

COMMUNITY-BASED MANGROVE PLANTING TO SUPPORT COASTAL CONSERVATION IN TANJUNG PASIR VILLAGE, TANGERANG REGENCY

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ABSTRACT

The coastal area of Tanjung Pasir Village, Teluknaga Subdistrict, Tangerang Regency, faces various environmental challenges, including coastal erosion, land-use change, and pressures on the sustainability of mangrove ecosystems. These conditions highlight the need for conservation activities involving the participation of multiple stakeholders. This community service activity aimed to implement a community-based mangrove planting activity to support coastal conservation in Tanjung Pasir Village. The community service activity was conducted on May 31, 2026, involving 30 participants, including Master of Management students from Matana University, their family members, local community members, village government representatives, and members of the Tourism Awareness Group (Pokdarwis). The activity adopted the Participatory Learning and Action (PLA) approach through four stages: Learn, Act, Reflect, and Evaluate. All 300 mangrove seedlings of *Avicennia* sp. and *Rhizophora* sp. were planted during the activity. The activity also provided a shared learning process on climate change and the importance of mangrove ecosystem conservation. Evaluation was conducted through an open discussion on activity implementation, challenges, and follow-up needs. No post-planting survival monitoring was conducted; therefore, seedling survival, growth, and longer-term ecological outcomes could not be assessed. The activity shows the feasibility of involving students and community stakeholders in community-based mangrove planting while highlighting the need for follow-up monitoring.

Keywords: Mangrove Conservation; Coastal Conservation; Community Participation; Participatory Learning and Action; Tanjung Pasir

INTRODUCTION

Coastal Conditions of Tanjung Pasir Village

Tanjung Pasir Village is one of the coastal areas located in Teluknaga Subdistrict, Tangerang Regency, Banten Province. This area holds significant coastal resource potential, including a mangrove ecosystem that plays an important role in maintaining coastal environmental balance. Nevertheless, the coastal area of Tanjung Pasir also faces various challenges such as erosion, land-use change, human activity, and pressures on the sustainability of mangrove vegetation.

Hidayat et al. (2021) identified spatial-use deviations in the coastal area of Tanjung Pasir that may affect coastal environmental conditions. More recent mapping by Rosmaida (2025) shows that the total mangrove vegetation area in Tanjung Pasir increased by 12.67 hectares (18.79%) between 2020 and 2024. The area classified as dense mangrove also increased from 46.03 hectares to 65.26 hectares. Despite this increase, mangrove vegetation in the study area still requires continued management and rehabilitation attention, as the 2024 mangrove area represented about 14.71% of the total study area and was classified as poor according to the referenced criteria.

At the broader coastal level, mangrove conditions in Teluknaga are also dynamic. Yumnaristya et al. (2023) examined the spatial and temporal distribution of mangrove biomass and carbon stocks in the Teluknaga coastal area over 2016-2022, highlighting the importance of continued conservation and monitoring in a coastal region experiencing land-use pressure. At the national level, Indonesia has extensive mangrove ecosystems, while mangrove management and rehabilitation remain important for maintaining coastal ecosystem sustainability (Rahmanto, 2020; Sasmito et al., 2023).

Tanjung Pasir Village therefore provides a relevant context for community-based mangrove conservation because it combines a documented history of spatial-use pressure, measurable changes in mangrove vegetation, an existing coastal mangrove ecosystem, and the availability of local stakeholders who can support conservation activities.

Previous community-based mangrove activities have also been conducted in Tanjung Pasir. Lantang et al. (2024) reported a multi-stakeholder program combining environmental education and mangrove planting in Tanjung Pasir through collaboration among state and non-state actors. Building on this local experience, the present activity was designed with a different emphasis: integrating environmental learning, field action, reflection, and evaluation within a single Participatory Learning and Action (PLA) sequence. Thus, the practical contribution of the present activity lies not in introducing mangrove planting as a new intervention in Tanjung Pasir, but in documenting the activity as a structured participatory learning-and-action process.

