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Article

Community-Based Development of an Environmental Education Curriculum in Coastal Primary Schools: The Case of SDN 1 Pasir Panjang

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ABSTRACT

This study explores the development of a community-based environmental education curriculum at SDN 1 Pasir Panjang, located on Rinca Island, as an effort to strengthen ecological awareness among primary school students in coastal areas. Although environmental degradation increasingly affects island communities, formal education in such regions often lacks participatory models that actively involve local stakeholders. Employing a qualitative approach with a community-based education framework, this research engaged students, teachers, parents, and local volunteers in a collaborative design process. The implemented activities included school clean-up campaigns, organic and inorganic waste sorting, and the creation of mosaic artworks from collected plastic waste. The findings reveal that shared responsibility between the school and community significantly enhanced students' environmental attitudes, encouraged sustainable behavior, and fostered stronger school-community collaboration. This model demonstrates that community-based curriculum development can serve as an effective strategy for embedding sustainability values in primary education, particularly within coastal and island contexts.

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INTRODUCTION

Environmental and socioeconomic challenges are increasingly complex and interconnected global issues. Climate change, ecosystem degradation, and increasing social inequality have become serious threats to the sustainability of human life, particularly in developing and remote regions. According to the United Nations Human Development Report (Hult, 2023), nearly 9% of the world's population still lives in extreme poverty and faces limited access to basic services such as education, health care, clean water, and productive economic resources. This situation not only reflects the problem of social inequality but also indicates the weak capacity for sustainable development in many isolated rural and island regions.

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Coastal and island regions are doubly vulnerable to environmental and socioeconomic pressures. Ecologically, communities in these regions depend on marine and coastal natural resources that are vulnerable to overexploitation and pollution. Meanwhile, socially, limited access to transportation, infrastructure, and skilled human resources hinders the process of inclusive development (Zheng & Qian, 2020). In the context of Indonesia, the world's largest archipelagic nation with over 17,000 islands, these challenges are particularly relevant. Many coastal areas and small islands face a development gap compared to mainland areas, both in terms of economics, education, and public services.

One area that reflects this situation is Pasir Panjang Village, located on Rinca Island, Komodo District, West Manggarai Regency, East Nusa Tenggara (NTT) Province. Although Rinca Island is known as part of the Komodo National Park tourist area, known for its natural beauty and rich biodiversity, the local community's socio-economic life still faces various limitations. According to data from the Central Statistics Agency (BPS, 2024), the literacy rate on Rinca Island is only 78.4%, far below the national average of 95%. This educational situation is exacerbated by a lack of adequate teaching staff and learning facilities. Meanwhile, in the health sector, there is only one primary health care center serving a population of over 3,000 (Rokom, 2023).

Approximately 52% of Rinca Island's population relies on traditional fishing and subsistence agriculture, whose yields are highly dependent on weather conditions and the marine ecosystem (BPS, 2024). Dependence on limited natural resources and unsustainable management practices have led to various environmental issues such as coastal pollution, poor waste management, and reduced public awareness of environmental conservation. Meanwhile, the region's vast tourism potential has not been optimally utilized due to a lack of infrastructure, institutional capacity, and local community involvement in destination management (Idrus et al., 2024).

Education plays a crucial role as a foundation for social change and increased environmental awareness. However, formal education systems in coastal and island areas are often not contextualized to local conditions. The curriculum used tends to be general and does not integrate ecological values, local culture, or community potential. As a result, students in coastal areas lack knowledge and awareness of the environment in which they live, even though they are the next generation who will face sustainability challenges in the future.

To address these issues, a community-based education approach is a strategic alternative. This approach emphasizes the importance of collaboration between schools, communities, and local stakeholders in designing and implementing educational activities relevant to the needs and potential of the surrounding environment. This model is oriented towards empowerment, active participation, and reciprocal knowledge transfer between educators and the community (Kerdiati & Darmastuti, 2023).

Various studies have shown that community-based approaches are effective in increasing community awareness and independence. Juhaidi et al. (2023) found that community-based health education can increase public awareness of hygiene and nutrition. Meanwhile, Aji et al. (2023) showed that the involvement of village officials in development planning encourages the emergence of more sustainable local programs. Lestari (2022) added that community-based micro-enterprise training can strengthen the economic resilience of families in rural areas. A study by Yu et al. (2024) even confirmed that integrating the education, health, and economic sectors in integrated development can create long-term positive impacts in remote areas.

