Open Access Journal
JOURNAL OF COMMUNITY SERVICE

Cultivating Sacred Earth Islamic Ecotheology Through Environmental Greening Among Santri at MA As'adiyah Mattirowalie, Bone Regency

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ARTICLE INFO

Received September 13, 2025
Revised October 23, 2025
Accepted November 12, 2025
Published November 20, 2025

ABSTRACT

This community service initiative explores environmental greening as practical ecotheology among 156 santri (Islamic boarding school students) at MA As'adiyah Mattirowalie in Tellussiattingnge District,

Keywords:
ecotheology, Islamic environmental ethics, environmental education, reforestation, khalifah stewardship, religious boarding schools

Bone Regency, South Sulawesi. The program integrated Islamic environmental ethics with hands-on reforestation activities, establishing theological foundations for ecological stewardship rooted in Qur'anic teachings and prophetic traditions. Over twelve months, participants planted 3,847 native trees, developed organic gardens, and implemented waste management systems while engaging in structured religious studies connecting environmental action with spiritual obligations. Results demonstrated significant transformations in environmental consciousness, with 89 percent of participants developing robust ecotheological frameworks viewing environmental protection as religious duty. The initiative strengthened connections between Islamic education and environmental sustainability, producing measurable ecological improvements while deepening students' spiritual understanding of human responsibility as khalifah (stewards) of Allah's creation. This model demonstrates how faith-based approaches can mobilize youth environmental action in Islamic educational contexts.

INTRODUCTION

Environmental degradation represents one of contemporary humanity's most pressing challenges, with deforestation, pollution, biodiversity loss, and climate change threatening planetary ecological systems and human wellbeing. Indonesia faces particularly acute environmental pressures, experiencing among the world's highest deforestation rates while confronting intensifying climate impacts including flooding, landslides, and agricultural disruption affecting millions of citizens (Muhsyanur, Satriani, Ekawati Hamzah, Indo Santalia, Syamsul Bahri, Umrati, Mansur, Nurdin, 2025) and (Muhsyanur, 2024). South Sulawesi Province exemplifies these challenges, with rapid agricultural expansion, mining activities, and urbanization driving forest loss and environmental deterioration across the region. According to the Indonesian Ministry of Environment and Forestry (2021), South Sulawesi lost approximately 47,000 hectares of forest cover between 2015 and 2020, with significant ecological and social consequences including watershed degradation, declining agricultural productivity, and increased disaster vulnerability. Bone Regency, a primarily agricultural district in South Sulawesi's eastern region, has witnessed substantial environmental changes as expanding rice cultivation, fish pond development, and settlement growth have transformed landscapes and strained natural resources.

Religious institutions possess significant potential for environmental mobilization, particularly in contexts where faith deeply influences worldviews and behaviors. Islamic educational institutions, including the extensive pesantren (Islamic boarding school) system educating millions of Indonesian students, represent largely untapped resources for environmental advocacy and action. White (2017) argues that environmental crises require not merely technological or policy solutions but fundamental transformations in human relationships with nature, suggesting that religious traditions offering alternative environmental ethics could

contribute substantially to sustainability transitions. Islam contains rich theological resources for environmental stewardship, including Qur'anic verses emphasizing divine creation's sacred character, prophetic traditions promoting resource conservation, and ethical principles mandating human responsibility as khalifah (vicegerents or stewards) of Allah's earth. However, these theological resources remain insufficiently mobilized in many Muslim contexts, with environmental issues often treated as separate from religious concerns rather than integral spiritual obligations.

The concept of ecotheology provides valuable frameworks for integrating environmental concern with religious belief and practice. Ecotheology examines theological understandings of humanity's relationship with creation, developing religious foundations for environmental ethics and action. Islamic ecotheology specifically draws upon textual sources including the Qur'an and Hadith, legal traditions such as fiqh al-bi'ah (Islamic environmental jurisprudence), and historical practices demonstrating environmental consciousness in Islamic civilization. According to Foltz (2003), Islamic teachings present nature as divine signs (ayat) manifesting Allah's attributes and wisdom, suggesting that environmental destruction represents not merely practical problems but spiritual transgressions against divine creation. The Qur'anic concept of mizan (balance) emphasizes that Allah created the universe in perfect equilibrium, implying that humans must avoid disrupting natural balances through excessive exploitation. Similarly, the prohibition against israf (wastefulness and excess) and the promotion of ihsan (excellence and doing good) provide ethical principles directly applicable to environmental behavior.

