

Madrasah Eco-Living Lab as a Strategy for Strengthening Ecological Citizenship: Case Study in Surabaya City

Dania Dyah Fitrawan^{1*}, Muhlis²

¹Yogyakarta State University, Indonesia

²MTs Negeri 1 Kota Surabaya, Indonesia

*) Corresponding author: daniadyahf@gmail.com

Abstract

The global ecological crisis has created an urgent need to strengthen the concept of ecological citizenship. This study aims to analyze students ecological citizenship competencies and identify obstacles in implementing the Madrasah Eco-Living Lab program at MTs Negeri 1 Surabaya. A qualitative descriptive-analytical method was chosen with data collection through questionnaires, observations, interviews, and documentation. The research subjects included 150 students and 5 teachers. The results showed that the level of ecological citizenship competency in students was 85.7% with the highest achievement in the participation aspect (88.4%) and the lowest in the justice aspect (86.9%). Strengthening ecological citizenship is needed to foster environmental awareness through the Madrasah Eco-Living Lab program. The strategies implemented began with the establishment of a zero plastic habit policy, Ecobrick activities and Eco-creative entrepreneurship every friday. Strengthening students ecological citizenship is realized through the formation of ecological responsibility, ecological justice, sustainability principles, and Active participation. Obstacles to this program include a transformation of the zero-plastic policy, which has not yet fully formed student habits, and limited expert mentors to produce environmentally friendly products. Integrating the Eco-Living Lab into the curriculum, school culture, and learning assessments is expected to foster awareness and responsibility for environmental protection.

Keywords: ecological citizenship; students; eco-living lab

Introduction

Environmental conservation is a primary prerequisite for maintaining ecosystem balance and sustainability. Sustainable development globally is currently faced with the challenges of an ecological crisis, including climate change, environmental pollution, natural resource exploitation, and biodiversity loss. These challenges have prompted the United Nations to make environmental protection a key pillar in achieving the Sustainable Development Goals (SDGs). The environmental conservation crisis also poses a serious challenge for Indonesia. Based on the

2022 Environmental Performance Index (EPI), Indonesia ranks 22nd out of 25 countries in the Asia-Pacific region and 8th out of 10 ASEAN countries in terms of environmental management performance. This is in line with the results of a World Wide Fund for Nature (WWF, 2024) survey, which identified five pressing environmental issues: waste and plastic pollution (81%), access to clean water and green city development (69%), industrial pollution (66%), and biodiversity degradation (58%). The survey results indicate that many environmental problems are still caused by technical aspects of waste management and low citizen responsibility for environmental

conservation.

Environmental threats in Indonesia include plastic waste and pollution, which continue to increase year after year. A report from the Ministry of Environment and Forestry (KLHK) states that national plastic waste production will reach 12.4 million tons per year by 2025 (KLHK, 2025). The problem of plastic waste is also projected to be local, particularly in the urban area of Surabaya. The total waste generated in Surabaya reaches 145,408 tons per year, with a significant proportion of single-use plastic waste from household and commercial activities. Plastic waste, made from synthetic materials that are difficult to decompose, is certainly a major contributor to environmental pollution. The accumulation of plastic waste that has been buried for hundreds of years can disrupt the balance of soil, water, and air ecosystems. Meanwhile, plastic waste that is difficult to decompose produces microplastic contamination that is harmful to health (Badrukamal et al., 2024).

The problem of the use of plastic that is difficult to decompose requires a collective effort both at the policy level and individual capacity to respond. This includes limiting the use of plastic materials and developing environmentally friendly products that need to be encouraged as preventative measures, starting from formal educational institutions. Formal education plays a crucial role in instilling practical solutions to environmental problems (Scoville, 2016; Symons & Karlsson, 2018; Komalasari et al., 2026). From the perspective of ecological citizenship theory, this study offers an alternative approach that integrates citizens' political and ecological responsibilities. Ecological citizenship theory serves to enhance understanding and awareness of the need to contribute to the sustainability of human life. Andrew Dobson (2003), through the concept of ecological citizenship, emphasizes the practice of citizenship, which should be expanded into ethical actions to contribute to global environmental sustainability. This means that every individual can be both a user of resources and a guardian of a just and sustainable ecosystem (Masud & Wibowo, 2025).

