concludes that the construction of transdisciplinary curriculum management in global ecotheology-oriented *pesantren* is a strategic solution to end the epistemological dualism between religious sciences (*turats*) and modern science. The model offered demands a curriculum paradigm shift from originally separate subject-based to real issue-based, where Ecotheology is placed as a *core-value* or "binding axis" that unites the reading of sacred texts (*ayat qauliyah*) and natural phenomena (*ayat kauniyah*). In this construction, the environmental crisis is no longer viewed merely as a technical problem, but a theological problem demanding an integrative response.

[29] Fachruddin M Mangunjaya, *Konservasi Alam Dalam Islam* (Jakarta: Yayasan Pustaka Obor Indonesia, 2019), 76, https://books.google.co.id/books?id=KonservasiAlam.

[30] Abdul Mufid and Asnawi, "The Role of Kyai in Environmental Conservation: Integrating Islamic Values and Local Wisdom," *Journal of Indonesian Islam* 18, no. 1 (2024): 95, https://doi.org/10.15642/JIIS.2024.18.1.88-105.

Managerially, the implementation of this curriculum reconstructs POAC management functions fundamentally. At the planning stage, the *pesantren* vision is reoriented to become a revelation-based conservation center with a syllabus incorporating global climate change issues. At the organizing stage, academic partitions are demolished through *team teaching* strategies between science teachers and yellow book ustadz, as well as the application of flexible block schedules. At the implementation stage, the *pesantren* transforms into a living laboratory (*living laboratory*) where conservation activity is integrated as worship. Finally, the evaluation function shifts from cognitive tests to authentic assessments measuring santri's ecological behavior (*eco-behavior*).

The theoretical implication of this construction is the birth of the "Green Khalifah" graduate profile, a figure possessing global scientific competence alongside strong spiritual roots as a guardian of the earth. This study recommends that this conceptual model be empirically tested in *pesantren* that are pioneering *Eco-Pesantren* programs to measure its effectiveness in forming santri characters resilient to *Anthropocene* era challenges.

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