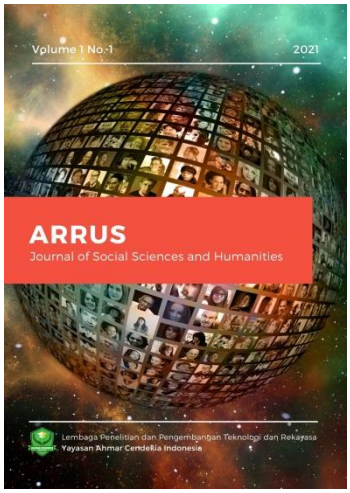
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RESEARCH ARTICLE

Green Behavior: An Ecoliteracy Perspective on the Adiwiyata Program at MAN 1 Majene, West Sulawesi

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Abstract: This study aimed to analyze the implementation of ecoliteracy within the Adiwiyata Program and examine its contribution to the development of green behavior among students at MAN 1 Majene, West Sulawesi, Indonesia. A qualitative descriptive design was employed. Data were collected through observations, in-depth interviews, and document analysis and were analyzed using the interactive model of Miles, Huberman, and Saldaña, involving data reduction, data display, and conclusion drawing. The trustworthiness of the findings was ensured through source, technique, and time triangulation. The findings revealed that ecoliteracy was systematically integrated into the four core components of the Adiwiyata Program: environmentally oriented school policies, an environment-based curriculum, participatory environmental activities, and environmentally friendly supporting facilities. This integration contributed to the development of students' green behavior, reflected in their active participation in school cleanliness activities (94%), plant care (92%), proper waste segregation (90%), greening activities (89%), water conservation (87%), energy conservation (84%), and the reduction of single-use plastics (81%). The study further found that the development of green behavior was supported by ecological knowledge, teachers' role modeling, and a school culture that promoted environmental responsibility. However, challenges remain, including variations in students' ecological awareness, continued reliance on single-use plastics, and the need for stronger collaboration among schools, families, and communities. These findings demonstrate that ecoliteracy provides a critical foundation for fostering students' green behavior through the Adiwiyata Program and offers practical insights for strengthening environmental education in support of the Sustainable Development Goals (SDGs).

Keywords: Ecoliteracy, Green Behavior, Adiwiyata Program, Environmental Education, Sustainable Education

1. Introduction

Environmental degradation, climate change, pollution, and the declining quality of ecosystems have increasingly highlighted the need for educational institutions to play an active role in developing environmentally responsible citizens. Schools hold a strategic position in this process because environmental responsibility can be cultivated not only through classroom learning but also through daily practices and a school culture that supports sustainability (Febriani et al., 2020a). Therefore, environmental education should not merely focus on delivering knowledge about environmental issues but should also emphasize the development of ecoliteracy, enabling students to understand the relationship between

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humans and the environment and translate this understanding into environmentally responsible actions. Strengthening ecoliteracy is consequently essential for fostering green behavior as part of a sustainable lifestyle (McBride et al., 2013). Ecoliteracy encompasses an individual's ability to understand ecological principles, recognize the interdependence between humans and the environment, and assume responsibility for maintaining ecosystem sustainability (Pitman & Daniels, 2020). Individuals with stronger ecoliteracy are expected to translate ecological knowledge into practical actions, such as conserving energy, reducing waste, recycling materials, maintaining environmental cleanliness, and participating in conservation activities (Nugroho et al., 2025). In this context, ecoliteracy serves as an essential foundation for developing environmentally responsible behavior (Hasriyanti et al., 2023).

One form of institutional implementation of environmental education in Indonesia is the Adiwiyata Program, which was developed collaboratively by the Ministry of Environment and Forestry and the Ministry of Education (Tiara Agustiani Mahardika et al., 2021). This program aims to establish environmentally responsible and sustainable school communities through environmentally oriented school management, the integration of environmental education into learning processes, active participation of school members, and the provision of environmentally friendly supporting facilities (Hasriyanti et al., 2025). Empirical evidence has also demonstrated that schools implementing the Adiwiyata Program tend to exhibit stronger levels of environmental knowledge, attitudes, and environmentally responsible behaviors compared with non-Adiwiyata schools (Nurwidodo et al., 2020).

