


## **Green Transformation in Islamic Education Institutions: Eco-Pesantren Innovation in Shaping Santri's Environmental Care Character**

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### **Abstract:**

The Eco-Pesantren program comes as a strategy to create a clean, healthy, and environmentally friendly pesantren ecosystem. This study aims to analyze innovations in the implementation of the Eco-Pesantren program and its contribution to the formation of environmentally friendly santri characters at Pesantren Darunnajah Bogor. The research was conducted with a qualitative approach through a case study method. Data were collected through in-depth interviews, participatory observation, and documentation studies. The main informants include pesantren managers, educators, and students who are actively involved in environmental conservation activities. The data analysis technique refers to the Miles and Huberman model, which includes data reduction, data presentation, and verification and conclusion drawing. The results showed that the Eco-Pesantren program effectively fosters the character of students who care about the environment through various activities such as waste management, recycling practices, organic farming, ecoliteracy training, and pesantren garden management. The values of Islamic teachings, especially the concept of khalifah fil ardh (caretaker of the earth), strengthen the internalization of ecological awareness among santri. The positive impact of this program is reflected not only in the daily behavior of santri, but also in their increased contribution to the surrounding social environment.

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## **INTRODUCTION**

Although environmental education is regarded as a key strategy for addressing the 21st-century ecological crisis, a significant gap remains between theoretical ideals and social practices. Theoretically, environmental education is expected to cultivate students' critical awareness, values, and actions concerning environmental issues (Tilbury, 2011; Nisa, 2019). However, in practice, the approaches adopted by many educational institutions remain

predominantly cognitive and disconnected from real-world contexts, thus failing to foster active student engagement (Sulthoniyah, 2024; Xiao, 2019). Moreover, a gap of social fact is evident in the limited participation of young people in environmental solutions, despite their exposure to formal environmental education. Curricula that lack contextual relevance and real-life action integration render education ineffective in shaping the transformative agents it envisions. Therefore, a more holistic, contextual, and empowering approach to environmental education is urgently needed to respond to the complexity of contemporary ecological challenges.

Research related to environmental issues shows that these problems are increasingly complex due to population growth and exploitation of natural resources (Yamin et al., 2023). In the Islamic perspective, humans have the responsibility as caliphs to preserve the earth, as stated in Q.S. Al-A'raf: 56. Pesantren as an Islamic educational institution is considered to have strategic potential in shaping the ecological awareness of students through a value and spirituality approach. (Yamin et al, 2023; Husnan, 2019) stated that the internalization of religious values in pesantren education supports the formation of environmental care characters. The implementation of the Adiwiyata program as a concrete form of environmental education in schools has been adapted in the context of pesantren through the Eco-Pesantren model (Pudjiastuti et al., 2021; Wathoni, 2020). This concept integrates Islamic teachings with conservation practices such as waste management, reforestation, and sustainable agriculture (Khairunnisaa, 2016). (Furthermore, Khairani & Fauzi, 2023) introduced the terms ecotheology and ecospiritualism to explain the relationship between religious values and ecological responsibility in the context of sustainable Islamic education. In addition, previous research shows that the concept of Eco-Pesantren has begun to be widely applied in various Islamic educational institutions in Indonesia as an effort to build environmental awareness based on religious values. Zulia (Khoirun Nisa', 2021) research in Blitar Regency shows that the development of environmental curriculum in pesantren refers to the principles of Eco-Pesantren, with an integrative approach between Environmental Education materials and pesantren subjects. The aim is to increase students' ecological insights and form their active role in the surrounding environment (Nisa, 2019; Meanwhile, Maulida, Nursaniah, and Sari's, 2021) study at Dayah Terpadu Inshafuddin Banda Aceh showed that although the implementation of Eco-Pesantren principles is not yet optimal, the institution has started to develop environmentally friendly policies and encourage student participation in daily ecological practices, which has an impact on improving the quality of the Islamic-based environment (Maulida et al., 2021). In the Lombok region, (Nawawi et al., 2021; Samarakoon, 2020) found that the implementation of the Eco-Pesantren program in several Islamic boarding schools still faces challenges in terms of curriculum and facilities, although internal policies have begun to be directed to support environment-based education (Nawawi, 2024; Abdul Quddus', 2022) study on Nurul Haramain NW Lombok even emphasized the importance of the role of the pesantren leader as a central figure in internalizing ecological values from the Qur'an and Hadith into the practice of santri life (Quddus, 2020). Another research in Abdussalam Salafi Pesantren, Kubu Raya Regency, underlined the importance of external support from the government in the form of training and funding to strengthen the implementation of Eco-Pesantren systemically and sustainably (Gunawan & Alfarisi, 2023). Furthermore, (Bahri, 2022; Anam, 2019) in his study at Pondok Pesantren An-Nur HA Rambigundam Jember traced the history and implementation of the Eco-Pesantren concept as part of an institutional transformation aimed at creating a clean, healthy, and spiritual environment (Bahri, 2018).

