

Eco-Pesantren: Islamic Boarding School Transformation Program to Support Natural Sustainability and Sustainable Development

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Abstract

Awareness of the role of the environment for the sustainability of the next generation needs to be developed. Ecology in the Islamic perspective has taught us to always maintain and protect the environment. This study aims to analyze the Islamic boarding school or pesantren transformation program through the eco-pesantren program to support nature conservation and sustainable development. This study uses a literature review method by using some studies by previous researchers as the main data source. The results of the study show that the eco-pesantren program was in line with the principles of environmental protection and preservation that have been described in Islamic teachings. Humans are also responsible for harmonizing religion, education, and the environment with the awareness that all elements of life are creatures created by Allah as God. This concept contributes to strengthening the importance of building an alternative ecological imagination that describes the relationship between humans and their environment, including in the pesantren environment. Steps to realize eco-pesantren: 1) development of environmentally friendly boarding school policies, 2) development of a nature-based environmental curriculum, 3) development of extracurricular activities based on contemplation of nature, 4) waste management, 5) sanitation, and 6) renewable energy.

Keywords

Eco-Pesantren, Islamic Boarding School, Natural Sustainability, Sustainable Development, Sustainability.

1. Introduction

Change and development to implement environmental awareness programs in the field of education is a relatively difficult thing. The toughest challenges in changing environmental awareness are related to preserving green areas to the problem of littering, people's lifestyles that are not clean or wasteful (Herdiansyah, Jokopitoyo, & Munir, 2017). The existence of behaviors that are not in line with the sustainable development program has recently been in the spotlight of many parties, including environmental practitioners who criticize the world of education which has not been able to build a generation that is clean and behaves friendly to the environment (Fua, 2013).

In Islamic teachings, nature conservation is also a religious requirement. Islam has become a doctrine explicitly that Allah forbids mankind to harm the earth, including the environment (Pudjiastuti, Iriansyah, & Yuliwati, 2021). The modern world demands the implementation of green business to develop business by preserving the environment (Purnomo et al., 2021). The existence of these demands becomes a guideline if humans are prohibited from taking exploitative actions and have a commitment to protect the earth from environmental pollution, damage and carry out conservation because Allah has given everything for the benefit of humans. Moreover, exploitative actions are not in

line with Islamic ethics and the commitment to faith and Islam that it adheres to (Pudjiastuti, Iriansyah, & Yuliwati, 2021).

Humans always have interests, along with increasing needs, humans tend to no longer heed the order of ecosystems and policies regulated by the government concerning nature, both narrowly and broadly (Fuad & Soedarto, 2018). Therefore, to tackle environmental problems, including natural preservation, it is necessary to first address human behavior through education, starting from the age of children to adults. This proves that awareness of protecting the environment is a process that must be carried out as early as possible for the sake of survival in the next generation so that it does not threaten future generations. Environmental awareness is mainly to achieve sustainable development and form a good habit. (Aulia, Isnaini, & Khumairoh, 2017). Strategic steps in inculcating environmental awareness are carried out through environmental education (Aziz, Budiyanto, Ahmad, & Suhartini, 2021).

As a religion of mercy li al-'alamin, Islam also regulates and strongly supports manners towards environmental preservation (Nurulloh, 2019; Husamah, Miharja, & Hidayati, 2020). Paying attention to nature and preserving it is also the same as ensuring the survival of future generations and the earth itself (Muhtarom, 2014). Future generations must be taught to change attitudes and mentality in preserving nature (Bahri, 2016).

So far, formal education has made changes and character formation following the values of humanity and Pancasila adopted by the Indonesian state as the main goal of generational development. However, the challenges of the world of education seem to belong, because religious values have not been maximized in sustainable learning. This also has an impact on the character of the current generation in treating other people, even the environment. If formal education has not been able to optimize the character of the next generation, then you can imagine the future of Indonesia's natural environment later (Mardhiah & Aulia, 2017). Therefore, religion-based education also has a big role in shaping the character of the next generation who loves the homeland and can preserve nature to realize sustainable development, one of which is Islamic boarding school education.

Pesantren is an educational institution that prioritizes the cultivation of Islamic religion-based morals. The pattern and process of Islamic boarding school education were carried out by carrying out coaching through the dormitory program. Modern Islamic boarding schools face the challenges of industry 4.0 (Sudrajat et al., 2019) and students need to be equipped with education and skills to adapt to website-based technology (Maulana et al., 2020). Today, Islamic boarding schools are starting to explore education that focuses on sustainable development, especially in terms of environmental conservation to create a generation of homeland lovers who care about the preservation of Indonesia's natural environment (Mardhiah & Aulia, 2017). The active role of pesantren has started in the late 70s and 80s when they were directly involved in education and community activities both economic development, environmental conservation, and the use of alternative technologies (Nurulloh, 2019).