However, the effectiveness of the Adiwiyata Program cannot be determined solely by the availability of environmentally friendly facilities. Its success also depends on the extent to which schools are able to internalize ecoliteracy values into students' learning experiences and daily practices (Laksono & Sari., 2024). The integration of ecoliteracy through classroom instruction, habituation activities, extracurricular programs, and school culture can progressively strengthen students' green behavior over time (Utari, 2025). This indicates that environmentally responsible character development is more likely to occur when environmental values are consistently reinforced through holistic educational processes that are integrated into students' everyday experiences at school (Indri Safitri et al., 2020).

The importance of such integration is further supported by several studies reporting a relationship between ecological literacy and students' environmental attitudes in Adiwiyata schools (Zsóka et al., 2013). Students with stronger ecoliteracy levels also tend to demonstrate environmentally friendly behaviors in their daily activities, both within and beyond the school environment (Praminingsih- et al., 2021). These findings position ecoliteracy not merely as environmental knowledge but as an educational capacity that can support sustainable actions and contribute to the achievement of the Sustainable Development Goals (SDGs), particularly those related to quality education and climate action.

MAN 1 Majene, located in Majene Regency, West Sulawesi, is one of the Islamic senior high schools that has implemented the Adiwiyata Program as part of its efforts to establish an environmentally responsible school culture. Environmental practices implemented at the school include greening activities, waste segregation, reducing single-use plastic consumption, water conservation, school land utilization, and the integration of environmental issues into classroom learning. These practices provide a relevant context for examining how ecoliteracy is operationalized within the Adiwiyata Program and how its implementation is reflected in students' green behavior.

Although research on the Adiwiyata Program has continued to develop, most existing studies have primarily focused on general program effectiveness, environmental awareness, or environmental attitudes. Limited attention has been given to how the Adiwiyata Program is translated into ecoliteracy-based practices and how these practices contribute to students' green behavior within the context of Islamic schools. Empirical evidence from eastern Indonesia, particularly Majene Regency, also remains limited. This research gap is important because the effectiveness of environmental education is determined not only by the existence

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of school policies and facilities but also by how ecological values are internalized, practiced, and sustained within the school community. Therefore, examining this process can provide a more contextual understanding of the relationship between the Adiwiyata Program, ecoliteracy, and students' green behavior.

Based on this background, this study aims to analyze the implementation of ecoliteracy within the Adiwiyata Program at MAN 1 Majene, Majene Regency, West Sulawesi, and to examine how this implementation contributes to the development of students' green behavior. This study is expected to provide empirical insights for strengthening environmental education practices, developing sustainable school cultures, and enhancing the implementation of the Adiwiyata Program in comparable educational contexts.

2. Literature Review

2.1. Adiwiyata Program

The Adiwiyata Program is an environmental education initiative developed by the Indonesian government to integrate environmental values into school policies, curriculum implementation, participatory activities, and the provision of environmentally friendly infrastructure, with the broader aim of establishing schools that are environmentally responsible and sustainable (Aqilah & Lathifah, 2023; Sunarto, 2023), emphasized that the program is designed to develop school communities with active responsibility for environmental protection and management through effective school governance, while simultaneously strengthening students' environmental literacy and environmentally responsible behavior. Effective implementation requires the systematic integration of environmental values into school vision and mission, curriculum, learning processes, extracurricular activities, and school culture to ensure that environmental awareness and sustainable practices can be developed across the entire school community (Kartini et al., 2024). Furthermore, the Adiwiyata Program should extend beyond conventional environmental conservation activities by embedding ecological values into institutional culture, classroom learning, and participatory environmental practices. Through sustained engagement and the internalization of ecological values, the program can contribute to strengthening students' environmental character and fostering long-term environmentally responsible behaviors (Maarif et al., 2026).

2.2. Ecoliteracy

Ecoliteracy refers to an individual's capacity to understand ecological systems, identify various environmental issues, and take appropriate actions to protect, restore, and enhance environmental sustainability through the integration of ecological knowledge, awareness, values, and practical skills (Murti et al., 2025). In a broader perspective, ecoliteracy is regarded as a multidimensional construct encompassing ecological knowledge, affective dispositions, environmentally responsible behavior, and cognitive skills that enable individuals to critically evaluate environmental issues and make sustainability-oriented decisions (Suwandi et al., 2024). The development of ecoliteracy can be strengthened through experiential learning approaches that utilize the surrounding environment as an authentic learning resource, allowing students to simultaneously develop knowledge, awareness, and practical competencies while fostering positive environmental attitudes (Ardoin et al., 2020). Within this process, environmental education plays a crucial role in deepening students' understanding of environmental issues, developing critical thinking abilities, and encouraging environmentally responsible behaviors that contribute to sustainable development (Wisman & Santoso, 2024).