Although these studies have explained various approaches and practices of implementing Eco-Pesantren, most of them still highlight the policy aspects, curriculum structure, or the role of pesantren leaders. Not many studies have specifically explored how the

Eco-Pesantren program is able to shape the character of environmental care concretely in the daily lives of students. The eco-pesantren program was initiated by the Ministry of Religious Affairs of the Republic of Indonesia and is one form of environmental education taught in pesantren. Saving nature may not be determined by the realization that calamities will come if nature is not addressed. However, as a form of devotion to a Muslim, Islam as a religion commands its adherents to do something beneficial (Junianto et al., 2025; (Saputra & Zulham, 2024). Adiwiyata education is a program initiated by the Ministry of Environment and Forestry of the Republic of Indonesia, present as one of the solutions in building awareness and active participation of the education community on environmental issues (Arifah et al., 2022). With the adiwiyata education implemented in educational institutions, it is expected to create schools that care and cultivate the environment through an educational and participatory approach. This innovation has been implemented in pesantren where students learn and live in this environment, becoming a strategic step in supporting the achievement of Sustainable Development or SDG's locally.

Pesantren Darunnajah Bogor is one of the Islamic educational institutions that has implemented this approach systematically. With its location near a mountainous area, this pesantren has great potential to develop a comprehensive and sustainable environment-based education model. Some of the initiatives include waste bank management, gardens, environmental training, and santri involvement in environment-based social activities. Therefore, this research seeks to fill the gap by exploring more deeply the practice of Islamic value-based environmental education at Pesantren Darunnajah Bogor, with a focus on transforming the character of the santri community through participatory approaches and religious values. Based on this background, the problem formulations in this study are: How is the Eco-Pesantren program innovation implemented in shaping the environmental care character of students at Pesantren Darunnajah Bogor? The purpose of this study is to explore the form of Eco-Pesantren program innovation implemented at Pesantren Darunnajah Bogor and analyze how the program contributes to the character building of students who care about the environment in a sustainable manner.

## RESEARCH METHODS

This research uses a qualitative approach with a bounded single case study design, which aims to deeply understand the implementation of the Eco-Pesantren program at Pesantren Darunnajah Bogor. This location was chosen purposively because it has been recognized as an Eco-Pesantren by the Bogor Regency Environmental Agency and actively integrates environmental education in the lives of santri. Informants were selected through purposive sampling, consisting of Adiwiyata coordinators, supervising teachers, santri, and alumni who are active in environmental programs, with the criteria of at least one year of experience and involvement in environmental training or projects. Data collection was conducted through semi-structured interviews, field observations, and analysis of documentation such as training modules, activity reports, and visual and digital archives of the pesantren. Data were analyzed using the Miles & Huberman interactive model, including data reduction, data presentation, and conclusion drawing through open coding. Data validity was maintained through triangulation of methods (interviews, observations, documentation) and triangulation of sources (teachers, students, alumni).