On Rinca Island, this concept is implemented through community service activities initiated by Arah Pemuda Indonesia (API), a non-governmental organization (NGO) focused on empowering communities in the 3T (remote, underdeveloped, and outermost) areas. Through a Human-Centered Development framework, this program involves various stakeholder sincluding educators, youth volunteers, village officials, and the local community to collaboratively design and implement environmental education programs at SDN 1 Pasir Panjang. This approach differs from conventional development programs because it positions the community not merely as beneficiaries but as active partners in the environmental education and management process.

Activities developed within this program include school cleanliness campaigns, sorting organic and inorganic waste, creating mosaic artwork from plastic waste, and reflective discussions on local environmental issues. These activities are designed as part of a community-based environmental education curriculum, where students not only learn cognitively but also directly participate in concrete environmental conservation actions. Preliminary results indicate that this approach increases students' ecological responsibility, strengthens collaboration between teachers and parents, and fosters closer ties between the school and the community.

The development of a community-based environmental education curriculum at SDN 1 Pasir Panjang has dual significance. First, practically, it contributes to improving the quality of basic education in remote coastal areas. Second, conceptually, it enriches the sustainable education model, which is oriented towards local values, community participation, and ecological awareness. This model can also inspire other schools across the Indonesian archipelago in developing contextual curricula capable of developing a young generation that cares about the environment and is resilient in facing future challenges.

METHOD

This research employed a descriptive qualitative approach with a community-based education framework that emphasizes the importance of involving various local stakeholders in the learning process. This approach was chosen because it provides an in-depth understanding of the social dynamics, community roles, and the transformation of ecological values that occurred during the development of an environmental education curriculum in a coastal elementary school. The research design took the form of a single case study, with SDN 1 Pasir Panjang on Rinca Island, East Nusa Tenggara (NTT) as the primary unit of analysis. This case study allowed for a comprehensive exploration of how students, teachers, parents, and local volunteers collaborated in designing and implementing an environmental education curriculum relevant to the local geographic and cultural context (Creswell & Poth, 2018; Yin, 2014).

The research was conducted in Pasir Panjang Village, a coastal area on Rinca Island, Komodo District, West Manggarai Regency, NTT. This location was chosen because it faces complex environmental challenges, such as plastic waste management, coastal ecosystem degradation, and low public awareness of sustainable practices. Chronologically, the research activities lasted four months, from July to October 2024. The preparation phase began with coordination with school officials and community leaders to determine the appropriate form of collaboration. The implementation phase continued with field activities involving teachers, students, and the community. The unit of analysis in this study consisted of approximately 90 students from grades 4, 5, and 6 of Pasir Panjang Elementary School (about 30 students per

class), who were directly involved in environmental education and participatory learning activities. The final phase focused on evaluation and joint reflection to measure changes in ecological behavior and attitudes that occurred during the learning process.

The research procedure was carried out in stages and structured to ensure the entire process ran systematically. The initial phase began with needs identification and situation analysis through preliminary observations and interviews with the principal, teachers, and parent representatives. The purpose of this phase was to map key issues related to environmental management and assess the extent to which environmental values had been integrated into school learning. Initial findings revealed that students' ecological awareness was still limited to knowledge, while the application of sustainable behaviors in daily life was still low.

The next phase was the collaborative design of a community-based curriculum. Researchers facilitated participatory workshops and focus group discussions involving teachers, students, parents, and environmental volunteers from the local community. In the forum, participants collaboratively identified relevant learning themes, designed action-based activities, and integrated environmental values into existing subjects. This participatory model adheres to the principles of Participatory Action Research (PAR), which positions the community as an active partner in the process of knowledge creation and social innovation (Kemmis, McTaggart, & Nixon, 2014).

Once the curriculum was mutually agreed upon, the activities moved into the implementation phase within the school environment. SDN 1 Pasir Panjang held various educational activities that combined classroom learning with real-world action. Students participated in a school clean-up campaign, sorting organic and inorganic waste, and creating mosaics from plastic waste. Teachers acted as facilitators, linking these activities to thematic learning, while parents and volunteers supported implementation and mentoring. These activities aimed not only to increase students' environmental knowledge but also to foster a sense of responsibility, mutual cooperation, and ownership of their school environment (Tilbury, 2011; UNESCO, 2020).