2.3 Green Behavior

Green behavior, also referred to as pro-environmental behavior, encompasses voluntary actions aimed at minimizing negative environmental impacts while supporting natural resource conservation and environmental sustainability (Qin et al., 2024). Environmental education plays an essential role in shaping such behaviors by enhancing environmental

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knowledge, strengthening pro-environmental attitudes, and encouraging sustainable practices through structured educational processes (Goldman et al., 2018). The development of environmentally responsible behavior can also be promoted through education and training programs that enhance sustainability competencies and encourage voluntary engagement in various green practices within educational settings (Nur Rahman & Permana, 2023). In the school context, the formation of pro-environmental behavior can be strengthened by integrating sustainable practices, including waste reduction, energy conservation, water efficiency, recycling, and environmentally responsible decision-making, into students' daily learning experiences and school culture (Demirtaş et al., 2025).

3. Research Method and Materials

This study employed a qualitative descriptive research design with a qualitative survey orientation. This design was selected to explore how ecoliteracy is implemented within the Adiwiyata Program and how students, teachers, and school administrators perceive its contribution to the development of students' green behavior at MAN 1 Majene, Majene Regency, West Sulawesi, Indonesia. The study was not intended to examine statistical relationships but rather to obtain an in-depth understanding of participants' experiences and perspectives regarding environmental practices, habits, and school culture within their natural context. Semi-structured interviews were used as the primary data source, while observations and document analysis were employed as supporting data to enrich and contextualize the interview findings (Busetto et al., 2020).

The research was conducted at MAN 1 Majene, Majene Regency, West Sulawesi, Indonesia, an Islamic senior high school implementing the Adiwiyata Program (Figure 1). The research site was purposively selected because the school has implemented various environmental initiatives, including waste management, school greening programs, water and energy conservation, and the integration of environmental education into learning activities. These characteristics make MAN 1 Majene a relevant setting for exploring the implementation of ecoliteracy and students' green behavior within the framework of the Adiwiyata Program.

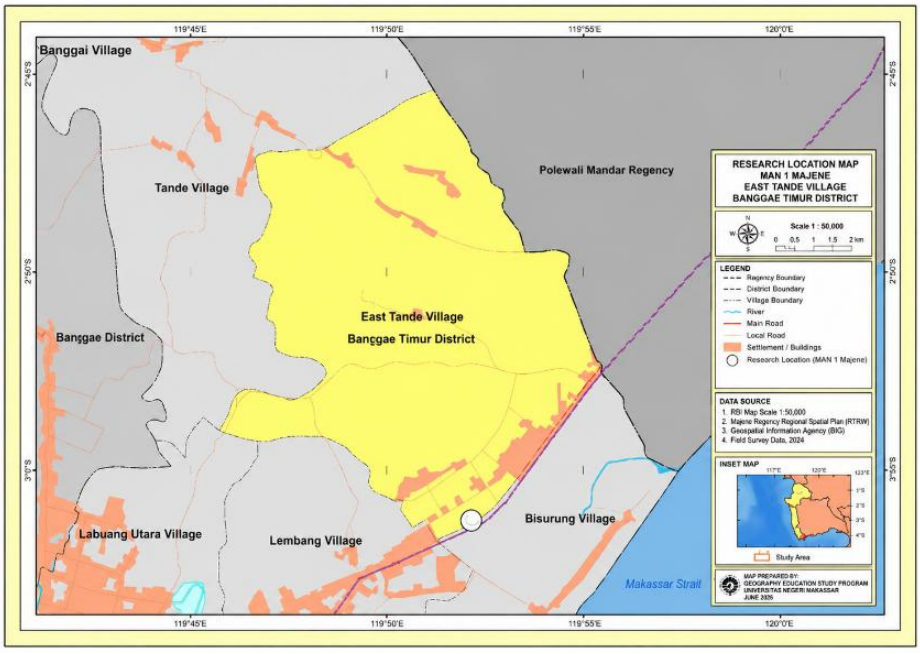


Figure 1. Research Location of MAN 1 Majene, West Sulawesi

The research participants were selected purposively based on their knowledge, experiences, and involvement in the implementation of the Adiwiyata Program and ecoliteracy-related activities at MAN 1 Majene. The distribution of research participants is presented in Table 1.