The Urgency of Mangrove and Coastal Conservation

Mangrove ecosystems provide important ecological functions, including coastal protection, habitat provision, and carbon storage, making their conservation relevant to the sustainability of coastal areas (Lovelock et al., 2024). In Indonesia, mangrove degradation and restoration remain important environmental challenges, while restoration efforts are increasingly connected with broader sustainable development objectives (Sasmito et al., 2023; Utami et al., 2024). These challenges highlight the importance of involving multiple stakeholders in mangrove conservation, including local communities, government actors, and higher education institutions. University-community partnerships can connect learning, community engagement, and local sustainability initiatives (Filho et al., 2023). The relevance

of such collaboration is also illustrated by the previous mangrove education and planting activity in Tanjung Pasir (Lantang et al., 2024).

Participatory approaches have also been applied in mangrove rehabilitation programs, emphasizing community involvement in conservation management (Tomaquin, 2023). The use of *Avicennia* sp. and *Rhizophora* sp. in the activity was relevant to mangrove rehabilitation because these genera have complementary ecological characteristics in coastal environments. *Avicennia* sp. is generally associated with open and dynamic coastal substrates, while *Rhizophora* sp. develops prop-root structures that can contribute to sediment stabilization (Kathiresan & Bingham, 2001; Lovelock et al., 2024).

Objectives of the Activity

The activity was designed to address the identified need for continued mangrove conservation in Tanjung Pasir Village while providing a structured opportunity for stakeholder participation and environmental learning. In contrast to a planting activity conducted as a stand-alone intervention, the present program integrated learning, field action, reflection, and evaluation through the Participatory Learning and Action (PLA) approach.

Specifically, this activity aims to: (1) implement a community-based mangrove planting activity in Tanjung Pasir Village, Teluknaga Subdistrict, Tangerang Regency; (2) support coastal conservation efforts through the planting of 300 mangrove seedlings of *Avicennia* sp. and *Rhizophora* sp.; and (3) involve students and local community members in environmental conservation activities.

LITERATURE REVIEW

Mangrove Conservation and the Coastal Ecosystem

Mangroves are intertidal ecosystems that provide multiple ecological functions, including coastal protection, carbon storage, habitat provision, and support for biodiversity and human well-being. Recent ecological research emphasizes that the effectiveness of mangrove conservation and restoration depends on understanding ecological variation, species characteristics, and the interaction between mangroves, climate pressures, and human use of coastal areas (Lovelock et al., 2024).

Mangrove conservation also increasingly involves community-based approaches because local participation can contribute to stewardship, collective action, and longer-term management of coastal ecosystems. Recent reviews of community-based conservation and restoration in coastal wetlands emphasize the importance of involving local communities and strengthening post-restoration monitoring, rather than treating restoration as a one-time intervention (Moore & Kumble, 2024). Collaborative environmental governance similarly highlights community involvement, knowledge co-production, and collective action in caring for environmental resources (Diver et al., 2024).

Mangroves comprise various species with differing ecological characteristics. Two genera relevant to coastal conservation and rehabilitation in Indonesia are *Avicennia* sp. and *Rhizophora* sp. Their ecological characteristics should be considered when selecting species for rehabilitation, because mangrove species and assemblages differ in their responses to environmental conditions and in the ecosystem functions they provide (Kathiresan & Bingham, 2001; Lovelock et al., 2024). In the present activity, *Avicennia* sp. and *Rhizophora* sp. were selected because both genera are locally relevant and provide complementary characteristics for mangrove rehabilitation.

Local evidence further supports the relevance of mangrove conservation in the Teluknaga coastal area. Yumnaristya et al. (2023) examined the spatial and temporal distribution of mangrove carbon stocks in the Teluknaga coastal area of Tangerang, demonstrating the ecological value of mangrove vegetation in the local context. Studies of mangrove degradation in Indonesia also show that anthropogenic pressures remain important drivers of mangrove loss and associated environmental impacts (Eddy et al., 2021; Utami et al., 2024). At the national level, mangrove restoration is also linked to broader sustainable development objectives, including climate action and coastal ecosystem conservation (Sasmito et al., 2023).