The involvement of pesantren in community activities shows that pesantren are not rigid educational institutions in responding to problems that arise in society (Sudjak, Asiyah, & Prasetyo, 2017) based on informal leadership (Anam et al., 2019), including environmental conservation issues, which in Islamic teachings also environmental issues receive very serious attention (Muhtarom, 2014). Pesantren even through the Ministry of Environment of the Republic of Indonesia in 2008 carried out the Eco-pesantren program to make innovations in its role related to environmental conservation (Yusuf, 2019). The term eco-pesantren was first introduced at the "Moeslem seven-year action plan for climate change" meeting in Istanbul, Turkey in early June 2009. Eco-pesantren means an Islamic educational institution (pesantren) that has an emphasis on activities that are responsive to environmental sustainability (Herdiansyah, Jokopitoyo, & Munir, 2017).

Preserving nature is not only driven by the awareness that disaster will come if nature is not taken care of. But also as a form of obedience of a Muslim. Because God commands us to do good, doing good to nature is also a form of obedience. "Islam is a religion that commands its adherents to do good. Not only doing good for Allah (hablum minallah) and doing good for fellow human beings (hablum minannas), Islam also commands Muslims to do good to nature (hablum minal alam)," (Pudjiastuti, Iriansyah, & Yuliwati, 2021).

An eco-pesantren study is a form of the Environmental-Based Education Model, which concludes that the forms of environmental-based educational activities in Islamic boarding schools were increasing environmentally-friendly lifestyles, developing health and environmental units in Islamic boarding schools, incorporating environmental curriculum in Islamic boarding schools, taking concrete actions in waste management, clean water, sanitation, and latrines, become models and lessons for the surrounding environment (Sudjak, Asiyah, & Prasetyo, 2017; Bahri, 2016; Fua, 2013).

From several previous studies which still have not explained the form and model of environmental-based Islamic boarding school management as agents of socialization of ecological values, Islamic boarding schools have become one of the pioneers of environmentally-based Islamic boarding schools (Nurulloh, 2019; Pudjiastuti, Iriansyah, & Yuliwati, 2021). This study examines the extent to which Islamic boarding schools implement the eco-pesantren program as a form of transformation in supporting nature conservation and sustainable development.

2. Research Methods

This research has used a method derived from the study literature review (SLR), namely the systematic mapping study (SMS). The use of the SLR method is carried out to identify, evaluate, and interpret all literature related to the desired research focus (Stephanidis, 2019). The use of the SLR is considered to be able to answer three things, namely: it can summarize all data on a particular topic of interest, can identify research gaps that have been carried out previously and can be a reference for future research, and can position new research in the topic of interest. A systematic mapping study (SMS) can map all data for research needs in a very systematic and detailed manner. SMS can be used to find out a detailed description of the information to be obtained from the desired topic (Maulina, Miftahuddin, Gaol, Syafarudin, & Mutofid, 2019). The results of the data search are shown in Table 1.

Table 1. Results of Data Search

Database Sources	Search Intervention	Detected
Google Scholar	Search string “Eco-pesantren”; “Kelestarian alam”; “Pembangunan Berkelanjutan”	1.470
	<i>Select Research</i>	17
	Relevant paper	11
Sciencedirect	Search string “Eco-pesantren” AND “Kelestarian alam” AND “Pembangunan Berkelanjutan”	0
	<i>Select Research</i>	0
	Relevant paper	0

The search string used in this research is with the keywords “Eco-pesantren” AND “natural conservation” AND “pembangunan berkelanjutan”, which finally found 11 relevant articles. Kelestarian alam is and pembangunan berkelanjutan is sustainable development. The search string above is applied to searches for all sections of the article, such as title, abstract, keywords, and main sections in the Google Scholar and Scencedirect electronic databases. The search process begins in December 2021.

The next step is to determine the category in the journal with the conditions that have been determined based on the exclusion criteria and inclusion articles that can be used in research or that are relevant to the research focus (Fauzi, Rizal, & Arifianti, 2018). Exclusion and inclusion criteria in this study are shown in table 2.

Table 2. Inclusion and Exclusion Criteria (Fauzi, Rizal, & Arifianti, 2018)

Inclusion criteria	Exclusion criteria
1. Research that focuses on eco-pesantren research and nature conservation	1. Journals that do not discuss eco-pesantren and nature conservation
2. Indonesian and English	2. Languages other than Indonesian and English
3. Only journal conference papers and books	3. Dissertations, theses, work reports, unclear literature
4. Journals that have been published and/or have DOI	4. Papers that have not been peer-reviewed
	5. Duplicate research

Furthermore, the annual trend of publications on topics that are relevant and can be used in this research is shown in Figure 1. In Figure 1 it can be explained that the trend in 2016-2018 is the highest research trend on Eco-pesantren, namely, there are 5 articles published which are certainly relevant to the focus of this research.