The final stage of the research was a collaborative evaluation and reflection. The evaluation was conducted through a participatory qualitative approach that included in-depth interviews with teachers and students, focus group discussions with parents, and observations of changes in student behavior and habits. In addition, simple pre- and post-tests were conducted to assess improvements in environmental understanding and awareness following the program's implementation. The evaluation results indicated that the collaboration between the school and the community successfully increased student participation in maintaining environmental cleanliness, fostered waste sorting habits, and strengthened social ties between the school and the surrounding community. The collaborative reflections between teachers, students, and volunteers also yielded recommendations for the program's sustainability and the development of similar curricula in other coastal schools.

The data collection techniques used in this study included participant observation, in-depth interviews, focus group discussions (FGDs), photo and video documentation, and simple formative tests. Participant observation was conducted throughout the activity to understand social interactions and collaborative dynamics among participants. Interviews were used to explore participants' perceptions, experiences, and changes in attitudes toward environmental education. FGDs were conducted to confirm the findings and ensure community involvement in the reflection process. Documentation served as visual evidence and additional analytical

material that enriched the research narrative. Data analysis was conducted inductively through stages of data reduction, categorization, and thematic interpretation to identify emerging patterns and meanings (Miles, Huberman, & Saldaña, 2014).

To maintain data validity and reliability, this study employed triangulation of sources and methods and conducted member checking with participants to ensure that the interpretation of the results aligned with actual experiences in the field (Lincoln & Guba, 1985). Conceptually, this study proceeds from the hypothesis that the greater the level of community involvement in environmental education curriculum development, the greater the increase in ecological awareness and sustainable behavior among students in coastal areas.

This research process illustrates a community-based environmental education model that connects formal learning spaces with real-life contexts in coastal communities. Through collaboration between the school, families, and the local community, SDN 1 Pasir Panjang successfully developed a curriculum model that not only emphasizes cognitive aspects but also fosters ecological awareness, social empathy, and collective responsibility for environmental sustainability on Rinca Island.

RESULT AND DISCUSSION

RESULT

The subtheme **"Waste and My Creativity"** represents a core component of the community-based environmental education curriculum developed at SDN 1 Pasir Panjang. This thematic module emerged from an authentic local challenge namely, the growing accumulation of plastic waste in the school and surrounding coastal settlements of Rinca Island. This environmental issue provided an opportunity to design learning activities that move beyond cognitive understanding toward practical engagement and behavioral transformation. Consequently, the subtheme was designed to cultivate environmental awareness, creativity, and social responsibility through experiential and participatory learning.

I. Concept and Learning Objectives

The "Waste and My Creativity" subtheme adopts the principles of *Education for Sustainable Development (ESD)*, integrating environmental knowledge, practical skills, and socio-emotional learning. The learning objectives are to ensure that students:

A. Understand different types and characteristics of waste (organic and inorganic);
B. Demonstrate the ability to sort and manage waste through simple practices;
C. Develop creativity by transforming waste into useful or aesthetic products;
D. Exhibit responsible behavior in maintaining cleanliness at school and at home; and
E. Collaborate with teachers, parents, and local actors in environmental preservation.

The subtheme was implemented over a three-week period and integrated across several subjects, including Science, Bahasa Indonesia, Civic Education, and Arts and Crafts (SBdP).

II. Curriculum Structure and Learning Process

The implementation followed a **Project-Based Learning (PjBL)** framework, allowing students to engage in a real-world creative project centered on plastic waste recycling. The curriculum was structured into three main learning phases: exploration, creation, and reflection.

a. Exploration Phase (Week 1):

Students began by observing their school environment through an activity called *"Waste Exploration."* Guided by their teachers, they collected different types of waste from the schoolyard and canteen areas, classified them, and discussed which types were recyclable. The teacher linked this activity to Science lessons (material classification)

and Bahasa Indonesia (report writing). This phase aimed to build foundational understanding of waste management through inquiry-based learning.

b. Creation Phase (Week 2):

In collaboration with local volunteers from *Arah Pemuda Indonesia (API)* and Arts teachers, students participated in creative workshops to produce plastic mosaics using collected waste materials. Each group chose a design inspired by their coastal environment such as fish, coral reefs, or boats—and constructed their artwork using pieces of colorful plastic. This activity encouraged fine motor skills, teamwork, and environmental appreciation, demonstrating that waste can become a resource for artistic expression.

c. Action and Reflection Phase (Week 3):

Students presented their works in a public exhibition titled *"From Waste to Art"*, attended by parents, teachers, and community leaders. During the event, students explained the meaning behind their artwork and shared personal reflections on environmental responsibility. Parents also testified to behavioral changes at home, such as children bringing reusable bottles or helping sort household waste. This final phase emphasized reflection and social sharing, reinforcing the moral and communal dimensions of environmental learning.