Participatory Learning and Action (PLA)

Participatory Learning and Action (PLA) positions participants as active contributors to a process of learning, action, reflection, and evaluation. Rather than treating participants only as recipients of information, participatory approaches encourage the use of local experience, stakeholder interaction, and collective action in addressing community-level issues. Mishra et al. (2022), for example, applied PLA to examine community participation and used participatory techniques to identify resources, barriers, facilitators, and an action plan involving multiple local stakeholders.

In community-based environmental activities, the four PLA stages can be understood as an interconnected process. The Learn stage establishes shared understanding of environmental issues and the purpose of the activity. The Act stage translates that understanding into collective action and allows participants to contribute according to their respective roles. The Reflect stage provides an opportunity to discuss field experiences, observations, and lessons learned. The Evaluate stage focuses on reviewing implementation and identifying possible improvements and follow-up actions. This participatory logic is consistent with recent work emphasizing community involvement, knowledge co-production, and collective action in environmental governance (Diver et al., 2024).

Based on these principles, the present activity conceptualizes PLA as a sequential process connecting Learn, Act, Reflect, and Evaluate with expected knowledge development, stakeholder participation, shared learning, and follow-up orientation for community-based mangrove conservation. The framework distinguishes immediate program outputs from longer-term ecological outcomes that require follow-up monitoring. As illustrated in Figure 1, the four PLA stages are connected sequentially to expected knowledge development, stakeholder participation, shared learning, and follow-up orientation for community-based mangrove conservation.

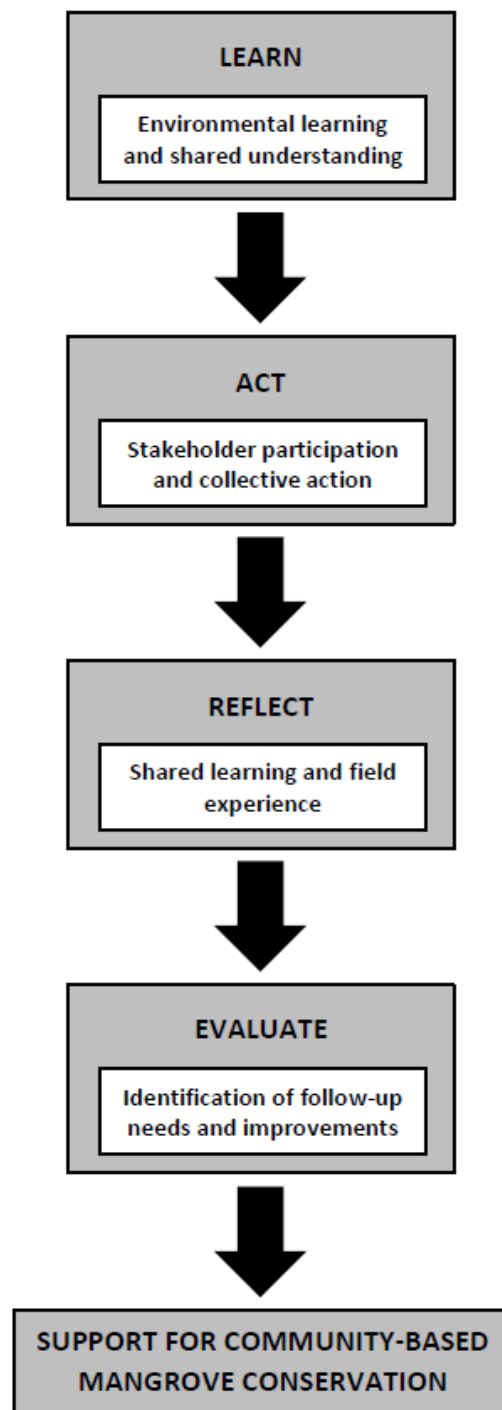


Figure 1. Conceptual Framework of PLA Implementation for Community-Based Mangrove Conservation

The activity was expected to generate immediate outputs in the form of completed mangrove planting, stakeholder involvement, and shared learning. Longer-term outcomes, including seedling survival, mangrove growth, and ecological recovery, require follow-up monitoring and therefore cannot be concluded from the present activity.