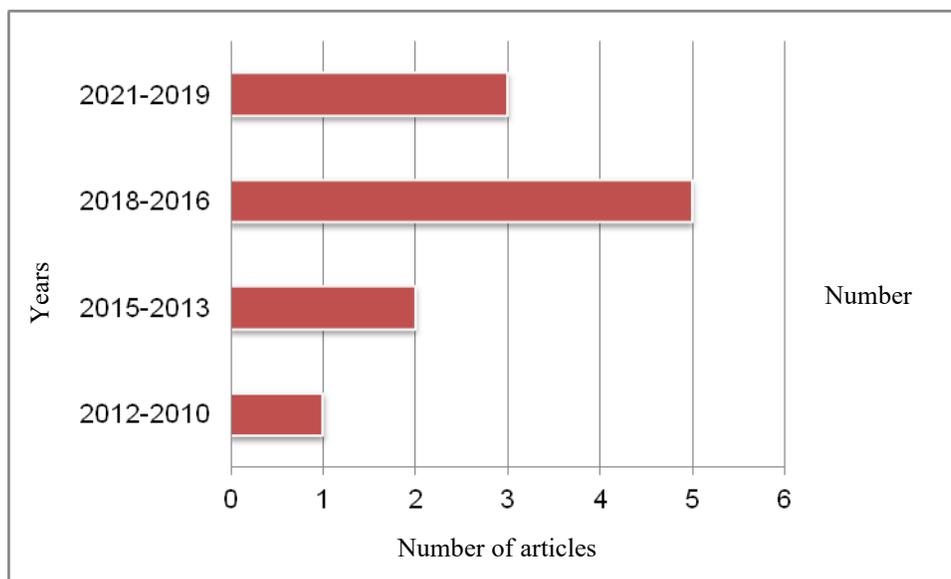


Figure 1. Annual Publication Trends

3. Result

3.1 Islam and Environmental Conservation

Islam is a religion that cares about the environment. Many of the verses of Allah written in the Qur'an contain messages about the environment, related to the protection and maintenance of the environment by humans. In the view of Islam, humans are the best creatures created by Allah SWT.

In the Islamic perspective, humans are created as the best creatures among Allah's creation (Sura 95:4; 17:70), humans are caliphs (QS. 2:30) who are responsible for managing the earth and protecting it (Surah 33:72). Humans are forbidden to do damage and continue to do good (Qur'an 28:77), humans are also prohibited from obeying the desires of other humans so that they do damage to the earth after it was created well (Qur'an 7:56). Islam shows that there must be harmony between humans and the universe because Islam is also mercy for the universe (Yusuf, 2019).

Humans were created by God for certain purposes and rules, especially to protect and preserve nature and the entire environment of the earth. Allah SWT gave a mandate to humans, as follows: First, the al-intifa relationship, where humans are allowed to use and utilize nature for the welfare of themselves and many people, of course without destroying the ecosystem. Second, the al-i'tibar relationship, in which humans as caliphs are asked to continue to take lessons from natural phenomena and tests that God has given through natural disasters. Third, is the al-islah relationship, in which humans must preserve nature and teach it to future generations to continue to preserve the environment. Many verses of the Koran explain the three mandates, whatever the rights of humans, including nature and the universe, humans must also maintain their sustainability as a form of gratitude for the gift of Allah SWT. For example, what is around humans is mata'anlakum wa li'an'amikum, "which means a pleasure, a pleasure of facilities for you" (Q.S. 79: 33 and QS. 80: 32) (Nurulloh, 2019).

Preserving and preserving nature is as important as maintaining other aspects, namely regarding al-usul al-khamsah in the material related to maintaining religion (alfiqh namely hifz ad-din), preserving the soul (hifz an-nafs), preserving reason (hifz al-' aql), maintaining property (hifz al-mal) and protect the environment (hifz al-'ardl). Furthermore, it is also necessary to add environmental maintenance (hifz al-bi'ah) which will better compliment these aspects of care and maintenance. Moreover, Islam also demands the importance of being aware of protecting nature and the environment (Nurulloh, 2019).

Therefore, Islam does not only regulate through the normative level but is also exemplified by the prophets, especially the Prophet Muhammad, so raising awareness of preserving nature and the environment is very important even through education. This awareness is a factor that can determine efforts to conserve nature. According to al-Ghazaly, awareness

is a dimension of inner charity centered on heart management. Awareness is a psychological symptom marked by the growth of an understanding as a product of the interrelation of human internal abilities (Bahri, 2016).

3.2 Program Eco-Pesantren and Sustainable Development Program

Eco-pesantren consists of two words, namely eco and pesantren. Eco from ecology means the study of human interactions with the natural environment. Meanwhile, pesantren is an Islamic-based educational institution that examines books, religious knowledge, and other knowledge about education as formal education. The students are called santri and the elders of the pesantren are known as Kiai. Thus, eco-pesantren is a nickname for Islamic educational institutions that are "environmentally friendly" and also contribute or actively participate in the protection, preservation, and preservation of nature and the environment (Bahri, 2016).

The Eco boarding school program was designed by the Ministry of Environment of the Republic of Indonesia in collaboration with the Ministry of Religion of the Republic of Indonesia on March 5-6 2008 at Pondok Gede Hajj Dormitory. The Eco-Islamic boarding school program has the following objectives: 1) increasing people's awareness in terms of having an environmentally friendly attitude; (2) carrying out activities based on Islamic teachings; (3) conducting socialization about the environment in all life in the pesantren; (4) implementation of environmentally friendly pesantren conditions; (5) empowerment of pesantren by improving the quality of religious education following the Qur'an and the Sunnah of the Prophet; (6) Adding and enhancing activities related to the ecological, economic and social fields; and (7) Islamic boarding schools also empower the surrounding community.

