Strengthening Volunteer Management and Corporate Social Responsibility Partnerships For Mangrove Forest Conservation of Pulau Ketam Perlis

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Abstract

This report presents the outcomes of a collaborative program between Universitas Pembangunan Panca Budi (UNPAB), Indonesia, and Politeknik Tuanku Syed Sirajuddin (PTSS), Malaysia, aimed at strengthening volunteer management and enhancing corporate social responsibility (CSR) partnerships in the conservation of mangrove forests at Pulau Ketam, Perlis. The program was designed to address ecological degradation, community livelihood challenges, and the need for sustainable coastal ecosystem management. By integrating environmental conservation with human capital development, financial technology applications, and CSR collaboration, the initiative sought to create a holistic model of sustainability. A situational analysis identified key challenges, including limited volunteer coordination, insufficient long-term CSR engagement, and gaps in community empowerment. To address these issues, a structured framework for volunteer management, digital-based financial support systems, and inclusive community training were implemented. The program emphasized student involvement through project-based learning, thereby aligning academic outcomes with real-world environmental and social challenges. Evaluation results demonstrated improvements in community participation, increased awareness of environmental stewardship, and stronger CSR contributions to local conservation efforts. The findings of this report highlight that the synergy of academic institutions, corporate partners, and local communities can serve as a replicable model for mangrove conservation in Southeast Asia. The integration of technology, sustainable finance, and human capital management into conservation strategies offers new pathways for addressing environmental degradation while simultaneously fostering community resilience and academic innovation.

Keywords: Mangrove Conservation, Pulau Ketam, Volunteer Management, Corporate Social Responsibility, Financial Technology, Human Capital Development, Sustainable Partnership

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Introduction

The mangrove ecosystem of Pulau Ketam in Perlis, Malaysia, represents a vital natural asset for both environmental sustainability and community livelihoods. Mangroves function as natural buffers against coastal erosion, nurseries for fish and crustaceans, carbon sinks that mitigate climate change, and cultural landscapes supporting the socio-economic well-being of coastal populations. However, similar to other mangrove ecosystems in Southeast Asia, Pulau Ketam faces increasing ecological threats from deforestation, aquaculture expansion, pollution, and the overarching impacts of climate variability. Previous studies have shown that more than 35% of global mangroves have been lost over the past two decades, with Southeast Asia experiencing the highest rates of deforestation (Valiela et al., 2001; Richards & Friess, 2016). In Malaysia, research indicates that mangrove areas have declined due to land conversion and unsustainable exploitation, highlighting the urgent need for integrated conservation frameworks (Alongi, 2015). Within this context, the partnership between Universitas Pembangunan Panca Budi (UNPAB) of Indonesia and Politeknik Tuanku Syed Sirajuddin (PTSS) of Malaysia offers a timely opportunity to strengthen volunteer management and enhance Corporate Social Responsibility (CSR) partnerships in safeguarding the mangrove ecosystems of Pulau Ketam.

Volunteer engagement has become an increasingly important mechanism for supporting community-based conservation. Studies by Measham and Barnett (2008) and Bruyere and Rappe (2007) highlight that volunteers contribute not only labor but also raise awareness and foster social capital within communities. However, research also emphasizes that unstructured volunteer activities often fail to deliver long-term ecological benefits (Clary & Snyder, 1999). In the case of Pulau Ketam, existing volunteer initiatives are largely one-off events, such as ceremonial tree plantings, which while useful for publicity, lack sustainability. There is no established system for volunteer recruitment, capacity building, task allocation, and recognition. Without such a system, retention becomes problematic, and volunteers cannot be mobilized for complex ecological tasks such as biodiversity monitoring or community education. Previous case studies in Thailand and Indonesia have shown that structured volunteer programs, when linked with academic institutions, lead to more impactful conservation outcomes (Datta et al., 2012; Primavera, 2000). Thus, the implementation of a volunteer management framework at Pulau Ketam—comprising training, monitoring, and recognition—would help transform volunteers from temporary participants into long-term conservation actors.