III. Actors and Their Roles

The successful implementation of the "Waste and My Creativity" subtheme relied on collaboration among multiple actors, reflecting the essence of *community-based education*. Each participant played a distinct yet interrelated role:

The implementation of the community-based environmental education curriculum at SDN 1 Pasir Panjang generated several significant findings regarding students' ecological awareness, community participation, and the integration of sustainability values into primary education. The results are presented according to the key themes that emerged from data collection and analysis: (1) improvement of students' environmental attitudes and behaviors, (2) enhancement of community involvement in school-based environmental programs, and (3) the development of collaborative learning as a pedagogical strategy in coastal education contexts.

Table 1 of Actors

Actor	Roles and Contributions
Teachers (SDN 1 Pasir Panjang)	Served as facilitators and curriculum designers, integrating the subtheme across subjects and assessing students' progress through holistic evaluation.
Students	Acted as active learners, observers, creators, and communicators who expressed environmental messages through art and daily behavior.
Parents	Assisted students in collecting recyclable materials, supported home-based waste sorting, and participated in the exhibition.
Local Volunteers (Arah Pemuda Indonesia)	Provided technical guidance on recycling and creative design, fostering motivation and community engagement.
School Leaders and Committee	Supported logistics and policy (e.g., providing sorting bins and designating exhibition spaces).
Village Officials / Community Leaders	Collaborated in school clean-up campaigns and recognized students' work as part of the village's environmental initiatives.

(Source: researcher data processing, 2025)

This collaboration created an educational ecosystem that transcended the traditional classroom boundary. Learning became a shared responsibility among the school, family, and community—enhancing both relevance and sustainability.

IV. Impacts on Learning and Community

The implementation produced tangible outcomes at three levels: individual, institutional, and communal.

At the individual level, students demonstrated clear behavioral change. Observations and interviews revealed that students began bringing their own lunch boxes, sorting waste independently, and reminding peers to keep the school clean. They also exhibited pride and ownership of their creative projects, reinforcing intrinsic motivation for environmental care.

At the school level, a new culture of environmental stewardship emerged. The school institutionalized a weekly *"Green Friday"* routine for clean-up and reflection. Teachers also transformed unused spaces into small green areas decorated with recycled pots made by students.

At the community level, the project stimulated wider participation. Parents adopted waste-sorting practices at home, and local authorities considered establishing a small "village waste bank" modeled after the school's initiative. This ripple effect exemplifies Kahn's (2010) *ecopedagogy*, wherein education becomes a catalyst for social and ecological transformation.

V. Curriculum Reflection and Transformative Value

The "Waste and My Creativity" subtheme highlights that effective environmental education depends on two critical dimensions: community participation and experiential learning. The collaboratively designed curriculum successfully shifted the paradigm from transmissive teaching toward transformative learning. Students did not merely *learn about* the environment they *learned from* and *acted for* the environment.

This aligns with Freire's (1970) philosophy of *critical pedagogy*, which asserts that education should connect lived experiences with social action. In the context of Rinca Island, community-based environmental education served as a means of empowerment, cultivating young citizens who are ecologically aware, socially engaged, and creatively expressive.

Hence, the subtheme "Waste and My Creativity" stands not only as a pedagogical experiment but also as an example of how curriculum design can function as a tool for community empowerment. This model demonstrates that even in resource-limited coastal schools, sustainability education can thrive when rooted in local realities, creative participation, and shared responsibility. It offers a replicable framework for other coastal primary schools in Indonesia aiming to integrate ecological awareness into their curriculum.

DISCUSSION

1. Strengthening Students' Environmental Awareness and Behavior

Observations and pre- and post-assessment data revealed a notable improvement in students' understanding and attitudes toward environmental care. Prior to the program, most students demonstrated limited awareness of waste management and environmental cleanliness. For instance, only 35% of students could correctly differentiate between organic and inorganic waste, and waste disposal practices were largely unstructured. After the implementation of community-based activities such as the *school clean-up campaign*, waste sorting, and mosaic creation from plastic waste students' comprehension and engagement increased significantly. Post-assessment results showed that approximately 82% of students could classify waste correctly, and more than 70% consistently participated in routine clean-up activities at school.

Qualitative observations confirmed behavioral change: students began bringing reusable containers to school, reducing plastic snack packaging, and encouraging peers to maintain classroom cleanliness. These behavioral shifts indicate that experiential learning integrated with local action has a tangible effect on internalizing environmental values among children.