According to the Ministry of Environment of the Republic of Indonesia, the advantages of the eco-pesantren program when implemented in a pesantren environment are; improving the efficiency of the implementation of activities in pesantren, reducing and saving resources used by pesantren, a more conducive and comfortable pesantren environment, the existence of togetherness between residents and all parties in the pesantren, especially concerning environmental awareness and benefit for the entire surrounding community, minimizing the impact environment as a result of the activities of the Islamic boarding school, as well as as a medium of learning for all parties including children or the younger generation regarding good and correct care, understanding, management and maintenance of the environment to realize sustainable development.

Pesantren is not only an Islamic educational institution but must also have an active contribution to problems in the community, including awareness of protecting the environment for sustainable development. These nature conservation efforts are related to the development of an understanding and knowledge of the community and even the next generation to jointly protect and maintain nature which is part of the mandate of Allah SWT. Of course, the eco boarding school program is developed and relies on collaboration with various parties and stakeholders (Mardhiah & Aulia, 2017).

The community must be involved in sustainable development through eco boarding schools, namely first, through the implementation of research in the field to determine the condition of environmental damage which is the focus of reforestation development. Second, sharing knowledge and understanding regarding the application of eco boarding schools that can promote and preserve the surrounding environment, by managing waste, campaigns for clean and healthy behavior, as well as green space programs that can preserve nature in the future, so that the Eco-Pesantren program can change the role of pesantren as educational institutions are the initiators of sustainable development through nature conservation with the community around the pesantren and the wider community (Amri, 2012).

The eco-pesantren program is known to be in line with the principles of maintaining Islamic ecology, where there is the inculcation of knowledge and understanding and raises an attitude of responsibility for the development of the concept of sustainability through Islamic-based education and the environment following Allah's commands. The concept then presents an ecological imagination that can give meaning to the relationship between humans and their environment.

3.3 Implementation of the Eco-Pesantren Program in Environmental Preservation and Sustainable Development

Eco-pesantren is something to be achieved and also part of the UNESCO (United Nations Educational, Scientific and Cultural Organization) program where with eco-pesantren educational institutions are also involved in sustainable development. This then proves that the impact of education is considered very crucial and can increase the achievement of sustainable development that links humans and the environment. Various countries have joined UNESCO-UNEP to discuss and declare commitments on environmental issues in 1977. The agreement also seeks to

identify and solve various environmental problems and their prevention so that they do not happen again (Yusuf, 2019).

The participating countries will consciously carry out socialization to influence all humans to create conditions that are safe for the environment and together achieve sustainable development while still empowering a green environment and preventing new environmental problems from arising. After awareness by UNESCO, then Indonesia also welcomed the plan. In April 2010 the Indonesian government collaborated and committed with 14 countries, addressing climate change. The conference also mentioned that there must be mitigation of environmental and climate change in their respective countries (Yusuf, 2019).

4 Discussion

Together with the commitment to environmental mitigation, the government has also designed programs for nature conservation and sustainable development for educational institutions, including Islamic boarding schools, called eco-pesantren. Several steps of the eco-pesantren program which can then be concluded from various previous discussions and research can be discussed as follows.

4.1 Development of Environmentally Friendly Islamic Boarding School Policy

The development of an environmentally friendly pesantren policy can be started by designing a green open space or often known as a school garden, where a plot of land is dedicated to being made as a boarding school garden and is dominated by shady plants, which is good for the emotional balance of students, pesantren elders, ustad/ustadzah. and all parties in the pesantren. School gardens usually consist of flowers, trees, grass, seats, fountains, gazebos, and boards that read to maintain the cleanliness, beauty, and environmental sustainability of the school garden.

Furthermore, pesantren policies can contain things that are in line with the objectives of eco-pesantren, namely: 1) All existing learning curricula are then inserted with a vision and mission to include environmental and character education that reflects concern for nature and the environment and is described in the form of work program plans and pesantren activities; 2) development of learning materials which include the environment; 3) include human resource development programs who understand environmental learning materials by attending seminars, workshops and so on that support environmental curriculum and learning plans; 4) Islamic boarding schools continue to make policies to save or use efficiency, namely water, electricity, office stationery and others that involve the use of resources in pesantren; 5) designing a pesantren curriculum that regulates regulations regarding health, waste management, classrooms, toilets, canteens and the entire pesantren environment together; 6) Make a pesantren budget plan that is devoted to carrying out learning and environmental management by improving the quality of facilities and infrastructure and in line with increasing the human resources of the pesantren.

4.2 Environment-Based Curriculum Development

The development of awareness to preserve nature can also be applied through the development of an environment-based curriculum, in addition to the contents of Islamic boarding school policies, which are related to learning methods, learning resources, and learning strategies based on the environment or nature so that students can have a good understanding of nature and the environment and be linked. with everyday life. The curriculum can be in the form of learning materials that are integrated with environmental subjects and following learning objectives and KBM (Minimal Learning Completeness) (Nurulloh, 2019).