Parallel to the issue of volunteer management is the underutilization of Corporate Social Responsibility as a strategic tool for mangrove conservation. The CSR movement in Malaysia has grown significantly over the past two decades, particularly after the Bursa Malaysia requirements on sustainability reporting (Amran et al., 2013). Yet, CSR practices often remain short-term and philanthropic in nature, emphasizing visibility rather than sustainability. Previous research by Jamali and Mirshak (2007) and Carroll and Shabana (2010) stresses that CSR, if restructured under the Creating Shared Value (CSV) paradigm, can integrate environmental and social goals with core business strategies, producing shared benefits. In the context of mangrove conservation, fisheries and aquaculture industries stand to benefit directly from healthier ecosystems, while tourism operators can integrate mangrove protection into eco-tourism programs. Empirical evidence from the Philippines and Indonesia suggests that CSR-driven conservation, when coupled with academic partnerships, results in measurable ecological improvements and greater community empowerment (Walton et al., 2014; Susanto et al., 2018). In Pulau Ketam, CSR initiatives could be reoriented toward sustainable livelihoods, eco-tourism, and long-term monitoring, with UNPAB and PTSS providing scientific guidance and accountability mechanisms.

The UNPAB–PTSS partnership is uniquely positioned to bridge academic research, volunteer engagement, and CSR collaboration. Previous cross-border academic projects in Southeast Asia have demonstrated the value of such partnerships in tackling shared environmental challenges (Cheung & Hamilton, 2018). Through joint research, student exchanges, and community-based projects, this partnership can strengthen ecological knowledge and foster regional solidarity. Volunteer programs can be transformed into international learning platforms, equipping students from both institutions with ecological competencies while instilling a stronger sense of environmental stewardship. Moreover, the partnership can provide evidence-based recommendations for policymakers in Perlis to mainstream mangrove conservation into regional development agendas, ensuring alignment with the United Nations Sustainable Development Goals (SDGs), particularly SDG 13 (Climate Action), SDG 14 (Life Below Water), and SDG 15 (Life on Land). By acting as knowledge brokers, UNPAB and PTSS can also serve as trusted partners for corporations, ensuring that CSR initiatives are scientifically grounded and socially inclusive.

Despite these opportunities, significant challenges remain. Previous studies highlight that financial and logistical constraints frequently undermine conservation projects (Alongi, 2002; Spalding et al., 2010). Ensuring long-term commitment from volunteers and corporate partners is difficult when incentives are lacking or when economic pressures lead to short-term priorities. Additionally, the integration of multiple stakeholders requires platforms for communication and governance, which are often fragmented in conservation contexts (Bennett et al., 2017). Socio-economic tensions also persist, as local communities may depend on mangrove exploitation for livelihoods, creating conflicts between conservation and survival needs (Barbier, 2007). Lessons from Indonesia and the Philippines underscore the importance of integrating conservation with community livelihood programs, such as sustainable aquaculture, eco-tourism, and alternative income generation (Primavera et al., 2012). For Pulau Ketam, balancing ecological restoration with socio-economic development is therefore essential for ensuring both ecological resilience and community support.

In conclusion, the conservation of Pulau Ketam's mangroves requires a multidimensional approach that integrates structured volunteer management and strategically designed CSR programs. Previous studies across Southeast Asia provide evidence that when volunteers are effectively trained, managed, and recognized, their contributions extend beyond symbolic actions into meaningful ecological outcomes. Similarly, when CSR moves beyond philanthropy to align with shared value creation, corporations become long-term stakeholders in conservation. The partnership between UNPAB and PTSS provides a critical platform to operationalize these insights, bridging academic research, volunteer engagement, corporate collaboration, and policy advocacy. If successfully implemented, this model could position Pulau Ketam as a best-practice site for mangrove conservation in the region, offering a replicable framework for other coastal communities facing similar challenges. Ultimately, the sustainability of Pulau Ketam's mangroves will depend on the ability of all stakeholders to collaborate across institutional, national, and disciplinary boundaries, guided by both scientific evidence and community participation.

1.1 Partner's Problems

Despite the promising collaboration between Universitas Pembangunan Panca Budi (UNPAB) in Indonesia and Politeknik Tuanku Syed Sirajuddin (PTSS) in Malaysia, the partnership is not without significant challenges. Both institutions share the common goal of strengthening volunteer management and fostering effective Corporate Social Responsibility (CSR) collaborations for mangrove forest conservation, yet several internal and external obstacles limit the full realization of this agenda.

One of the foremost problems lies in institutional constraints. Academic institutions often operate with limited financial resources for large-scale field implementation. While research projects and student exchange programs are feasible, sustaining long-term community-based conservation requires consistent funding for logistics, training, and monitoring. Previous studies on university-led conservation programs highlight that resource limitations often reduce projects to short-term interventions, creating gaps in continuity and impact (Primavera, 2000; Alongi, 2002). This problem becomes more complex when international partnerships are involved, as differences in budget allocation mechanisms and administrative procedures can delay or restrict program execution.