Youth environmental education represents crucial investment in long-term sustainability, as young people will face intensifying environmental challenges while possessing capacity to drive transformative change. Islamic boarding schools provide particularly promising contexts for youth environmental engagement, combining intensive religious education with residential community structures enabling sustained programs. Santri (boarding school students) typically spend years immersed in Islamic learning environments emphasizing character development, community service, and ethical formation alongside academic study. Nasr (2003) emphasizes that Islamic education traditionally integrated spiritual and material dimensions, teaching students to recognize sacred character permeating creation and cultivating attitudes of respect, gratitude, and responsibility toward the natural world. Contemporary pesantren education could recover these dimensions while addressing modern environmental challenges, preparing students to become both religious leaders and environmental advocates in their communities.

MA As'adiyah Mattirowalie represents one of numerous Islamic secondary schools operating within Indonesia's extensive Islamic education system. Located in Tellussiattingnge District in Bone Regency's rural areas, the madrasah serves students from surrounding agricultural communities where environmental changes directly impact family livelihoods and wellbeing. The school's surrounding

landscape has experienced notable degradation, with declining tree cover, soil erosion, and waste accumulation creating both environmental and health concerns. School leadership recognized opportunities to address these environmental challenges while enriching students' Islamic education through practical application of religious environmental teachings. According to Khalid (2019), Islamic educational institutions worldwide are increasingly recognizing responsibilities to incorporate environmental dimensions into curricula and institutional practices, both modeling environmental ethics and preparing students for environmental leadership. However, many such institutions lack resources, expertise, or models for effectively integrating environmental programming with religious education.

This community service initiative emerged from collaborative consultation between university environmental educators and MA As'adiyah Mattirowalie leadership seeking to develop comprehensive environmental programming grounded in Islamic theology and ethics. The project aimed to demonstrate how environmental greening activities could serve as practical ecotheology, enabling students to embody religious environmental principles through concrete action while producing tangible ecological improvements. Rather than treating environmental education as secular subject matter separate from religious formation, the program intentionally integrated environmental learning with Islamic studies, presenting environmental stewardship as fundamental religious obligation rooted in core Islamic teachings about Allah's creation, human khalifah responsibility, and ethical principles governing human conduct. This article documents the program's development, implementation, and outcomes, contributing models for faith-based environmental education in Islamic educational contexts while demonstrating young people's capacity for environmental leadership when provided appropriate motivation, knowledge, and opportunities.

METHOD

This community service project employed participatory action research methodology implemented over twelve months from August 2023 through July 2024 at MA As'adiyah Mattirowalie in Tellussiattingnge District, Bone Regency. The research design integrated Islamic ecotheological education with practical environmental action, creating cyclical processes where religious learning informed environmental activities while environmental experiences deepened theological understanding. According to Stringer (2014), action research in educational contexts enables practitioners to systematically improve teaching and learning while generating knowledge applicable beyond immediate settings, making it particularly appropriate for developing innovative educational approaches. Our methodology emphasized collaboration among university facilitators, madrasah teachers, and santri participants as co-researchers collectively designing and implementing environmental programs. Initial planning involved three months of consultation with madrasah leadership, teachers, and student representatives establishing

program priorities, theological frameworks, and implementation structures ensuring alignment with institutional educational goals and Islamic values.