## RESULTS AND DISCUSSION

### Results

Pondok Pesantren Darunnajah Bogor is one of the real examples of a pesantren that has implemented an environmentally friendly system or commonly called Eco-pesantren. This

pesantren is located in an area surrounded by nature, close to the mountains, so that the pesantren has the responsibility to contribute in preserving the nature around it. This phenomenon is part of the solution to the rampant environmental problems that are of great concern. In this context, pesantren as an institution that not only focuses on teaching religion, but can integrate environmental care attitudes in the lives of students who will have an impact on society. At Pesantren Darun Najah, environmental education is not only delivered through theory, but also through concrete actions that involve students in various conservation and environmental maintenance activities. The students are taught to be part of the solution to environmental problems, both in the pesantren and in the surrounding community.

This study aims to explore how the Eco-Pesantren program innovation at Pesantren Darunnajah Bogor shapes the environmental awareness character of the students. Through interviews, field observations, and documentation studies, four main findings were obtained that are intertwined in the process of environmental education based on Islamic values, namely: (1) an educative and participatory waste management system, (2) structured practice-based environmental training, and (3) utilization of the pesantren garden as a medium for ecological learning. (4) active involvement of santri in environmental action green dakwah.

**Figure 1**



### **Waste Management Based On Education And Santri Involvement**

Waste management is one of the important aspects of the eco-pesantren concept implemented at Darun Najah Islamic Boarding School. The pesantren develops a waste management system that not only emphasizes the final result in the form of cleanliness, but also the educational process that involves the entire pesantren community. Santri are routinely accustomed to sorting waste into three categories: organic, non-organic, and B3. This process is not incidental, but part of the institution's policy and culture that is deeply embedded.

The observation results show that the pesantren has provided adequate waste sorting facilities in every strategic corner, including dormitories, public kitchens, and garden areas. Organic waste processing is carried out through a composting process and used as fertilizer for the pesantren garden. This process not only encourages ecological awareness among santri, but also gives them a deep understanding of the importance of managing waste responsibly. Organic waste, which consists of food scraps and other natural materials, is processed into compost. This fertilizer is then used for the pesantren garden, which is part of the pesantren's efforts to reduce reliance on chemicals in agriculture and promote environmentally-friendly farming practices.

Meanwhile, non-organic waste, especially plastic waste, is recycled into handicraft items, such as bags, wallets, and various other accessories. These recycled products are sold at affordable prices to visitors of the pesantren, thus creating a system that is not only ecologically sustainable, but also provides a positive economic impact for the pesantren and the community. By applying the principles of reduce, reuse, and recycle, the pesantren succeeds in reducing the waste generated while creating added value from waste that was originally considered as useless items. A teacher in charge of Eco-Pesantren, stated: "We not only require the students to be clean, but also teach them the process. Starting from sorting, processing, to recycling. Everything is done together". This activity has a direct impact on the formation of responsible behavior towards waste. Data from the pesantren's internal report shows a 30% decrease in the volume of residual waste during the one-year implementation of the program.

This approach is in line with the principles of the circular economy proposed by the (Ellen MacArthur Foundation, 2013), which states that an economic model that emphasizes waste reduction and reuse of obsolete goods can help reduce pressure on natural resources (Saputra & Zulham, 2024).

### **Practice-Based Environmental Education And Training**

Environmental education in this pesantren is carried out through a practice-based approach. Santri are involved in environmental trainings such as composting, organic soap from used cooking oil, and hydroponic farming. These activities are scheduled regularly and involve internal and external tutors from the Bogor Regency Environmental Agency. The aim of these activities is to provide santri with a deeper understanding of the importance of preserving nature as well as developing practical skills that can be applied in their lives.

The training covers a variety of topics, such as composting, making natural soap from organic ingredients, and processing crops into environmentally friendly products. Every month, the pesantren holds workshops and seminars that aim to provide knowledge and skills related to environmental management, such as composting, waste management, and making eco-friendly products, such as natural soaps and relaxation candles. The training is also designed to support santri's independence and foster environmentally-based life skills. Alumni of this pesantren said in an interview, "Every santri has participated in training to make environmentally friendly products. Some even make soap and sell it during the pesantren bazaar".