Transformation of education and learning is essential as part of the process of

internalizing ecological values. Madrasahs play a strategic role as spaces for the formation of ecological habits and character through experiential learning. As a result, students are expected to be able to connect knowledge, values, and concrete actions in everyday life. As Laksono (2023) stated, madrasahs serve as agents of social change that can foster ecological citizenship through the instilling of environmentally friendly behaviors. The madrasah curriculum, which has previously focused on academic skills, needs to be developed to be more reflective and participatory by integrating environmental issues, ecological justice, and environmental responsibility. Meanwhile, studies analyzing the strengthening of ecological citizenship competencies in madrasahs are still relatively limited and have not examined much about the process of internalizing the values of ecological responsibility, ecological justice, sustainability principles, and active participation.

In an effort to bridge the gap between ecological citizenship discourse and practice, MTs Negeri 1 Surabaya, as a secondary education institution, is striving to implement plastic waste management programs and policies within the madrasah environment. Through the development of an integrated innovation titled Madrasah Eco-Living Lab, the madrasah integrates school culture, interdisciplinary learning, and partnerships into one learning ecosystem. This study aims to analyze students' ecological citizenship competencies, describe the implementation of ecological citizenship strengthening strategy programs, identify obstacles and solutions in strengthening ecological citizenship at MTs Negeri 1 Surabaya. This study is expected to provide conceptual contributions to the development of ecological citizenship education studies and offer solutions to challenges in internalizing environmental education.

Method

This study used a qualitative method with a descriptive-analytical design to examine the implementation of the Madrasah eco-living lab in strengthening students' ecological citizenship. The study was conducted at MTs Negeri 1 Surabaya, a madrasah that developed

an eco-living lab through collaboration with Bumbi.id and CommonSeans English. The study involved 150 students in grades VII, VIII, and IX who were selected using proportional cluster sampling to obtain a profile of ecological citizenship at each grade level. Semi-structured interviews were conducted with five students and five teachers actively involved in the program implementation. Data were collected through questionnaires as supporting information, while the main interpretation of the study was based on the results of interviews, observations, and documentation. The credibility of the findings was ensured through technical triangulation and source triangulation by comparing data obtained from students, teachers, field observations, and madrasah documents. Data were analyzed using the interactive model of Miles and Huberman (2014) which includes data collection, data presentation, drawing and verification of conclusions.

Result and Discussion

Students Ecological Citizenship Competencies in Zero Plastic Habit

Awareness of environmental conservation issues in Indonesia is crucial to develop through school education, particularly in strengthening the concept of ecological citizenship. From a post-cosmopolitan perspective, ecological citizenship emphasizes individuals' responsibility to influence environmental policymaking, promote green political initiatives, and engage in environmental activism (Latta, 2007; Hadjichambis et al., 2022; Komalasari et al., 2025). This concept aligns with the goals of sustainable education, which seeks to develop global citizens who are critically engaged in environmental issues. J. Sheasby & Smith (2023) outline three core competencies: (1) function (the ability to act), (2) knowledge and understanding, and (3) pro-environmental values and attitudes. Reinforcing this concept, Karatekyn & Uysal (2018) present four competencies in ecological citizenship: responsibility, justice, sustainability principles, and active participation. These four competencies serve as the basis for measuring

students' ecological citizenship in the Eco-Living Lab madrasah program. The results of the ecological citizenship level questionnaire are shown as follows:

Table 1. Results of the Ecological Citizenship Competency Questionnaire of Students in the Eco-Living Lab Madrasah Program

Competencies	Average
Ecological responsibility	84,7%
Ecological Justice	86,9%
Sustainability principle	82,8%
Active participation	88,4%

Based on the table data above, the average score for all four ecological citizenship competencies among students at MTs Negeri 1 Surabaya is 85.7%. This score places the ecological citizenship profile in the high category. In the active participation aspect, students demonstrated active involvement in various organized activities and achieved the highest score. Meanwhile, in the ecological justice aspect, students role in preserving resources and negative impacts on the environment is suboptimal.

MTs Negeri 1 Surabaya is a madrasah that pioneered the zero plastic habit movement. The madrasah is working to establish a memorandum of understanding with the Surabaya City Education Office, Bumbi.id, and CommonSeans UK. This collaboration includes teacher training on environmental module development, eco-creativepreneur outreach, ecobrick monitoring support, and field activities with green MSME partnerships. According to Saadah et al. (2023), Partnerships with external institutions, such as environmental agencies, non-governmental organizations (NGOs), and environmental communities. They play a vital role in strengthening the internalization of environmental values and increasing student active participation through outreach activities, project-based learning, and field experiences.

Eco-Living Lab program as a regulatory and cultural foundation for reducing single-use plastic waste within the school environment. Observations and interviews with the program coordinator revealed that the zero plastic habit initiative is based on the issuance of a Decree from the Head of the School, requiring all students to bring their own refillable food and drink containers. This policy is reinforced by the discontinuation of the sale of plastic bottles

or cups within the school. The school also provides free drinking water stations, also known as smart refill corners in the strategic areas. This arrangement serves as a form of enforced habituation in establishing new social norms within the school environment.