The program engaged 156 santri participants including all students in grades 10-12 at MA As'adiyah Mattirowalie, with activities integrated into the regular school schedule through dedicated environmental education periods, Friday afternoon action programs, and weekend intensive activities. The ecotheological curriculum development involved madrasah religious teachers working with university Islamic studies scholars to develop comprehensive instructional units connecting environmental topics with Qur'anic teachings, Hadith, fiqh principles, and Islamic ethical frameworks. Curriculum units addressed topics including theological foundations for environmental stewardship, Islamic perspectives on natural resources and sustainability, prophetic environmental practices, and contemporary environmental challenges viewed through Islamic ethics. According to Ozdemir (2003), effective environmental education requires connecting scientific understanding with ethical frameworks motivating behavioral change, suggesting that religious environmental ethics could provide powerful motivational foundations. Religious instruction emphasized that environmental protection represents not optional good deed but fundamental religious obligation incumbent upon all Muslims as part of khalifah responsibilities and worship of Allah through caring for divine creation.

Practical environmental activities included multiple components designed to produce measurable ecological improvements while providing experiential learning opportunities. The reforestation program involved santri planting 3,847 native trees across 12 hectares including madrasah grounds, adjacent community lands, and degraded watershed areas identified through community consultation. Tree species selection prioritized native species including mahogany, teak, and local fruit trees providing multiple benefits including erosion control, habitat provision, and eventual economic value. Organic garden development transformed unused madrasah land into productive gardens supplying vegetables for school meals while demonstrating sustainable agricultural practices. Waste management initiatives established recycling systems, composting programs, and plastic reduction campaigns addressing significant waste problems affecting school and surrounding community. Water conservation activities included rainwater harvesting system installation and water-efficient practices reducing consumption. Each practical activity incorporated structured reflection connecting experiences with religious teachings, with students journaling about theological significance of their environmental work.

Data collection employed mixed methods documenting both program implementation processes and participant outcomes. Pre- and post-intervention surveys assessed participants' environmental knowledge, attitudes, and behaviors using standardized environmental literacy instruments adapted for Islamic educational contexts. Ecotheological understanding was assessed through written reflections, oral presentations, and discussions examining students' abilities to

articulate Islamic environmental principles and connect religious teachings with environmental issues. Environmental monitoring documented ecological changes including tree survival rates, garden productivity, waste reduction, and water conservation achievements. According to Bamberg and Möser (2007), effective environmental education evaluation requires measuring not merely knowledge acquisition but behavioral changes and psychological factors predicting sustained environmental action. Our assessment therefore examined multiple dimensions including knowledge, attitudes, values, self-efficacy, and behavioral intentions alongside documented behavioral changes. Qualitative data collection through focus groups, interviews, and participant observation explored participants' experiences, perceived program impacts, and meaning-making processes connecting environmental action with religious identity and practice.

Islamic pedagogical approaches guided instructional design, emphasizing experiential learning, community engagement, and character formation alongside knowledge transmission. The program utilized traditional Islamic teaching methods including halaqah (learning circles) for theological discussion, amaliyah (practical application) emphasizing learning through action, and uswah hasanah (modeling) with teachers participating in environmental activities alongside students. Nasr (2003) emphasizes that Islamic education traditionally integrated intellectual, spiritual, and practical dimensions, cultivating holistic human development rather than merely transmitting information. Our program recovered this holistic approach, treating environmental education as opportunity for comprehensive formation developing students' religious knowledge, ethical consciousness, practical skills, and sense of social responsibility. Community partnerships extended learning beyond school boundaries, with students collaborating with local farmers, community leaders, and environmental organizations, demonstrating how environmental stewardship serves broader social good while fulfilling Islamic principles of community solidarity and mutual support.

RESULT AND DISCUSSION

The ecotheological environmental greening program produced substantial outcomes across educational, environmental, and community domains, demonstrating significant potential for Islamic educational institutions to contribute to environmental sustainability while enriching religious education. Participant engagement remained consistently high throughout the twelve-month program, with 94 percent attendance at scheduled environmental activities and enthusiastic student-initiated extensions of program activities. The integration of ecotheological frameworks with practical environmental action proved highly effective for motivating sustained participation and behavioral change, with students frequently expressing that religious understanding of environmental responsibility provided deeper motivation than secular environmental arguments. The program generated measurable ecological improvements while transforming participants'

environmental consciousness and establishing sustainable structures for ongoing environmental programming within the madrasah.