RESEARCH METHOD

The PLA Approach

This activity used the Participatory Learning and Action (PLA) approach, which emphasizes shared learning, active participation, field action, reflection, and evaluation. The approach was selected to structure the community service activity as a sequence of learning, action, reflection, and evaluation rather than as a planting activity alone. The stages of PLA used consisted of:

1. Learning (Learn): shared learning on climate change and mangrove conservation.
2. Action (Act): implementation of mangrove planting.
3. Reflection (Reflect): discussion and reflection on experiences during the activity.
4. Evaluation (Evaluate): evaluation of the activity's implementation and follow-up plans.

The four stages were implemented sequentially during the activity. Participant involvement differed according to the role of each stakeholder group and the activity stage, as described in Section 3.2 and Table 2.

Location, Time, and Participants

The activity was conducted in Tanjung Pasir Village, Teluknaga Subdistrict, Tangerang Regency, Banten Province, on May 31, 2026. The planting site was selected in coordination with the village government based on the availability of a designated coastal area for mangrove planting and its suitability for community-based conservation activities. Prior to planting, the activity team and local stakeholders conducted a direct visual observation of the designated area to identify the planting location and its general field conditions. No formal environmental assessment or quantitative baseline measurement was conducted before the activity. A total of 30 participants took part in the activity. The participants comprised 30 participants consisting of students from the first cohort of the Master of Management program of Matana University and their family members, representatives of the Tourism Awareness Group (Pokdarwis), local community members, and three representatives of the village government. Students and family members participated voluntarily, while local community members, village government representatives, and Pokdarwis were involved through coordination with the village head. The roles of the participant groups were distributed according to the needs of the activity. Students and family members attended the socialization session and participated in planting. Pokdarwis supported field coordination and documentation, local community members assisted with site preparation and technical aspects of planting, while village government representatives facilitated the planting location and provided the seedlings.

Participants were informed that photographs documenting the activity would be used for academic publication, and permission was obtained for the use of photographs in this article.

Table 1. Profile of the Community Service Activity

COMPONENT	DESCRIPTION
Location	Tanjung Pasir Village, Teluknaga Subdistrict, Tangerang Regency, Banten
Date	May 31, 2026
Institution	Matana University
Participants	30 people

Participant composition	The planting activity involved all 30 participants, comprising 9 students, 8 family members, 4 Pokdarwis representatives, 3 village government representatives, and 6 local community members
Seedlings	300 seedlings
Mangrove genera	<i>Avicennia</i> sp. and <i>Rhizophora</i> sp.

Implementation Stages Based on PLA

The implementation of this community service activity was designed based on the Participatory Learning and Action (PLA) approach, which emphasizes the active involvement of participants at every stage of the activity. This approach was implemented through four main stages: Learn, Act, Reflect, and Evaluate. Each stage was connected to the next so that the activity combined shared learning, field action, reflection on experience, and evaluation of implementation.

Table 2. Stages of Activity Implementation Based on the PLA Approach

PLA STAGE	TIME (WIB)	ACTIVITY
Learn	08.00 – 09.30	Participant registration, opening ceremony, and socialization on climate change and mangrove conservation
Act	09.30 – 12.00	Planting of 300 mangrove seedlings (<i>Avicennia</i> sp. and <i>Rhizophora</i> sp.)
Reflect	13.00 – 14.30	Joint discussion and reflection on experiences during the activity
Evaluate	14.30 – 15.00	Activity evaluation and closing

The learning stage was carried out through an educational session aimed at providing participants with an initial understanding of climate change and the importance of mangrove conservation. The session served as the shared-learning component before field action.