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Table 1. Distribution of Research Participants

No.	Informant Group	Criteria/Role in the Study	Number
1	Principal	Possesses knowledge of school policies and leadership in the implementation of the Adiwiyata Program	1
2	Vice Principal for Curriculum Affairs	Possesses knowledge of the integration of environmental education into the curriculum and learning processes	1
3	Adiwiyata Program Coordinator	Directly involved in the planning and implementation of Adiwiyata activities	1
4	Subject Teachers	Involved in integrating environmental issues into classroom learning	4
5	Educational Staff	Support the implementation of the program and the management of school environmental facilities	2
6	Students	Directly involved in and experiencing environmental practices within the Adiwiyata Program	30
	Total		**39**

Informants were selected using a purposive sampling technique to ensure that all participants possessed relevant knowledge and direct experience regarding the implementation of ecoliteracy and the Adiwiyata Program within the school environment (Indah Inayati & Rizqiyah Ratu Balqis, 2026).

Data were primarily collected through semi-structured interviews with the principal, vice principal for curriculum affairs, Adiwiyata Program coordinator, teachers, educational staff, and students. The interviews were conducted to explore participants' experiences and perspectives regarding the implementation of ecoliteracy, green behavior practices, and challenges encountered during the implementation of the Adiwiyata Program. Observations were conducted to provide contextual understanding of ongoing environmental practices within the school, while document analysis was employed to examine Adiwiyata Program documents, curriculum materials, environmental policies, school reports, and activity documentation. Data collection was guided by a semi-structured interview protocol covering the dimensions of ecoliteracy, including ecological knowledge, environmental awareness, environmental attitudes, and green behavior, as well as the four components of the Adiwiyata Program: environmentally oriented school policies, environment-based curriculum, participatory environmental activities, and the management of environmentally friendly supporting facilities. Semi-structured interviews were selected because they allow researchers to obtain focused data while providing flexibility to explore participants' experiences in greater depth (Adeoye-Olatunde & Olenik, 2021).

The trustworthiness of the findings was strengthened through source triangulation and method triangulation by comparing information obtained from different groups of informants and cross-checking interview findings with observational and documentary evidence (Stenfors et al., 2020). Interview data were transcribed and analyzed using qualitative content analysis, involving the identification of meaning units, data condensation, coding, categorization of codes, and interpretation of themes related to the implementation of ecoliteracy and students' green behavior (Lindgren et al., 2020). To illustrate patterns in students' responses, green behavior categories were summarized based on the number of students who expressed or confirmed each behavior and were presented using n/N values and descriptive percentages. These frequencies were used solely to support qualitative interpretation and were not intended for statistical inference or generalization to the broader student population.

4. Results and Discussion

4.1 Result

4.1.1. Implementation of Ecoliteracy within the Adiwiyata Program at MAN 1 Majene

The findings indicate that the implementation of ecoliteracy at MAN 1 Majene has been effectively integrated into the Adiwiyata Program through four main components, namely environmentally oriented school policies, an environment-based curriculum, participatory environmental activities, and the management of environmentally friendly supporting

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facilities. These four components complement one another in fostering a school culture that promotes environmental sustainability.

The school has established a range of policies that encourage environmentally responsible behavior, including mandatory classroom cleanliness, the reduction of single-use plastics, waste management through the segregation of organic and inorganic waste, and school greening initiatives. These policies are further reinforced through the school's vision, which incorporates environmental stewardship as an integral component of students' character development. To support effective waste management practices, the school has also provided separate waste bins for plastic waste, metal cans, organic waste, and inorganic waste, thereby facilitating proper waste segregation and subsequent waste processing (Figure 2).



Figure 2. Plastic Waste Segregation



Figure 3 Organic and Inorganic Waste Segregation

Implementation of ecoliteracy was also reflected in the environment-based curriculum (Capra & Luisi, 2014). Teachers integrated environmental issues into various subjects, particularly Geography, Biology, Islamic Religious Education, and Craft Education. Topics such as climate change, environmental pollution, natural resource conservation, and sustainable development were contextualized by relating them to the environmental conditions of Majene Regency, thereby providing students with meaningful and context-based learning experiences.

These findings are consistent with those reported by Syah et al. (2021), who argued that the integration of environmental education into the curriculum of Adiwiyata schools enhances students' ecological knowledge while simultaneously fostering positive environmental

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attitudes. Such knowledge serves as the foundation for the development of green behavior, enabling students to adopt environmentally responsible practices consciously and sustainably. In addition to classroom instruction, the school has implemented a variety of participatory environmental activities, including Clean Friday programs, tree-planting initiatives, the utilization of the school garden, compost production, waste bank management, and energy conservation campaigns. The active involvement of the entire school community ensures that the principles of ecoliteracy are not only understood conceptually but are also translated into everyday environmental practices.