Ecotheological Understanding and Religious Environmental Identity

Post-intervention assessments demonstrated dramatic improvements in participants' understanding of Islamic environmental teachings and ability to articulate ecotheological frameworks connecting faith and environmental stewardship. While pre-intervention surveys revealed that only 23 percent of participants could identify Qur'anic verses or Hadith related to environmental protection, post-intervention assessments showed 89 percent demonstrating robust knowledge of Islamic environmental teachings. Students accurately cited relevant Qur'anic verses including Surah Ar-Rum 30:41 discussing corruption on earth resulting from human actions, Surah Al-A'raf 7:56 prohibiting corruption after Allah has set creation in good order, and numerous verses describing natural phenomena as ayat (signs) of Allah's creative power and wisdom. Hadith knowledge similarly improved, with students citing prophetic traditions promoting tree planting, water conservation, animal welfare, and prohibition of environmental destruction even during warfare. According to Khalid (2002), recovering and applying Islam's rich environmental heritage could transform Muslim environmental engagement, providing religious motivations and ethical frameworks for ecological responsibility.

The concept of khalifah (stewardship or vicegerency) emerged as particularly powerful framework for participants' environmental understanding and identity formation. Through curriculum units and reflective discussions, students developed sophisticated understanding of khalifah as divinely appointed human responsibility to care for and maintain Allah's creation in trust for future generations. Students contrasted khalifah stewardship with exploitative relationships treating nature as merely instrumental resource for human use without regard for ecological integrity or future sustainability. One student's written reflection articulated that "as khalifah, we are not owners of the earth but managers who will be held accountable to Allah for how we treat His creation." This stewardship consciousness transformed how students viewed environmental issues, seeing environmental degradation not merely as practical problem but as betrayal of sacred trust and failure of religious obligation. Focus group discussions revealed that khalifah identity provided students with sense of purpose and agency, viewing themselves as having divinely ordained responsibility to protect environment rather than being powerless in face of environmental problems.

Integration of environmental concern with Islamic identity and practice represented crucial outcome, with students increasingly viewing environmental action as integral to being good Muslims rather than optional add-on to religious life. Pre-intervention surveys showed that 67 percent of participants viewed environmental protection as important but separate from religious obligations, with only 18 percent considering environmental stewardship as form of worship (ibadah). Post-intervention assessments revealed dramatic shift, with 91 percent agreeing that

environmental protection constitutes religious duty and 76 percent viewing environmental action as form of worship demonstrating gratitude and submission to Allah. This integration manifested in students' religious practices, with environmental themes appearing in student-led religious discussions, environmental supplications incorporated into group prayers, and students frequently referencing environmental teachings when discussing Islamic ethics in various contexts. Several students reported that environmental engagement deepened their overall religious commitment, explaining that recognizing Allah's creative power through studying and protecting nature strengthened their faith and sense of divine presence.

The program also addressed potential tensions between development aspirations and environmental protection by presenting Islamic principles of balance (mizan) and moderation (wasatiyyah) as frameworks for sustainable development. Students explored how Islamic ethics prohibit both excessive consumption (israf) and complete rejection of legitimate material needs, instead advocating balanced approach meeting genuine human needs while avoiding wastefulness and environmental harm. Discussion sessions examined contemporary environmental challenges including deforestation, pollution, and climate change through Islamic ethical lens, with students analyzing how these problems reflect departure from Qur'anic principles and exploring Islamic responses. These discussions developed students' capacity for environmental ethical reasoning, enabling them to navigate complex environmental dilemmas by applying religious principles rather than simply following rules. According to Nasr (1996), developing such ethical reasoning capacity proves essential for preparing youth to address unprecedented environmental challenges requiring thoughtful application of religious values to novel situations.

Environmental Action and Ecological Outcomes

Practical environmental activities produced measurable ecological improvements demonstrating that student environmental action can generate substantive environmental benefits beyond educational value. The reforestation program achieved impressive results with 3,847 trees planted across 12 hectares and overall survival rate of 82 percent after twelve months, exceeding typical reforestation program survival rates of 60-70 percent. High survival rates reflected careful site preparation, appropriate species selection, and diligent maintenance by students who developed strong ownership of "their" trees. Table 1 presents detailed data on planting activities and outcomes across different locations. Students maintained detailed planting records including individual tree monitoring documenting growth rates and identifying maintenance needs, demonstrating scientific observation skills alongside environmental action. Several degraded watershed areas showed visible improvement with reduced erosion and increased ground cover, while madrasah grounds transformed from sparse grass to diverse vegetated landscape providing shade, aesthetic beauty, and habitat for birds and insects.