This finding supports Tilbury's (2011) notion that environmental education becomes transformative when it connects conceptual learning with direct, community-based experience. Moreover, the use of creative activities such as mosaic-making provided affective engagement students expressed pride in turning waste into art, transforming what was once seen as useless into something meaningful. This creative dimension encouraged emotional connection with the idea of sustainability, consistent with the affective learning theory in environmental education (Hungerford & Volk, 2003).

2. Community Participation and Shared Responsibility

The research also found that active involvement of parents, teachers, and local volunteers was crucial in sustaining the environmental education program. Interviews revealed that before the initiative, environmental issues were perceived as the school's responsibility alone. However, during the collaborative process, parents began to take part in clean-up events, contributed materials for recycling activities, and even initiated household waste segregation inspired by their children's participation in school. Teachers reported that students' environmental habits gradually influenced practices at home, creating a ripple effect across the community.

The engagement of local volunteers many of whom were part of the *Arah Pemuda Indonesia (API)* movement further strengthened the program's continuity. They provided logistical and educational support, ensuring that the activities were contextually relevant to the local culture and environment of Rinca Island. This finding reinforces the theory of *community-based education* (Freire, 1970; O'Sullivan, 1999), which posits that meaningful education arises when learning processes are grounded in local realities and co-created with the community. Through shared responsibility, environmental education became a collective project rather than an institutional obligation. The collaboration between school and community thus transformed environmental learning into a form of participatory social practice, building both ecological literacy and social cohesion.

3. Collaborative Learning as a Pedagogical Strategy

Another major finding relates to how collaboration reshaped the learning environment at SDN 1 Pasir Panjang. Teachers who initially relied on lecture-based instruction began integrating project-based and experiential learning methods after the training and participatory workshops. Classroom observations showed that students became more active, communicative, and reflective when lessons incorporated group discussions and real-life environmental tasks. The mosaic project, for instance, encouraged teamwork, creativity, and critical thinking while reinforcing lessons about waste reduction.

This pedagogical shift illustrates the alignment of *community-based education* with *constructivist learning theory*, emphasizing that knowledge is best developed through active participation and reflection (Vygotsky, 1978). Teachers reported that involving parents and community members in classroom projects also reduced absenteeism and increased students' motivation to learn. In this sense, the community became an extended learning space—transforming the boundary between school and society into a continuum of shared learning experiences.

4. Integration of Environmental Education into Local Curriculum

The collaborative process resulted in the formulation of a contextual environmental curriculum tailored to the coastal setting of Rinca Island. The curriculum included thematic modules such as "My Environment, My Responsibility," "Waste and Creativity," and "Life by the Sea." Each theme was linked to local ecological issues, such as mangrove preservation and plastic pollution in coastal areas. Teachers adapted lesson plans to incorporate environmental topics into existing subjects like Natural Science, Art, and Civic Education.

This local curriculum model represents an innovative approach to contextualizing environmental education within the framework of *Education for Sustainable Development*

(ESD) (UNESCO, 2020). By rooting curriculum design in community participation, the program ensured that learning objectives were both relevant and practical for the students' living environment. Furthermore, integrating environmental content into multiple subjects helped normalize sustainability as a daily discourse rather than an isolated topic.

CONCLUSION

The findings demonstrate that community-based curriculum development can serve as an effective mechanism for embedding sustainability values in primary education, particularly in geographically isolated and resource-limited contexts. The case of SDN 1 Pasir Panjang highlights that environmental education is most impactful when it is participatory, experiential, and grounded in local realities. This supports the argument by Sterling (2010) that sustainability education requires a systemic shift from transmissive teaching to transformative learning where learners are not merely informed but empowered to act.

The involvement of the community transformed the traditional school model into a more inclusive learning ecosystem. Parents and local actors became *co-educators*, reinforcing the school's role as a cultural and social hub within the community. This dynamic aligns with the principles of *ecopedagogy*, which views education as a space for cultivating ecological citizenship and social responsibility (Kahn, 2010). Furthermore, the program demonstrated that even in resource-constrained environments, innovation and collaboration can yield meaningful educational transformation.

This study underscores that developing an environmental curriculum through community participation not only improves environmental literacy among students but also promotes intergenerational learning and community resilience. The integration of experiential learning, creative expression, and shared responsibility contributed to a holistic model of education that nurtures ecological awareness and strengthens social ties. These findings offer a replicable framework for other coastal and island schools seeking to align primary education with sustainable development goals.

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