The provision and management of environmentally friendly supporting facilities further strengthened the implementation of the Adiwiyata Program. The school has provided segregated waste bins, green open spaces, biopore infiltration holes, school gardens, water-efficient handwashing facilities, and environmental education media, including posters, slogans, and information boards promoting environmental conservation. Overall, the implementation of ecoliteracy at MAN 1 Majene reflects the principles of ecological learning by emphasizing the interconnections among knowledge, attitudes, skills, and practical actions in promoting environmental sustainability.

4.1.2. Students' Green Behavior from an Ecoliteracy Perspective

The observational findings revealed that the majority of students had demonstrated environmentally responsible behavior as a result of the habitual practices fostered through the implementation of the Adiwiyata Program. The most frequently observed forms of green behavior included:

Table 2. Forms of Students' Green Behavior at MAN 1 Majene

No.	***Green Behavior Indicators***	**Persentase (%)**
1	Proper Waste Segregation	90
2	Water Conservation	87
3	Energy Conservation	84
4	School Plant Care	92
5	Reduction of Single-Use Plastics	81
6	Participation in Clean-Up Activities	94
7	Participation in Greening Activities	89

Source: Researchers' Observation and Questionnaire Survey (2026).

Based on Table 1, the highest percentage was observed for students' participation in school clean-up activities (94%), followed by school plant care (92%). These findings indicate that environmental responsibility has become an integral part of students' daily routines. In contrast, the indicator related to the reduction of single-use plastics recorded a relatively lower percentage (81%). This finding may be attributed to the fact that some students still bring food and beverages packaged in single-use plastic containers from outside the school. This suggests that the development of green behavior is influenced not only by the school environment but also by habits established within families and the broader community. These findings support those of Nugroho et al. (2025), who reported that environmentally responsible behavior develops more effectively when reinforced through consistent habituation and authentic environmental practices within the school setting. Students' participation in school plant care and clean-up activities is presented in Figure 4.

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Figure 4 School Plant Care



Figure 5. School Hydroponic Garden

4.1.3. The Relationship Between Ecoliteracy and Green Behavior

The interview findings indicated that the development of students' green behavior did not occur instantaneously but rather evolved through the process of internalizing ecoliteracy values. Students who understood the importance of maintaining ecosystem balance tended to demonstrate stronger motivation to engage in concrete environmental actions. The relationship between the dimensions of ecoliteracy and green behavior is presented in Table 2.

Table 2. Relationship Between Ecoliteracy Dimensions and Green Behavior

Ecoliteracy Dimensions	**Implementation at MAN 1 Majene**	**Impact on Green Behavior**
Ecological Knowledge	Integration of Environmental Topics into Classroom Instruction	Students understand the importance of environmental conservation.
Environmental Awareness	Environmental Awareness Campaigns and Outreach	Students develop a sense of environmental responsibility.
Environmental Attitude	Habituation of Environmental Cleanliness and Greening Practices	Positive environmental habits are established in daily life.
Ecological Skills	Waste Management, Composting, and School Garden Management	Students are able to adopt environmentally friendly practices.
Environmental Participation	Clean Friday and Adiwiyata Programs	Impact on Green Behavior

Source: Researchers' Observation and Questionnaire Survey (2026).

The findings demonstrated that the dimensions of ecological knowledge, environmental awareness, environmental attitude, ecological skills, and environmental participation are closely interconnected in fostering green behavior. In other words, the higher the level of students' ecoliteracy, the greater their tendency to adopt green behavior in their daily lives.

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These findings are consistent with those reported by Syah et al. (2021), who identified a positive relationship between ecological literacy and environmentally responsible behavior in Adiwiyata schools. Environmental education implemented in a systematic manner not only enhances students' ecological knowledge but also fosters a sense of responsibility toward environmental sustainability. The school plays a significant role in strengthening students' ecoliteracy values, one of which is through the installation of environmental information boards, cleanliness regulations, and school environmental management guidelines displayed on bulletin boards and public notice boards (Figure 6).