Table 1. Tree Planting Activities and Twelve-Month Outcomes by Location

Location	Area (hectares)	Trees Planted	Species Diversity	Survival Rate (%)	Average Height Growth (cm)	Student Participants
Madrasah grounds	2.5	687	12	89	94	156
Adjacent community land	3.8	1,124	8	84	87	124
Watershed Area 1	2.3	856	6	78	76	98
Watershed Area 2	3.4	1,180	7	79	81	112
Total	12.0	3,847	15	82	85	156

Note. Survival rate calculated as percentage of planted trees surviving at twelve months. Average height growth measured from planting date. Student participants indicates number of different students who participated in planting at each location, with most students working at multiple locations.

Organic garden development produced both food security and educational benefits, with three garden plots totaling 840 square meters yielding 1,247 kilograms of vegetables during the ten-month growing period. Garden produce supplemented school meals reducing food costs while providing fresh, pesticide-free vegetables improving meal nutritional quality. More importantly, gardens served as outdoor classrooms where students learned ecological principles through direct observation of plant growth, soil biology, pest dynamics, and nutrient cycling. Students experimented with companion planting, natural pest control methods, and composting techniques, developing practical agricultural knowledge alongside appreciation for natural processes. According to Williams and Dixon (2013), school gardens provide powerful educational contexts integrating multiple learning domains including science, environmental education, nutrition, and practical life skills while fostering environmental stewardship attitudes. The organic approach specifically reinforced Islamic principles of environmental care by avoiding chemical inputs harmful to soil health and broader ecosystems.

Waste management initiatives achieved significant reductions in waste generation and improved waste handling, with comprehensive waste audits showing 67 percent reduction in non-recyclable waste disposal compared to baseline

measurements. Students established functional recycling systems separating paper, plastic, metal, and glass for appropriate disposal or repurposing. Composting programs diverted organic waste including food scraps and garden waste from disposal, producing nutrient-rich compost used in gardens and tree planting. Plastic reduction campaigns emphasized reducing single-use plastic consumption through reusable water bottles, eliminating plastic straws, and preferring alternatives to plastic packaging. These initiatives addressed visible waste problems affecting madrasah and surrounding community while teaching systems thinking about resource consumption, waste generation, and environmental impacts. Students extended waste management education beyond school through community workshops teaching neighbors about waste separation and composting, demonstrating environmental leadership and community service.

Water conservation activities reduced madrasah water consumption by 34 percent compared to baseline usage while improving water availability during dry seasons. Rainwater harvesting systems capturing roof runoff provided supplemental water for gardens and tree irrigation, reducing groundwater dependence. Students installed water-efficient fixtures, repaired leaks, and promoted conservation behaviors including turning off taps, using water sparingly for ablutions (wudu), and reusing greywater for irrigation. These practical measures connected with Islamic teachings promoting water conservation, including prophetic Hadith describing the Prophet Muhammad's modest water use for ablutions and emphasizing that even abundant water should not be wasted. Focus group participants noted that learning about Islamic water ethics while implementing conservation practices made water conservation feel like religious practice rather than mere resource management, exemplifying program's success in integrating practical action with spiritual significance.

Community Impact and Sustainable Institutionalization

The program generated broader impacts extending beyond direct participants to influence families, surrounding communities, and the madrasah institution itself. Students reported serving as environmental advocates within their families, sharing knowledge about Islamic environmental teachings and encouraging household environmental improvements including tree planting, waste reduction, and water conservation. Several students initiated home environmental projects inspired by madrasah activities, with 43 percent of participants reporting that their families planted trees or started home gardens following student encouragement. Parents and community members expressed appreciation for students' environmental knowledge and action, with some noting that students' religious framing of environmental responsibility proved particularly persuasive. One parent explained that when his son explained tree planting as religious duty based on Hadith, "it made me think differently about environmental work—not as modern idea from outside but as part of being good Muslim."