The action stage was realized through the planting of 300 mangrove seedlings of *Avicennia* sp. and *Rhizophora* sp. The seedlings were provided by the village government and were in good condition and ready for planting. No technical measurements of seedling age, height, or other physiological characteristics were recorded as part of the activity. Planting was carried out jointly by the participants under field guidance. The seedlings were secured to short bamboo supports using ties and were planted together with their polybags. Local community members assisted with site preparation and technical aspects of planting, while Pokdarwis supported coordination and documentation. Specific planting distance, planting depth, zonation, and tidal measurements were not systematically recorded during the activity. Planting was conducted at the designated site according to the field conditions and practical guidance provided during implementation.

The reflection stage involved participants from the different stakeholder groups in an open group discussion after the planting activity. Participants shared their experiences, field challenges, and lessons learned, allowing the experience of direct field action to be discussed collectively. No formal reflection instrument, questionnaire, or pre-test/post-test was used; the reflection relied on direct verbal exchange among participants. The discussion was guided by several topics, including participants' experiences during planting, field challenges, lessons learned, and possible follow-up actions for mangrove conservation.

The evaluation stage involved the participating stakeholder groups in an open discussion to review the implementation of the activity, challenges encountered during fieldwork, and possible follow-up actions for mangrove conservation. No structured evaluation instrument was administered, so the feedback was interpreted descriptively based on participants' verbal responses during the discussion. Participants' feedback was not recorded through formal transcripts, questionnaires, or a structured coding system. The feedback obtained during the open discussion was reviewed descriptively to identify recurring comments concerning participants' experiences, field challenges, lessons learned, and possible follow-up actions.

The implementation indicators comprised completion of the four PLA stages, participation of 30 participants, planting of 300 mangrove seedlings, and completion of the reflection and evaluation discussions. These indicators were used to assess implementation of the activity rather than long-term ecological impact. No systematic post-planting monitoring was conducted to assess seedling survival or growth. Therefore, longer-term ecological outcomes of the planting activity could not be assessed within this activity.

RESULTH AND DISCUSSION

Learning Stage

The learning stage was carried out through an educational session on climate change and the importance of mangrove conservation. The session involved participants from the different stakeholder groups in a shared learning process before the planting activity. The learning stage was conducted according to the activity schedule from 08.00 to 09.30 WIB, covering participant registration, the opening ceremony, and socialization on climate change and mangrove conservation. The session preceded the field planting activity and served as the learning component of the PLA process.

This approach is consistent with the participatory learning principles of PLA, in which participants engage in shared learning, discussion, and action planning (Mishra et al., 2022). Rahman et al. (2025) highlight the role of environmental education in mangrove conservation activities as a means of providing participants with knowledge about coastal environmental issues.



Figure 2. Participants at the Beginning of the Community Service Activity in Tanjung Pasir Village

Action Stage

The action stage was realized through the planting of 300 mangrove seedlings consisting of *Avicennia* sp. and *Rhizophora* sp. The activity involved 30 participants representing Master of Management students and family members, local community members, village government representatives, and Pokdarwis. Participants contributed according to their respective roles: students and family members participated in planting, local community members assisted with site preparation and practical planting activities, Pokdarwis supported field coordination and documentation, while village government representatives facilitated the planting location and provided the seedlings. The activity is documented in Figures 3-6, showing the participants displaying the seedlings prior to planting and their direct involvement throughout the planting process. The involvement of multiple stakeholder groups is consistent with participatory approaches reported in mangrove rehabilitation programs, where community participation is an important component of conservation management (Tomaquin, 2023).



Figure 3. Participants Displaying Mangrove Seedlings Prior To Planting

The activity used seedlings of *Avicennia* sp. and *Rhizophora* sp. provided by the village government. These genera have complementary ecological characteristics relevant to coastal environments. *Avicennia* sp. is generally associated with open and dynamic coastal substrates, while *Rhizophora* sp. develops prop-root structures that can contribute to sediment stabilization (Kathiresan & Bingham, 2001; Lovelock et al., 2024).