In this workshop, students learn not only from pesantren administrators, but also from outside parties, such as the environmental agency or environmental experts. They are directly involved in the practice of making environmentally friendly products by making mini projects as a form of practice. One of the leading activities in environmental education at Darun Najah is the practice of hydroponic farming. This hydroponic method allows students to grow plants using water as a growing medium, without the need for soil. This activity is often led by the group of nature-loving santri (SAPALA), which is a special group responsible for organizing various activities related to environmental conservation. This group is the driving force in activities such as environmental cleaning, tree planting, and hydroponic farming practices.

### **Islamic Boarding School Garden As An Ecological Education Tool**

The pesantren garden is an integral part of the Eco-Pesantren program. With an area of more than one hectare, this garden is used to grow various types of food and fruit crops. Santri are involved in the entire process from nursery, planting, maintenance, to harvesting. The principle of organic farming is strictly applied, with the use of compost fertilizer from the processing of internal pesantren waste. The program coordinator said: "This garden is not only a source of food, but also a learning space. Students learn about the life cycle of plants, the



importance of healthy soil, and how to plant without chemicals". Santri are not only invited to garden, but also taught to record production results, make reports, and distribute the harvest to the surrounding community in a series of pesantren social service activities.

Darun Najah Islamic Boarding School, located in a fertile area with abundant natural resources, has a large garden as an integral part of the sustainability practices implemented in the pesantren. This garden is not only a source of livelihood for the pesantren, but also reflects the pesantren's efforts to realize the principle of an environmentally friendly circular economy. The concept of "from pesantren for pesantren" is the basis for the management of this garden, which not only provides economic but also social and ecological benefits. The garden of Pesantren Darun Najah produces various agricultural products, such as mangosteen, longan, citrus, and timber plants. This diversity of agricultural products is not only useful to fulfill the daily consumption needs within the pesantren, but also supports the overall economy of the pesantren. With the principle of sustainability, the garden reduces the pesantren's dependence on external resources and ensures the availability of healthy and natural food for the santri and the surrounding community. Most of the garden produce is used to meet the internal needs of the pesantren, such as the daily consumption of students, the management of communal meal activities, as well as the manufacture of agricultural-based products that can be used in the pesantren's proselytization activities. These products, which are produced organically without the use of harmful chemicals, demonstrate the pesantren's commitment to sustainability principles that include aspects of health and well-being.

### **Active Involvement Of Students In Green Dakwah Environmental Action**

Pesantren Darun Najah also has a flagship program called Green Dakwah, which aims to spread environmental awareness to the surrounding community. In this program, students are trained to become agents of change who can inspire the surrounding community to participate in preserving the environment. This program involves students to spread awareness about the importance of preserving the environment to the community around the pesantren. The santri are trained to become agents of change who can influence their social environment, both inside and outside the pesantren. The active participation of santri is the hallmark of this program. They are involved in various environmental activities such as reforestation, river cleaning, making biopore holes, and energy saving campaigns. These activities not only increase the ecological awareness of the santri, but also foster leadership and collaboration between santri.

As part of the Green Dakwah program, the pesantren holds activities such as distributing tree seedlings to the community, planting trees in the area around the pesantren, and socializing the importance of waste management. These activities involve not only santri, but also the general public, thus creating a close collaboration between the pesantren and the surrounding environment in an effort to preserve nature. The distribution of tree seedlings is expected to increase public awareness of the importance of greening and nature conservation. By planting trees, people can experience direct benefits, such as fresher air, preventing erosion, and improving soil quality. In addition to the distribution of tree seedlings, students are also involved in river cleanup activities around the pesantren. This activity aims to improve environmental cleanliness while preventing river pollution that can damage the surrounding ecosystem. By participating in this activity, santri learn directly about ways to keep nature clean and apply the values of da'wah in everyday life.