Community environmental activities organized by students extended program benefits beyond madrasah boundaries while developing students' leadership capabilities and sense of civic responsibility. Students organized community tree-planting events engaging 237 community members, conducted environmental education workshops at local mosques reaching 156 adults, and established demonstration gardens at three community locations. These activities positioned students as knowledge holders and community educators, reversing typical age hierarchies where youth primarily receive instruction from elders. Community members responded positively to youth environmental leadership, particularly when students presented environmental action within Islamic frameworks resonating with community values. According to Zelezny (1999), youth environmental activism can catalyze broader social change by inspiring adult engagement and demonstrating that environmental action is possible and meaningful. The program's success in mobilizing student community engagement suggests significant potential for Islamic educational institutions to serve as hubs for broader environmental movements.

Picture 1. Greening Process by Santri

The madrasah institution demonstrated strong commitment to sustaining environmental programming beyond the initial project period, with administration incorporating environmental education into official curriculum and establishing permanent structures for ongoing environmental activities. Environmental topics were integrated into Islamic studies, biology, and social studies courses, while dedicated environmental education periods were added to weekly schedule. The madrasah established an environmental committee led by students with teacher advisors, responsible for maintaining gardens and trees, continuing waste management programs, and organizing environmental activities. Administrative support included budget allocation for environmental programs, staff training in environmental education, and facility improvements supporting environmental initiatives. This institutional commitment indicates successful transformation from external project to integrated institutional programming, suggesting long-term sustainability.

The program's success also inspired other pesantren in Bone Regency to develop similar environmental programs, with five neighboring Islamic schools sending delegations to observe MA As'adiyah's programs and requesting assistance developing their own initiatives. This diffusion effect amplified program impact beyond direct participants, potentially catalyzing broader movement toward environmental engagement among Islamic educational institutions in the region. The madrasah networks and religious education system infrastructure provide natural pathways for spreading environmental programming models, suggesting that successful demonstrations in pioneering institutions could accelerate broader adoption. Regional Islamic education authorities expressed interest in developing guidelines and support systems for pesantren environmental education, indicating potential for policy-level support enabling systematic integration of environmental education throughout Islamic education systems.

CONCLUSION

This community service initiative demonstrates that Islamic ecotheology provides powerful framework for motivating and sustaining youth environmental action, with MA As'adiyah Mattirowalie santri demonstrating remarkable environmental leadership when environmental stewardship is presented as fundamental religious obligation rooted in core Islamic teachings. The twelve-month program integrating ecotheological education with practical environmental activities produced substantial outcomes including deep transformation in participants' environmental consciousness and religious identity, measurable ecological improvements through reforestation and sustainable practices, and establishment of sustainable institutional structures ensuring continued environmental programming. Critical success factors included authentic integration of environmental concern with Islamic teachings rather than superficial religious messaging, practical action opportunities enabling students to embody religious principles through concrete environmental work, community partnerships extending program benefits beyond school boundaries, and strong institutional support ensuring program sustainability. The program establishes replicable model for environmental education in Islamic educational contexts, demonstrating that faith-based approaches can effectively mobilize youth environmental engagement while enriching religious education and deepening spiritual formation.

These findings challenge secular environmental education paradigms that often neglect or dismiss religious motivations, suggesting that engaging rather than bypassing religious frameworks may prove more effective in religious communities. However, successful replication requires careful attention to local contexts, authentic theological grounding rather than instrumental use of religion, and addressing structural barriers limiting environmental action including economic pressures, inadequate resources, and policy environments insufficiently supporting faith-based environmental initiatives. Future research should examine long-term impacts as program participants become adult environmental leaders in their communities,

investigate factors enabling successful scaling of faith-based environmental education across diverse Islamic educational contexts, and explore how Islamic environmental movements might contribute to broader sustainability transitions addressing Indonesia's pressing environmental challenges while strengthening connections between religious tradition and contemporary social needs.

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