The following are environmental-based curriculum planning that can be carried out by Islamic boarding schools, namely: 1) planning active learning methods combining learning materials with environmental and cultural elements, maintaining and preserving the environment or nature proportionally between theory and practice; 2) development of other activities or extracurricular activities that can increase understanding of the environment and can participate in preserving the environment and nature; 3) the existence of adequate teaching materials on environmental issues accompanied by evidence regarding the learning outcomes of students.

4.3 Development of Extracurricular Activities Based on Nature

Development must also be carried out on extracurricular activities which are then connected with the surrounding community. This activity pays attention to and has the aim of carrying out activities in protecting and maintaining the environment as well as environmental management activities.

The development of these extracurricular activities must cover the following: (1) design participatory activities between students or the pesantren and the community around the pesantren to jointly carry out learning about the environment at least one activity regularly that has an environmental theme in each extra-curricular program; 2) participate in programs or activities initiated by the surrounding community in environmental-themed actions, but these actions must be positive, not anarchic; 3) There are activities in building cooperation with various parties on environmental themes, as well as implementing them and initiating various environmental action activities in the long term and measurable.

4.4 Waste Management

Garbage is the remnant or former of a consumptive object from a particular individual or group. In the context of Islamic boarding schools, the waste that is commonly found in the pesantren environment is old or unused reading stationery, used food and beverage wrappers, students' clothes, and personal needs such as washing latrines and detergents. The existence of policies or steps in managing waste is intended to maintain and maintain the beauty and sustainability of the space around and throughout the pesantren environment, so that it becomes safe, comfortable, clean, and healthy.

Waste management itself is generally related to minimizing the unhealthy or negative impacts of waste. Therefore, good awareness is needed in good management in the pesantren environment. Here is a reflection of the garbage conscious attitude:

- a) Minimizing consumptive attitudes if the goods or objects are not needed.
- b) Goods or objects used must be long-lasting.
- c) Utilizing used/used goods that can be reused.
- d) Be able to distinguish between types of waste, namely paper, liquid, metal, plastic, and organic.

To realize this waste awareness attitude, several steps can be taken, such as the following:

1) Dormitory Garbage Corner (PSA)

Every room, such as kitchens, classrooms, learning halls, and student rooms, must have cleaning support equipment and trash cans that distinguish the types of waste.

2) Temporary Disposal Sites (TPS)

Garbage that has been sorted in each room in the trash bin is then taken to a location which is a TPS to be re-differentiated according to the waste category, then put in a special sack according to the type or class of waste, which must be carried away from the boarding school location to avoid a strong smell.

3) Islamic Boarding School Waste Bank (BSP)

Garbage that has been separated by using special sacks is taken to a waste bank that has been built or specifically for management by the pesantren based on its type.

4.5 Sanitation & Water Management

Water management must be carried out to preserve nature and avoid the emergence of a water crisis due to the destruction of water sources. Santri in pesantren activities also use water a lot, which is used for ablution, bathing, and other activities, so pesantren should be able to take an active role in water management for the implementation of the eco-pesantren.

Water that can be re-managed by pesantren is water used for ablution, because every day students must perform ablution before carrying out various religious activities, such as praying, studying and tadarus, and others. The principle of the ablution water management system can be carried out in several steps, namely:

- a) Giving river stones to be used in the pool to precipitate the water used for ablution;
- b) Make a filter (filtration) which consists of sand/zeolite stone, charcoal, gravel, and special coconut shells, so that it can purify the flow of water used for ablution.
- c) Make a water reservoir that has been given a water filtration device so that it can be reused for washing.

4.6 New Renewable Energy

The energy that is often used by humans, in general, comes from electrical energy and is fueled by oil. This energy is destructive to the ecosystem if exploited and is not cheap. Therefore, eco-pesantren must be the initiators in making changes by utilizing new energy that is cheap and environmentally friendly to preserve nature (Mujaahid, Widyasmoro, Iswanto, & Susanto, 2019).

Renewable energy is energy that comes from solar, wind, water currents, geothermal and biological processes that can be managed and utilized as an energy source. This energy can preserve nature and be the beginning of the implementation of sustainable development. Islamic boarding schools have become pioneers of renewable energy because the use of energy in the pesantren environment has always been very large (Yusuf, 2019).

The following are efforts to save energy in the pesantren environment, including:

- a) Reducing the use of air conditioning when it is not needed which can use natural air ventilation;
- b) Santri are not allowed to use electronic goods and charge batteries in class, if not requested by the teacher;
- c) Utilization of facilities and infrastructure if they will only be used.

Utilizing new energy can not all be implemented properly, because a lot of preparation is needed, the energy requirements that are most likely to be used in the pesantren environment, namely:

- a) Solar power, which utilizes sunlight with the help of special panels;
- b) biogas power that utilizes livestock manure sources;
- c) Water currents that utilize the flow of waterfalls, rivers, and dams.