Figure 6. Environmental Information Board

4.1.4. Challenges in Implementing Ecoliteracy within the Adiwiyata Program

The findings identified several challenges that are still encountered by MAN 1 Majene. These include students' uneven understanding of the concept of ecoliteracy, the continued use of single-use plastics brought from outside the school, limited financial resources for the development of environmentally friendly supporting facilities, and the need to strengthen collaboration among the school, parents, and the wider community in fostering an environmentally responsible culture. These challenges indicate that the success of the Adiwiyata Program depends not only on school policies but also on the active support of all stakeholders. The development of green behavior is a long-term process that requires consistency in environmental education, habitual practices, and exemplary behavior demonstrated by all members of the school community.

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4.2 Discussion

The findings suggest that the implementation of the Adiwiyata Program at MAN 1 Majene has served as an effective platform for developing students' ecoliteracy. Ecological values are not only delivered through formal classroom instruction but are also internalized through the school's culture and participatory environmental activities. This approach is consistent with the concept of ecoliteracy, which emphasizes the integration of knowledge, skills, attitudes, and actions in maintaining ecosystem balance (Capra & Luisi, 2014).

A school culture that promotes environmentally responsible habits has been shown to contribute significantly to the development of students' green behavior. Activities such as waste segregation, school greening initiatives, water conservation, and energy conservation have become routine practices among students. These findings indicate that environmental education is more effective when implemented through experiential learning, rather than being limited to the delivery of theoretical concepts in the classroom.

These findings reinforce those reported by (Febriani et al., 2020b) and (Nugroho et al., 2025), who argued that the success of the Adiwiyata Program lies in its ability to foster a sustainable school culture through the strengthening of ecoliteracy. Accordingly, the Adiwiyata Program functions not only as a school-based environmental conservation initiative but also as a character education instrument that supports the achievement of the Sustainable Development Goals (SDGs), particularly SDG 4 (Quality Education), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action).

The findings further demonstrate that the implementation of the Adiwiyata Program at MAN 1 Majene has successfully established a school culture that supports the development of students' green behavior through the strengthening of ecoliteracy. This suggests that the success of the Adiwiyata Program depends not only on the provision of environmentally friendly physical facilities but also on the systematic internalization of ecological values through school policies, classroom instruction, habitual environmental practices, and the active participation of the entire school community. In this regard, ecoliteracy serves as a conceptual foundation that bridges environmental knowledge with practical environmental actions in everyday life.

4.2.1. Ecoliteracy as the Foundation for Developing Green Behavior

One of the key findings of this study is that students who possess a strong understanding of the relationship between human activities and ecosystem balance are more likely to exhibit environmentally responsible behavior. This understanding is reflected in their daily practices, including proper waste segregation, water and energy conservation, school plant care, and active participation in various environmental conservation activities.

These findings reinforce the theory of ecological literacy proposed by , which suggests that individuals who understand ecological principles are better equipped to make decisions that support environmental sustainability. In other words, ecoliteracy extends beyond the cognitive domain to encompass moral awareness and ecological responsibility(Husamah et al., 2025).

This process was evident through the integration of environmental topics into the teaching of Geography, Biology, Islamic Religious Education, and other subjects. Teachers not only introduced concepts such as environmental pollution, climate change, and natural resource conservation but also contextualized these topics by relating them to local environmental issues in Majene Regency, including waste management, coastal erosion, and the conservation of coastal ecosystems. Such a contextual learning approach enables students to recognize that environmental issues are closely connected to their own lives.

The findings of this study are consistent with those reported, who found that ecoliteracy significantly contributes to improving students' environmental knowledge, attitudes, and environmentally responsible behavior in Adiwiyata schools. The higher the level of students'

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ecological literacy, the greater their tendency to demonstrate behaviors that support environmental sustainability(Kamid et al., 2020).

4.2.2. The Adiwiyata Program as a Medium for Internalizing Environmental Values

This study demonstrates that the Adiwiyata Program at MAN 1 Majene has served as an effective medium for character development through a whole-school approach. Environmental education is delivered not only through classroom instruction but also through a school culture that actively engages the entire school community. Habitual practices such as the Clean Friday program, waste segregation, waste bank utilization, school greening initiatives, compost production, and energy conservation campaigns have become routine activities. Over time, these practices have gradually evolved into an integral part of the school's culture.

The development of sustainable behavior is more effective when environmental education is implemented through experiential learning (learning by doing) rather than being limited to the delivery of theoretical concepts in the classroom (Lewinsohn et al., 2015). This is consistent with the conditions observed at MAN 1 Majene, where students gain authentic hands-on experience in maintaining and protecting the school environment.

The experiential learning approach offers several advantages, including:

(a). Enhancing students' ecological skills.
(b). Fostering a sense of ownership toward the school environment.
(c). Strengthening collaboration among students.
(d). Establishing sustainable environmental habits.