In the initial implementation phase, bringing tumblers and refusing plastic packaging may have been perceived as mere administrative compliance. However, over time, this regulation succeeded in forming collective habits that eroded the culture of instant consumerism. This shared habit then developed into ecological justice. In this initial stage, students began to understand that a clean environment is a right of the madrasa community that must be jointly protected. Referring to the documentation study, the four-month zero plastic habit habituation was able to build awareness of collective responsibility and ecological justice.

These findings support the concept of environmental citizenship developed by Hadjichambis & Reis (2022), which places rights, responsibilities, and collective action as the main components of ecological citizenship. Zero plastic habit embodies ethical and civilized values both in human interactions and in human actions in treating nature as a shared living space. A sense of responsibility to avoid polluting the madrasah environment trains students moral sensitivity. When students consciously limit their plastic consumption footprint, they are actually practicing the ethics of self-restraint for the sake of the madrasah's sustainability, which is the core of developing responsible citizenship character.

Students awareness and behavioral changes regarding plastic use reinforce Dobson's (2003) view of ecological citizenship, which states that ecological citizenship stems from behavioral changes in the private sphere that directly impact the public sphere. The adoption of a plastic-free lifestyle in madrasas has been shown to trigger civic guilt when students violate environmental conservation norms. The program aims to foster ecological citizenship, a sense of civic responsibility that combines awareness of the rights and obligations of citizens with moral responsibility for environmental sustainability. Ecological citizenship focuses on compliance with environmental laws and moral agency to take voluntary action for the preservation of

nature, both locally and globally (Dobson, 2003).

Implementation of Madrasah Eco-Living Lab to strengthen students' ecological citizenship

The problem of plastic waste has become one of the most obvious environmental challenges in the madrasa environment. The presence of madrasas as educational ecosystems can demonstrate their role as gladiators in the formation of habits, values, and concrete actions in reducing plastic waste. Hafizah (2026) explains that reducing plastic waste is a form of concrete action that students can take as part of environmental conservation efforts. Habituating environmentally friendly behavior from an early age plays an important role in shaping students character to become agents of change that encourage the creation of a culture of sustainability in their surroundings. The results of the study show that the formation of ecological citizenship at MTs Negeri 1 Surabaya is realized through the Madrasah Eco-Living Lab which makes the madrasa environment a living laboratory. In this laboratory, students have the opportunity to learn through direct experience, reflection, collaboration, and solving everyday environmental problems. The Madrasah Eco-Living Lab is implemented through the following three strategies:

Socialization and Education about Ecobricks

Ecobricks provide an opportunity for students to integrate ecological knowledge and plastic waste processing skills into creative products. The school and the Bumbi.id organization conduct outreach programs to provide information on waste management procedures and the impact of environmental damage. These activities are used to educate students on the importance of environmental protection. Meanwhile, education on sorting non-economic waste is held every Friday. The sorted non-economic plastic waste is then processed through sewing and weaving techniques to construct the school's physical facilities. Some plastic packaging waste is utilized in craft projects, resulting in parade

uniforms, wall hangings, chairs, and garden tables.

These findings reinforce the theoretical synthesis that fostering ecological citizenship is highly dependent on the availability of space created by the madrasah. As emphasized by Fatikhah & Rejekiningsih (2024), environmental ethics encompasses ecological principles embodied in virtuous behavior. Ecobrick activities provide a space for students to produce solutions to their own environmental problems. Awareness of these ecological principles transforms from mere cognitive understanding into citizenship skills that are deeply embedded in the students' personalities. By adopting the basic principles of the Living Lab, MTs Negeri 1 Surabaya has successfully made the surrounding environment an integrated part of the social laboratory for developing environmentally conscious character.

Eco-Creative Entrepreneurship Activities

Eco-Creative Entrepreneurship is one of the Madrasah Eco-Living's implementations of circular economy-based entrepreneurial activities. This activity is held every Friday in each class, utilizing non-organic waste to create products of economic value. This program is intended as a learning laboratory that integrates environmental education, entrepreneurial skills, and the strengthening of environmental awareness through real-life reuse and recycling practices.

Observations show that this program utilizes a set of sewing machines as a means of creative production. In one class, students also collaborated to process used materials found in the madrasah environment. Some of these include activity banners, promotional banners, unused uniforms, and plastic packaging that were converted into various environmentally friendly products. The resulting products include eco-shopping bags made from used banners, tote bags made from unused uniforms, pouches made from banners and plastic packaging, and aprons for madrasah MSMEs. These findings are reinforced by documentation showing records of eco-merchandise production, followed by marketing at class meeting bazaars and market days with parents.