To use renewable energy, the pesantren must plan very carefully, because the budget required is also not small. Therefore, it requires cooperation or asking for assistance from the private sector and the government. For example, the energy source from biogas. The infrastructure development for biogas energy can be done in several ways, namely:

- a) Centralized disposal of livestock manure from the cage to a special reactor that has been prepared and must be free of air (vacuum);
- b) Providing iron pipes that are useful for conveying gas or waste from the reactor;
- c) Provision of gas storage devices made of zinc or iron;
- d) Zeofilter for biogas source enhancement by purifying gas content from the filter.
- e) Compressor that can be used as a gas diverter to the stove and other cooking utensils.

5. Conclusion

The results of the study show that the eco-pesantren program is in line with the principles of environmental protection and preservation that have been described in Islamic teachings, where humans are also responsible for harmonizing religion, education, and the environment with the awareness that all elements of life are creatures created by Allah. This concept contributes to strengthening the importance of building an alternative ecological imagination that describes the relationship between humans and their environment, including in the pesantren environment. The steps in realizing eco-pesantren are 1) Development of environmentally friendly Islamic boarding school policies; (2) development of a nature-based environmental curriculum; (3) development of extracurricular activities based on natural tadabbur; 4) waste management; 5) water management (sanitation) and 6) new and renewable energy.

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References

- Amri, U. (2012). Konservasi Berbasis Komunitas Religi: Membedah Peran Ormas Keagamaan dalam Upaya Melestarikan Sumber Daya Alam di Indonesia. *Masyarakat Indonesia*, Vol.38, No.1, Juni, 23-46.
- Anam, F., Purnomo, A., Ismanto, H., & Rosyidah, E. (2019). The effect of informal leadership roles and school head performances on the culture of quality in the Ma'arif education institute of Nahdlatul Ulama Sidoarjo. *International Journal of Innovation, Creativity and Change*, 9(11). https://www.ijicc.net/images/vol9iss11/91121_Anam_2019_E_R.pdf
- Armina, S. H. (2020). The Role of Islamic Boarding School in The Formation of The Madani Community. *IQTISHODUNA: Jurnal Ekonomi Islam Volume 9 Issue 2, October*, 235-246. doi:doi.org/10.36835/iqtishoduna.v9i2.460
- Aulia, R. N., Isnaini, D. E., & Khumairoh, U. (2017). Pengelolaan Lingkungan Berbasis Pesantren (Studi Kasus di Pondok Pesantren Nurul Hakim Lombok NTB). *Hayula: Indonesian Journal of Multidisciplinary Islamic Studies*, Vol. 1, No. 2, Juli, 229-244. doi:https://doi.org/10.21009/hayula.001.2.05
- Aulia, R. N., Jasin, F. M., & Irma, A. (2019). Management of Eco-Pesantren Based Critical Land Disaster Mitigation (Case Study of The Hidayatullah Islamic Boarding School in Gunung Balikpapan Kalimantan. *Unnes Science Education Journal*, Vol. 8, No. 2, 139-147.