The Adiwiyata Program not only enhances students' environmental knowledge but also promotes the development of social competencies, leadership skills, and environmental responsibility.

4.2.3. Developing Green Behavior Through Habituation

The observational findings indicate that most environmentally responsible behaviors emerged as a result of continuous habituation. Repeated engagement in environmentally friendly practices enabled students to gradually adopt these behaviors as part of their daily routines.

From the perspective of educational psychology, behaviors that are performed repeatedly gradually develop into habits, which eventually become an integral part of an individual's character (Lickona, 2013). Therefore, the success of the Adiwiyata Program at MAN 1 Majene can be understood as the outcome of a consistent and sustained process of habituation. For example, students who are required to segregate waste every day gradually perform this activity independently without requiring reminders. Likewise, practices such as turning off lights when classrooms are unoccupied and watering school plants according to the duty roster have become routine behaviors.

These findings suggest that the development of green behavior is not the result of short-term learning but rather the cumulative outcome of continuous learning experiences shaped through interactions between students and the school environment.

These findings are consistent with those reported by Nugroho et al. (2025), who concluded that schools that consistently cultivate an environmentally oriented school culture produce students with higher levels of green behavior than schools that provide environmental education solely through theoretical instruction (Hasriyanti et al., 2026).

4.2.4. Teachers' Role as Agents of Ecological Transformation

The findings of this study indicate that teachers play a pivotal role in the successful implementation of ecoliteracy. Their role extends beyond delivering instructional content to

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serving as role models who exemplify environmentally responsible behavior. At MAN 1 Majene, teachers demonstrate this commitment through everyday practices such as bringing reusable water bottles, reducing paper consumption, maintaining classroom cleanliness, and actively participating in school greening initiatives. Such exemplary behavior reinforces the learning process by allowing students to directly observe and emulate the environmental practices expected of them (Hasriyanti et al., 2023).

This finding is consistent with Bandura's Social Learning Theory, which posits that individuals are more likely to adopt behaviors observed in influential role models (Desfandi et al., 2017). Consequently, teachers' exemplary behavior constitutes a critical factor in fostering students' environmentally responsible behavior. In addition to teachers, the school principal plays a crucial role in establishing policies that support the long-term sustainability of the Adiwiyata Program. Leadership that actively promotes an environmentally oriented school culture has been shown to strengthen the participation and commitment of the entire school community in implementing environmental sustainability initiatives.

4.2.5. Supporting Factors for the Implementation of Ecoliteracy

The study identified several factors that contributed to the successful implementation of ecoliteracy at MAN 1 Majene, as follows:

(a). School Leadership Commitment

The commitment of the school principal provides the foundation for all environmental initiatives implemented within the school. Environmental policies established by the principal ensure that every environmental program is systematically planned and aligned with the school's sustainability goals.

(b). Curriculum Integration

Environmental topics have been integrated across various subjects, enabling environmental education to become an integral component of the teaching and learning process rather than a supplementary activity. This cross-curricular approach facilitates the continuous development of students' ecological knowledge and environmental awareness.

(c). Participation of the School Community

The success of the Adiwiyata Program is supported by the active involvement of teachers, students, educational staff, the school committee, and parents. The collaborative participation of all stakeholders fosters a shared responsibility for maintaining and improving the school environment.

(d). Supporting Facilities and Infrastructure

The availability of environmentally friendly facilities and infrastructure including school gardens, waste banks, segregated waste bins, biopore infiltration systems, school gardens, and environmental information boards strengthens practice-based environmental learning. These facilities provide students with authentic opportunities to apply ecological knowledge and develop environmentally responsible behavior through direct experience.

The identified supporting factors are consistent with the Adiwiyata Program Guidelines issued by the Indonesian Ministry of Environment and Forestry, which emphasize the importance of synergy among environmental policies, curriculum integration, stakeholder participation, and the management of environmentally friendly facilities.

4.2.6. Challenges in the Implementation of the Adiwiyata Program

Based on these identified challenges, several strategic interventions are recommended to strengthen the sustainability and effectiveness of the Adiwiyata Program implementation:

(a). Enhancing students' environmental habits through continuous reinforcement and monitoring

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Schools should establish structured and sustainable mechanisms to foster environmentally responsible behaviors among students, particularly in waste separation, reducing reliance on single-use plastics, and promoting resource conservation practices. These efforts can be supported through initiatives such as the development of *eco-students* or *green ambassadors*, the improvement of accessible waste management facilities, routine monitoring of students' environmental practices, school-wide plastic reduction campaigns, and recognition systems for students who consistently demonstrate positive environmental actions. Continuous reinforcement, supported by appropriate supervision and guidance, is expected to facilitate the transformation of environmental practices from externally driven compliance into internalized and self-regulated behaviors.