## Discussion

Waste management based on education and santri involvement at Darun Najah Islamic Boarding School not only succeeded in creating a clean and healthy environment, but also formed a sustainable ecological culture in pesantren life. Waste sorting activities, compost processing, and waste recycling into handicrafts are carried out systematically and integrated into the daily activities of the students. This shows that the educational process is not only normative, but has become an inherent practice in the life of the pesantren community.

This result is in accordance with the theory of action-oriented environmental education, which emphasizes the importance of active involvement of students in real activities to foster awareness and environmentally friendly behavior (Tilbury, 1995). In this context, the students not only receive theoretical material about the importance of protecting the environment, but also experience firsthand the process of waste management, organic farming, and other sustainability practices. This kind of activity is proven to be effective in shaping ecological attitudes because it involves the cognitive, affective, and psychomotor aspects of students simultaneously.

Furthermore, the approach applied at Darun Najah is very much in line with the concept of circular economy as proposed by the (Ellen MacArthur Foundation, 2013), which emphasizes the importance of reducing waste through the principles of reduce, reuse, and recycle. Organic waste is processed into compost to fertilize the pesantren garden, while non-organic waste is utilized as handicraft materials that have economic value. Thus, the pesantren not only creates an environmentally friendly system, but also strengthens economic and social independence through waste utilization. In addition, the existence of the pesantren garden as a means of ecological education strengthens the practice-based learning process. Santri are directly involved in the organic farming cycle, from seedling to harvest, and are also trained to record results, make reports, and distribute the harvest to the community in pesantren social activities. This process not only strengthens practical skills, but also instills values of responsibility, leadership, and social care. This finding also supports the initial hypothesis which states that an educational approach in waste management that actively involves students can increase ecological awareness and shape sustainable behavior. This is evidenced by internal data showing a 30% decrease in residual waste volume within one year. This achievement is not only an indicator of the success of the waste management program, but also shows the transformation of values and behavior among santri.

Regular environmental training activities, both by internal tutors and external parties such as the Environmental Service, further strengthen practice-based learning. Students are not only trained to process waste, but are also invited to develop environmentally friendly products such as organic soap and natural candles that are sold at the Islamic boarding school bazaar. This activity gives them environmental-based entrepreneurial experience and demonstrates the integration of education, sustainability, and economic empowerment. The Green Dakwah program that involves students in environmental campaigns to the surrounding community shows that ecological education in this Islamic boarding school does not stop at the individual level, but has developed into a social movement that involves the wider community. This concept is in line with the idea of environmental citizenship (Dobson, 2007) which emphasizes the importance of citizen participation in maintaining environmental sustainability through real action and social advocacy.

Overall, the results of this study show that an educational approach integrated into the culture of Islamic boarding schools has great potential in building sustainable ecological awareness and behavior. This shows that religious educational institutions, such as Islamic boarding schools, can play a strategic role in supporting the environmental sustainability agenda, both through internal transformation and through external contributions to society.

However, these findings are still limited to one case study in one Islamic boarding school. The success of this model can be used as a basis for developing similar programs in other Islamic boarding schools, by adjusting to their respective local contexts. Further comparative and quantitative research is needed to strengthen the validity and expand the generalization of these findings in the context of Islamic education and environmental sustainability in Indonesia.

**Figure 2**

**Waste Management Cycle in Islamic Boarding School**



Although the implementation of the Eco-Pesantren program at Pesantren Darunnajah Bogor has shown much progress and innovation, this study also identified a number of challenges and weaknesses that need to be considered to improve the effectiveness and sustainability of the program. These challenges arise from both the institutional, human resource, and cultural aspects of the pesantren itself. Discussion of the obstacles is very important so that this study is not merely descriptive-positive, but can be used as a basis for improvement and replication in other institutions.