Figure 4. Participants Planting Mangrove Seedlings in the Coastal Area of Tanjung Pasir Village



Figure 5. Mangrove Seedling Planting Activity in the Designated Coastal Area of Tanjung Pasir Village



Figure 6. Participants Involved in the Mangrove Planting Activity

The selection of Tanjung Pasir Village as the activity location was also based on the condition of the coastal area, which continues to face various environmental pressures and requires ongoing conservation efforts. Hidayat et al. (2021) explain that the coastal area of Tanjung Pasir faces pressure due to changes in spatial use with the potential to affect coastal environmental conditions. In addition, Rosmaida (2025) shows that mangrove vegetation in Tanjung Pasir Village still requires attention in terms of conservation and rehabilitation efforts. At the national level, mangrove conservation is also a government priority in maintaining the sustainability of the coastal ecosystem, as reflected in the National Mangrove Map compiled (Rahmanto, 2020). The action stage was completed within the scheduled period of 09.30-12.00 WIB, with 300 seedlings planted. These findings demonstrate completion of the planned planting activity, but they do not establish ecological outcomes because seedling survival, growth, erosion reduction, biodiversity, and carbon-related changes were not measured.

Reflection Stage

The reflection stage was carried out after the mangrove planting activity had been completed. At this stage, participants took part in a joint discussion and reflection session to share experiences, convey the constraints they had faced during the activity, and discuss the lessons learned from carrying out the activity in the field.

During the open reflection discussion, participants identified the muddy terrain, changing tidal conditions, and the practical planting process as field experiences that required cooperation and coordination. Within the PLA approach, reflection provides an opportunity for participants to share experiences, identify challenges, and develop shared learning from the

activity (Mishra et al., 2022). The participation of students, family members, local community members, village government representatives, and Pokdarwis also illustrates how different stakeholder groups contributed to a shared environmental activity. This collaborative involvement is consistent with the emphasis on stakeholder participation and collective action in environmental governance (Diver et al., 2024).

Evaluation Stage

The evaluation stage was carried out to review the overall implementation of the activity, including the conformity of implementation with the activity plan, the constraints encountered, and the potential for developing future activities. Evaluation was conducted participatorily through joint discussion with participants. Within the PLA approach, evaluation can provide an opportunity to review the implementation process, participants' experiences, and possible follow-up actions (Mishra et al., 2022).

Evaluation also served as a means for participants to provide input regarding the implementation of the activity and opportunities for developing future conservation activities. Based on the evaluation discussion, similar conservation activities need to be continued through regular monitoring of mangrove growth and increased involvement of the community and higher education institutions. The importance of post-planting monitoring is supported by previous mangrove rehabilitation studies showing that seedling survival can vary according to environmental and methodological conditions and that restoration outcomes can be assessed through indicators such as survival, growth, and seedling health (Gorman et al., 2022; Kusmana & Rifana, 2023; Oktaviani et al., 2026).

Based on the implementation indicators, the planned activity sequence was completed, including the four PLA stages and the planting of 300 mangrove seedlings. The evaluation discussion also identified the need for continued monitoring and future stakeholder involvement.



Figure 7. Participants During the Closing Session of the Mangrove Planting Community Service Activity

Implications of the Activity for Coastal Conservation

The activity has implications primarily in terms of community participation, shared learning, and support for ongoing coastal conservation efforts. Because ecological outcomes were not quantitatively measured, the present activity should not be interpreted as evidence of changes in seedling survival, mangrove growth, erosion, biodiversity, or carbon storage.

Mangrove ecosystems provide important ecological functions, including coastal protection, habitat provision, and carbon storage (Lovelock et al., 2024). In Indonesia, mangrove restoration is also connected to broader sustainable development objectives (Sasmito et al., 2023). In the context of this activity, however, these functions represent the broader environmental rationale for mangrove conservation rather than measured outcomes of the planting activity.