(b). Strengthening school–family partnerships to promote consistent environmental practices

The implementation of environmental education should be extended beyond the school context by strengthening collaboration between schools and families. Such collaboration is necessary to ensure that environmental values and practices developed at school are continuously reinforced within students' home environments. This approach may involve initiatives such as the implementation of a *Green Family Program*, the use of household environmental behavior monitoring instruments, family-based waste reduction challenges, and sustained communication between schools and parents through environmental awareness activities. A strong school–family partnership is essential because students' environmental behaviors are influenced not only by formal learning experiences at school but also by daily practices and environmental values developed within their families.

(c). Gradual development of environmental infrastructure through collaborative partnerships

The limitations of financial resources in developing environmental facilities require schools to adopt gradual, adaptive, and collaborative strategies. Priority can be given to feasible and cost-effective facilities, including simple composting units, school-based waste banks, and small-scale rainwater harvesting systems, which can later be expanded into more advanced environmental infrastructure based on school capacity and needs. In addition, partnerships with local governments, higher education institutions, private sectors through Corporate Social Responsibility (CSR) initiatives, environmental organizations, and community groups should be strengthened to support resource mobilization and sustainable facility development. This partnership-based approach enables schools to maintain and expand the Adiwiyata Program despite existing financial limitations.

Overall, the long-term sustainability of the Adiwiyata Program depends on meaningful collaboration among schools, families, communities, local governments, and other relevant stakeholders. Such collaborative efforts are fundamental to cultivating a sustainable environmental culture in which environmental responsibility is not only practiced within schools but also extended to broader social contexts.

4.2.7. Implications of the Study for Sustainable Education

The findings of this study suggest that ecoliteracy should be recognized as one of the core competencies required in 21st-century education. Strengthening ecological literacy is not only essential for enhancing the effectiveness of the Adiwiyata Program but also represents a strategic approach to achieving the Sustainable Development Goals (SDGs), particularly:

(a). SDG 4 (Quality Education): through the integration and strengthening of environmental education.
(b). SDG 12 (Responsible Consumption and Production): through the promotion of waste reduction and the responsible use of natural resources.
(c). SDG 13 (Climate Action): through increasing environmental awareness and encouraging concrete climate action among members of the school community.

Furthermore, the findings demonstrate that the development of green behavior requires a comprehensive educational approach that integrates the cognitive (knowing), affective

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(feeling), and psychomotor (acting) domains (Edsand & Broich, 2020). Therefore, future development of the Adiwiyata Program should focus not only on meeting administrative requirements but also on strengthening a sustainable ecological culture that promotes long-term environmentally responsible behavior.

5. Conclusion

The implementation of the Adiwiyata Program at MAN 1 Majene, Majene Regency, has demonstrated a significant contribution to fostering students' environmentally responsible behavior through the enhancement of ecoliteracy. The program was realized through a comprehensive approach that integrated environmentally based school policies, the incorporation of environmental education into classroom practices, student participation in environmental initiatives, and the development of supporting facilities that promote sustainability. The interaction among these elements has strengthened an environmentally conscious school culture. Furthermore, the enhancement of ecoliteracy has improved students' environmental knowledge, awareness, attitudes, and practical skills, encouraging them to engage in sustainable behaviors, such as responsible waste management, resource conservation, and active participation in environmental preservation efforts.

The findings underscore the need for stronger collaborative policies between the Ministry of Education and the Ministry of Environment and Forestry to promote the broader implementation of the Adiwiyata Program across schools throughout Indonesia. Such cross-institutional collaboration is crucial to positioning environmentally oriented schools as an integral component of the national education system, particularly in cultivating students' ecological awareness and sustainability-oriented values. However, the sustainability of the program requires continuous attention due to remaining challenges, including differences in students' levels of ecological awareness, the ongoing reliance on single-use plastics, and the need for enhanced cooperation among schools, families, and local communities. Therefore, sustained efforts to strengthen ecoliteracy through the Adiwiyata Program are essential for establishing a long-term school culture that encourages environmental responsibility and supports the achievement of the Sustainable Development Goals (SDGs).

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