**1. Limited Funds and Supporting Facilities**

One of the most obvious challenges is limited funds in carrying out various environmental activities sustainably. Although Islamic boarding schools have a strong commitment to the Eco-Pesantren program, budget constraints hamper the procurement of supporting facilities such as modern compost processing equipment, water-saving irrigation systems, or technology-based environmental education media. Some creative activities such as organic soap production, hydroponics, or plastic recycling can only be implemented when there is additional support from external partners or special project activities. This condition shows that despite the enthusiasm and potential, environmental programs often face technical constraints that require continuous resource support. Without a special budget allocation, the sustainability of the program is highly dependent on individual initiatives and the involvement of external partners that cannot always be ensured at all times.

**2. Low Initial Awareness and Cultural Resistance**

Not all students and residents of Islamic boarding schools have the same environmental awareness at the initial stage. Some parties still view environmental activities as an additional burden rather than as part of character building. Especially for new students or those who have not received intensive coaching, there is a tendency not to be actively involved or to underestimate practices such as sorting waste, processing waste, or gardening. This condition reflects the importance of the internalization process of values that are sustainable and not merely programmatic. Environmental care character education cannot be built only through symbolic activities, but through consistent habits and contextual approaches according to the background of students (Rusdiana, 2014). This resistance can also appear in passive forms, such



as low participation or lack of initiative in environmental activities, which ultimately affects the effectiveness of the program.

### 3. Dependence on Certain Figures and Regeneration Problems

The next challenge is dependence on certain figures in running environmental programs. Some environmental activities or innovations run well as long as there are individuals who have high capacity and concern. However, when the individual graduates or moves on to another job, the activities in question often stagnate or even stop. This shows the weakness of the cadre system and program documentation which should be an important part of long-term sustainability. The regeneration problem arises mainly because there is no formal coaching system and tiered training that can ensure the continuity of knowledge and skills between generations. Some innovative environmental activities are not even well documented so that they are difficult for others to continue. This weakness in knowledge management is a serious challenge in building a sustainable program that does not depend on certain individuals.

The various challenges faced show that the success of the Eco-Pesantren program cannot be separated from the internal and external dynamics of the educational institution itself. Limited funds, cultural resistance, weak cadre formation, and minimal curriculum integration are common problems encountered in the process of institutional transformation. However, these challenges also open up space for institutional strengthening, policy innovation, and more strategic collaboration with external partners. Therefore, it is very important for Islamic boarding schools that develop similar models to not only focus on achieving program success, but also to build an adaptive, resilient, and evaluation-based system. Reflection on internal weaknesses is an important step in building a sustainable environmental education ecosystem that can be replicated by other Islamic educational institutions

## CONCLUSIONS

This study concludes that the Eco-Pesantren program in Darunnajah Bogor is an environmental education innovation based on Islamic values that has succeeded in instilling ecological awareness in the lives of students and the pesantren community. Through activities such as waste bank management, environmentally friendly product training, organic garden management, hydroponic farming practices, and environmental preaching through the Green Dakwah and Green Safari programs, the pesantren is able to foster sustainable behavior that is integrated into religious and social activities. These activities not only have an impact on reducing organic waste by 30% in a year, but also form an ecological and spiritual mindset that emphasizes the role of humans as caliphs in protecting the earth.

Theoretically, it shows that the success of Eco-Pesantren Darunnajah lies in the integration of Islamic values, active involvement of students, and contextualization of Islamic boarding school culture. Practically, this model is relevant to be replicated in various Islamic boarding schools, because it is able to unite environmental preservation with Islamic education traditions. However, challenges such as limited funds, adaptation of new students, and dependence on key figures still need attention in further development

The conclusion of this study suggests that the Eco-Pesantren model is worthy of being adopted as an environmentally-based character education approach by other educational institutions, with contextual adjustments. For policy makers, regulatory support, funding, and HR training are needed to encourage replication of similar programs, in line with efforts to achieve SDGs 11. For scientific development, further research is recommended to be conducted longitudinally to measure the long-term impact on changes in the ecological behavior of students and the surrounding community

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