- Aziz, A. A., Budiayanti, N., Ahmad, N., & Suhartini, A. (2021). The Potential of Islamic Boarding Schools and Their Effort of Development and Fostering at Pesantren Persatuan Islam 1-2 Bandung. *JMKSP (Jurnal Manajemen, Kepemimpinan, dan Supervisi Pendidikan)*, Volume 6 Issue 2, 352-371.
- Bahri, S. (2016). Pesantren and The Development of Living Enviroment: The Study Concept of Eco-Pesantren in Pondok Pesantren An-Nur Ha Ramingundam Jember. *International Journal of Management and Administrative Sciences (IJMAS)*, Vol. 5, No. 10, 43-54.
- Fauzi, A. H., Rizal, M., & Arifianti, R. (2018). Corporate Entrepreneurship In SMEs: A Systematic Mapping Study. *Jurnal Manajemen Pelayanan Publik*, Volume 02, Nomor 1 Agustus, 55-63.
- Fua, J. L. (2013). Eco-pesantren: Model Pendidikan Berbasis Pelestarian Lingkungan. *Jurnal Al-Ta'dib*, Vol. 6 No. 1 Januari-Juni, 113-125.
- Fuad, K., & Soedarto. (2018). Paradigma Teologi Lingkungan dalam Islam dan Eco-Pesantren. *Jurnal Sosiologika*. Vol. 1(1), 33-67.
- Herdiansyah, H., Jokopitoyo, T., & Munir, A. (2017). Environmental Awareness to Realizing Green Islamic Boarding School (Eco-Pesantren) In Indonesia. *IOP Conf. Series: Earth and Environmental Science*, 30, 1-6. doi:doi:10.1088/1755-1315/30/1/012017
- Husamah, H., Miharja, F. J., & Hidayati, D. A. (2020). Environmental Literacy of Islamic Boarding School Students: Study in MA Bilingual-Sidoarjo, East Java, Indonesia. *Prisma Sains: Jurnal Pengkajian Ilmu dan Pembelajaran Matematika dan IPA IKIP Mataram*, Vol. 8, No. 1 June, 57-68.
- Mardhiah, I., & Aulia, R. N. (2017). Menumbuhkan Rasa Cinta Tanah Air Melalui Pengembangan Ekopesantren. *Prosiding Seminar Nasional Tahunan Fakultas Ilmu Sosial Universitas Negeri Medan*, Vol. 1, No.1, 616-621.
- Mardiani, N. D., Husamah, Fatmawati, D., Miharja, F. J., & Fauzi, A. (2021). Environmental Literacy of Students in Al-Rifa'ie Modern Islamic Boarding School, Malang Regency-Indonesia Based on Gender Differences and Parents' Occupation. *Jurnal Pendidikan Sains Indonesia*, Vol. 9, No. 2, 317-328. doi:10.24815/jpsi.v9i2.19316
- Maulana, F. I., Zamahsari, G. K., & Purnomo, A. (2020). Web Design for Distance Learning Indonesian Language BIPA. *2020 International Conference on Information Management and Technology (ICIMTech)*, 988–991. <https://doi.org/10.1109/ICIMTech50083.2020.9211175>
- Maulina, E., Miftahuddin, A., Gaol, D. F., Syafarudin, D. M., & Mutofid, M. (2019). A Systematic Mapping Study on Competitive Advance for Micro, Small and Medium Enterprises. Dalam R. Rahim, A. S. Ahmar, R. Hidayat, & J. Simarmata (Penyunt.), *Proceedings of the Proceedings of 1st Workshop on Environmental Science, Society, and Technology, WESTECH 2018, December 8th* (hal. 221-228). Medan: EAI.
- Muafiah, E., Afifah, A., Nurohman, D., Huda, S., & Siswadi. (2021). The Concept of Eco-Friendly Schools: The Application of Science Education in Shaping Children's Characters To The Environment. *Journal of Physics: Conference Series*, 1-9. doi:doi:10.1088/1742-6596/1796/1/012063
- Muhtarom, A. (2014). Pembinaan Kesadaran Lingkungan Hidup di Pondok Pesantren: Studi Kasus di Pondok Pesantren Al-Mansur Darunnajah 3 Kabupaten Serang. *Ibda' Jurnal Kebudayaan Islam: Vol. 12, No. 2, Juli - Desember*, 225-240.
- Mujaahid, F., Widyasmoro, Iswanto, & Susanto, R. (2019). Panel Surya Sebagai Edukasi Energi Hijau di Lingkungan Pondok Pesantren. *SEMINAR NASIONAL ABDIMAS II: Sinergi dan Strategi Akademisi, Bussiness and Government (ABG) Dalam Mewujudkan Pemberdayaan Masyarakat Yang Berkemajuan d Era Industri 4.0*, 279-286.
- Nisa, Z. K. (2019). Pengembangan Pendidikan Lingkungan Hidup di Pondok Pesantren Kabupaten Blitar. *BRILIANT: Jurnal Riset dan Konseptual*, Volume 4 Nomor 1, Februari, 105-113.
- Nurulloh, E. S. (2019). Pendidikan Islam dan Pengembangan Kesadaran Lingkungan. *Jurnal Penelitian Pendidikan Islam*, Vol. 7, No. 2, 237-254. doi:<https://doi.org/10.36667/jppi.v7i2.366>
- Pauw, J. B.-d., Gericke, N., Olsson, D., & Berglund, T. (2015). The Effectiveness of Education for Sustainable Development. *Sustainability*, 7, 15693-15717. doi:doi:10.3390/su71115693
- Pradini, S., Alikodra, H. S., Hasim, & Pranadji, T. (2016). Pesantren Transformation System in the Food Sustainability. *International Journal of Development and Economic Sustainability*, Vol.4, No.2, 1-18.
- Pudjiastuti, S. R., Iriansyah, H. S., & Yuliwati. (2021). Program Eco-Pesantren Sebagai Model Pendidikan Lingkungan Hidup. *Jurnal Abdimas Prakasa Dakara*, e-ISSN 2776-768X, 29-37. doi:<https://doi.org/10.37640/japd.v1i1.942>
- Purnomo, A., Firdaus, M., Widiyanti, A., Choifin, M., & Maghfiroh, L. (2021). Green business publication: Insights from scientometric analysis (1990-2019). *Proceedings of the International Conference on Industrial*