From a social standpoint, the activity created an opportunity for students, family members, local residents, village officials, and Pokdarwis to participate in a shared environmental activity. Such stakeholder collaboration is consistent with the role of community participation and collaborative governance in environmental conservation (Diver et al., 2024; Moore & Kumble, 2024). The involvement of higher education participants also illustrates the potential of university-community collaboration in connecting learning with local sustainability initiatives (Lantang et al., 2024; Filho et al., 2023).

For Pokdarwis and other local stakeholders, the planted area may provide a basis for future community-based environmental education or ecotourism initiatives if the mangrove area is maintained and appropriately managed. Such a possibility represents a longer-term opportunity rather than an outcome demonstrated by the present activity, since no assessment of tourism use, visitor potential, or economic benefits was conducted.

The activity also aligns conceptually with SDG 13 (Climate Action) and SDG 14 (Life Below Water) through its focus on mangrove conservation and stakeholder participation (Sasmito et al., 2023). However, this alignment should be understood as a contribution at the activity level rather than a measured contribution to specific SDG indicators.

The present activity is comparable to previous community-based mangrove initiatives that combine environmental education, planting, and stakeholder participation. Tomaquin (2023) highlights the role of community participation in mangrove rehabilitation, while Lantang et al. (2024) documented collaboration among state and non-state actors in mangrove education and planting in Tanjung Pasir. The present activity similarly combined learning, field action, and stakeholder participation; however, unlike mangrove rehabilitation programs that incorporated post-planting monitoring, such as the assessment of seedling growth and biomass reported by Rahman et al. (2025), the present activity did not collect follow-up data on seedling survival or ecological change. Nevertheless, this article does not specifically measure the activity's contribution to the achievement of these SDG targets. Therefore, the implications discussed in this article are limited to the documented implementation, participant involvement, shared learning, and potential contribution to continued community-based conservation. Longer-term ecological and socio-economic outcomes require follow-up monitoring and assessment.

CONCLUSION

The community-based mangrove planting activity in Tanjung Pasir Village was implemented using the Participatory Learning and Action (PLA) approach through four stages: Learn, Act, Reflect, and Evaluate. The main output of the activity was the planting of 300 mangrove seedlings of *Avicennia* sp. and *Rhizophora* sp., involving 30 participants from

students and family members, local community members, village government representatives, and Pokdarwis. Beyond the planting activity itself, the practical contribution of the program was to integrate field action with shared learning, reflection, and evaluation, providing a structured community-based approach to mangrove conservation activities. However, this was a one-day activity and no follow-up monitoring was conducted to measure seedling survival, mangrove growth, erosion reduction, biodiversity, or other ecological changes. Therefore, the activity demonstrates completion of the planned community-based planting process and documents stakeholder participation and shared learning, rather than measurable ecological impacts.

RECOMMENDATIONS

Future activities should establish a post-planting maintenance and monitoring arrangement involving the village government, Pokdarwis, and the local community. Monitoring should be conducted at 1, 3, 6, and 12 months after planting, with indicators including seedling survival rate, seedling growth, physical condition, and the need for replanting or maintenance (Gorman et al., 2022; Kusmana & Rifana, 2023; Oktaviani et al., 2026). Pokdarwis and local community members can support field observation and documentation, while the village government can facilitate coordination and continuity of the monitoring activities.

Higher education institutions can also develop sustainable conservation activities through collaboration with the community and local stakeholders, whether in the form of community service activities, environmental education, or mangrove conservation monitoring and mentoring (Filho et al., 2023; Lantang et al., 2024). For Pokdarwis, the planted mangrove area could be developed as a community-based environmental education and potential ecotourism resource, provided that the mangrove vegetation is adequately maintained and its development is evaluated over time. Future higher-education community service programs can support this process through periodic mentoring, environmental education, monitoring assistance, and capacity building for local stakeholders.

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