The findings of this study are in line with the circular economy concept developed by the Ellen MacArthur Foundation (2019). Namely the importance of maintaining the value of materials for as long as possible through reuse, repair, and recycling strategies. The application of circular economy principles in learning provides students with the opportunity to understand that sustainability is not only related to environmental conservation, but also innovation in managing resources efficiently. This approach aligns with the educational framework for the Sustainable Development Goals (ESDGs).

Obstacles and Solutions in Efforts to Strengthen Ecological Citizenship

The results of the study prove that the implementation of the Madrasah Eco-Living Lab, which started with the establishment of Zero Plastic Habit, Ecobricks and Eco-Creative Entrepreneurship have successfully strengthened students' ecological citizenship competencies. High achievement in ecological responsibility, ecological justice, sustainability principles, and active participation demonstrates a bottom-up approach. This approach is reinforced by the opinion of Fatikhah & Rejekiningsih (2024) environmental conservation programs can only be optimally implemented if supported by social movements. However, the internalization of ecological values has not been fully shared among all students. Observations, interviews, and documentation still reveal obstacles to strengthening ecological citizenship.

This obstacle relates to the process of forming behavior in daily life. Referring to the interview results, some students were still inconsistent in implementing the zero plastic habit. Some forgot to bring tumblers and still used plastic bags when purchasing food or drinks from outside the madrasa. This indicates that understanding has not been translated into responsibility. This finding requires strong efforts to transform the rules into personal habits that students continue to practice both at the madrasa and outside the madrasa. As in the research of Baharuddin et al. (2023), which states that the success of environmentally conscious school programs needs to be strengthened by consistent

habituation, school culture, family involvement, and social support. Another obstacle lies in the development of the Ecobrick and Eco-Creative Entrepreneurship programs related to the availability of student mentoring in product production. This finding is supported by the results of interviews with teachers who require support from partnerships with craftsmen or entrepreneurs so that the resulting products have utility and economic value.

Obstacles in strengthening ecological citizenship are in line with the Behavior theory popularized by Robert Barker and Alan Wicker. In the Behavior-Setting theoretical framework, Barker and Wicker state that human and environmental interactions are closely influenced by various factors. Some of these include habits, rules, typical activities, and the physical characteristics of a place. This theory, which is a derivative of ecological theory, emphasizes the suitability of programs created by related parties with human behavior in that environment. This theory projects that human behavior is an integral part of the ecosystem of interactions between the two. Then, in the Madrasah Eco-Living Lab research, the madrasah attempted to create a set of zero plastic habit policies, the provision of smart refill corners, the development of creative production spaces through Ecobricks and Eco-Creative Entrepreneurship. This series of programs forms a behavior setting that gradually transforms compliance with rules into ecological awareness.

Based on the above obstacles, madrasahs can strive to strengthen ecological citizenship through integration into the curriculum, school culture, and learning assessments. Integrating the Eco-Living Lab into several subjects is expected to foster awareness and participation in environmental protection. Meanwhile, to ensure the sustainability of the Madrasah Eco-Living Lab program, funding support and teacher training are needed, particularly in developing good environmental education practices in madrasahs. The Eco-Living Lab program model can be replicated to strengthen Education for Sustainable Development and Environmental Citizenship in Indonesia.

Conclusion

Strengthening ecological citizenship is a key element in addressing current and future environmental challenges. The implementation of the Madrasah Eco-Living Lab program demonstrates that ecological citizenship positions students as ethical agents who play an active role in maintaining environmental sustainability. Madrasahs serve as a system for practicing ecological citizenship through the reduction of single-use plastics, the provision of smart refill corners, the utilization of plastic waste through Ecobrick, and the development of creative production spaces in Eco-Creative Entrepreneurship. This series of activities is effective in improving students' competencies in responsibility, justice, sustainability principles, and active participation in protecting the environment. With an average achievement of each competency in the high category, students are able to internalize madrasah rules into habits and awareness of ecological responsibility. This study found that strengthening ecological citizenship still faces challenges such as inconsistent internalization of environmentally friendly behavior outside the madrasah environment and limited expert resources to support the program's sustainability. This study expands the study of ecological citizenship by explaining its implementation as a strategy that connects students' knowledge, attitudes, and skills in addressing environmental problems. Further research is expected to deepen the review of the integration of ecological citizenship values. Especially the environmental care attitude of students outside the formal environment.

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