- Engineering and Operations Management*, 1826–1833.
<http://www.ieomsociety.org/singapore2021/papers/341.pdf>
- Quddus, A. (2020). Eco-Pesantren as The Panacea For Global Climate Change: Lessons From Nurul Haraiman NW Lombok Islamic Boarding School Indonesia. *Jurnal Tatsqif: Jurnal Pemikiran dan Penelitian Pendidikan Volume 18, No. 2, Desember*, 111-121. doi:<https://doi.org/10.20414/jtq.v17i2.2741>
- Stephanidis, C. (Penyunt.). (2019). *HCI International 2019-Late Breaking Papers: 21st HCI International Conference, HCII Orlando, FL, USA, July 26-31*. USA: Springer.
- Sudjak, Asiyah, U., & Prasetyo, R. A. (2017). The Role of Islamic Boarding School as Socialization Agent of Ecological Values (A Case Study in Salaf-Modern Islamic Boarding School). *Wacana, Vol. 20, No. 4*, 9-17.
- Sudrajat, D., Achdisty, M., Kurniasih, N., Roslina, Parwito, Mulyati, S., Purnomo, A., & Sallu, S. (2019). The Implementation of Innovation in Educational Technology to Improve The Quality of Website Learning in Industrial Revolution Era 4.0 Using Waterfall Method. *Journal of Physics: Conference Series*, 1364, 012044. <https://doi.org/10.1088/1742-6596/1364/1/012044>
- Suryani, A., Soedarso, Saifulloh, M., Muhibbin, Z., Wahyuddin, Hanoraga, T., . . . Rahmawati, D. (2019). Education for Environmental Sustainability: A Green School Development . *IPTEK Journal of Proceedings Series No. 6*, 65-72.
- Wibowo, A., Muhammad, D., Lestari, E., & Karsidi, R. (2021). Community empowerment based on religious ecology leading to sustainable agricultural development (A case study of Isy Karima Islamic boarding school in Karanganyar, Central Java). *IOP Conf. Series: Earth and Environmental Science*, 905, 1-8. doi:[doi:10.1088/1755-1315/905/1/012035](https://doi.org/10.1088/1755-1315/905/1/012035)
- Yusuf, M. A. (2019). *Menuju Pesantren Hijau: Dari Pesantren Merawat Bumi*. Jakarta: LPBI NU.

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Annexure 1. Systematic Mapping Study (SMS) Overview

No	Reference	Year	Title	Research Focus	Database
1.	J.L Fua	2013	Eco-pesantren: Model Pendidikan Berbasis Pelestarian Lingkungan	Identification of environmental conservation-based education model (Eco-pesantren)	Google Scholar
2.	Ulil Amri	2012	Konservasi Berbasis Komunitas Religi: Membedah Peran Ormas Keagamaan dalam Upaya Melestarikan Sumber Daya Alam di Indonesia	Presenting religious-based natural resource conservation practices that emphasize the role of communities or community organizations based on religion	Google Scholar
3	Kaherul Fuad & Soedarto	2018	Paradigma Teologi Lingkungan dalam Islam dan Eco-Pesantren	The human perspective on nature, starts from an anthropocentric view (humans as the center), biocentric (biology as the center), to an ecocentric view (ecology as the center).	Google Scholar
4	Endang Syarif Nurulloh	2019	Pendidikan Islam dan Pengembangan Kesadaran Lingkungan	Environmental awareness development in Islamic education	Google Scholar
5	Ali Muhtarom	2014	Pembinaan Kesadaran Lingkungan Hidup di Pondok Pesantren: Studi Kasus di Pondok Pesantren Al-Mansur Darunnajah 3 Kabupaten Serang	Islamic boarding school's response to environmental problems life and how to implement Islamic values in fostering environmental awareness at Al-Mansur Darunnajah Islamic Boarding School 3 Serang Regency, Banten	Google Scholar
6	Sri Rahayu Pudjiastuti, Herinto & Yuliwati	2021	Program Eco-Pesantren Sebagai Model Pendidikan Lingkungan Hidup	Identification of the development of eco-pesantren programs, as a form of environmental education based on Islamic boarding schools	Google Scholar
7	Rihlah Nur Aulia, Dian Elvira Nanda Isnaini & Umi Khumairoh	2017	Pengelolaan Lingkungan Berbasis Pesantren (Studi Kasus di Pondok Pesantren Nurul Hakim Lombok NTB)	How is the management of the pesantren-based environment at the Nurul Hakim Islamic Boarding School, Lombok	Google Scholar
8	Rihlah Nur Aulia, Faisal M. Jasin dan Asma Irma	2019	Management of Eco-Pesantren Based Critical Land Disaster Mitigation (Case Study of The Hidayatullah Islamic	Identification of eco-pesantren management based on natural disaster mitigation at Hidayatullah Islamic boarding school Balikpapan	Google Scholar

No	Reference	Year	Title	Research Focus	Database
			Boarding School in Gunung Balikpapan Kalimantan		
9	Izzatul Mardhiah, Rihlah Nur Aulia	2017	Menumbuhkan Rasa Cinta Tanah Air Melalui Pengembangan Ekopesantren	Elaborating on how to cultivate the character of caring for the natural environment in a promising boarding school the realization of a generation of homeland lovers who care about the preservation of Indonesia's natural environment	Google Scholar
10	Herdiansyah, H., Jokopitoyo, T., & Munir, A	2017	Environmental Awareness to Realizing Green Islamic Boarding School (Eco-Pesantren) In Indonesia.	Identifying and knowing environmental awareness within the pesantren (eco-pesantren) environment in Indonesia	Google Scholar
11	Syamsul Bahri	2016	Pesantren and The Development of Living Enviroment: The Study Concept of Eco-Pesantren in Pondok Pesantren An-Nur Ha Ramingundam Jember	Knowing the development of Islamic boarding schools and environmental awareness with eco-pesantren at Pondok Pesantren An-Nur Ha Ramingundam Jember	Google Scholar