Another challenge is coordination and communication barriers across institutions and stakeholders. UNPAB and PTSS operate within different national systems, each with unique academic priorities, regulatory environments, and community engagement models. Aligning these systems into a cohesive framework requires intensive coordination, which is often undermined by differences in institutional calendars, bureaucratic requirements, and cultural expectations. Misalignments in schedules and objectives may result in fragmented activities that fail to achieve integrated outcomes.

There are also community-related challenges that both partners face. The residents of Pulau Ketam, like many coastal communities in Southeast Asia, rely heavily on natural resources for their livelihoods. Activities such as small-scale aquaculture, fishing, and limited mangrove wood harvesting are deeply embedded in their economic and cultural practices. Consequently, conservation initiatives, when not coupled with livelihood alternatives, can generate resistance from local stakeholders. Previous research has shown that conservation projects which fail to address socio-economic realities often encounter low levels of community participation and even opposition (Barbier, 2007; Bennett et al., 2017). UNPAB and PTSS must therefore address the delicate balance between environmental sustainability and economic survival in their joint programs.

From the perspective of corporate partnerships, the problem lies in the superficial nature of CSR practices. Many companies are willing to provide financial support or participate in symbolic activities, but few commit to long-term ecological investments. This reflects a broader issue in Malaysia and the region, where CSR often remains philanthropic rather than strategic (Amran et al., 2013; Jamali & Mirshak, 2007). For the UNPAB–PTSS partnership, this means limited opportunities to secure sustainable CSR collaborations that align with conservation objectives. Without effective academic-industry engagement frameworks, CSR contributions risk being episodic, underfunded, or poorly monitored.

Finally, there are logistical and political challenges that complicate conservation efforts. Conducting transnational programs requires navigating visa regulations, cross-border travel expenses, and compliance with different environmental governance frameworks in Malaysia and Indonesia. Furthermore, conservation work in Pulau Ketam must align with local government policies in Perlis, which may not always prioritize environmental issues given competing development agendas. This creates uncertainty for program continuity and necessitates additional advocacy and negotiation efforts from both institutions.

In summary, the UNPAB–PTSS partnership faces multiple interrelated problems; financial limitations, coordination difficulties, community livelihood tensions, superficial CSR practices, and governance challenges. Addressing these obstacles requires a comprehensive strategy that combines stronger institutional commitment, multi-stakeholder dialogue, integration of livelihood development into conservation, and the redesign of CSR into long-term, shared-value partnerships. Without resolving these problems, the potential of the partnership to create transformative change in Pulau Ketam's mangrove conservation will remain constrained.

1.2 Partner's Problems and Proposed Solutions

Although the partnership between Universitas Pembangunan Panca Budi (UNPAB), Indonesia, and Politeknik Tuanku Syed Sirajuddin (PTSS), Malaysia, offers significant potential for strengthening volunteer management and enhancing CSR-driven conservation in Pulau Ketam, several problems remain that hinder its effectiveness. These challenges are multifaceted, involving institutional, social, corporate, and governance dimensions. Without addressing these issues strategically, the partnership risks producing short-term outcomes without achieving long-term ecological resilience.

One of the major problems is financial and resource limitation. Both institutions face budgetary constraints that limit their ability to conduct large-scale and sustained conservation programs. While research projects and student exchange initiatives are possible, consistent funding for mangrove restoration, volunteer training, and monitoring systems remains insufficient. Previous studies demonstrate that many academic-led conservation programs fail to achieve impact because of fragmented and temporary funding mechanisms (Alongi, 2002; Primavera, 2000). To solve this issue, the partnership should establish a sustainable funding model by combining multiple sources: research grants, CSR contributions, and government support. Additionally, integrating conservation into international research collaborations could secure long-term funding while aligning with global environmental agendas such as the UN Sustainable Development Goals (SDGs).

Another critical challenge is coordination and communication. Differences in academic calendars, bureaucratic procedures, and institutional priorities between UNPAB and PTSS often delay implementation. Misalignments can fragment activities and weaken synergy between research, volunteer engagement, and community-based action. A proposed solution is to create a joint coordination platform, such as a cross-border steering committee composed of representatives from both institutions, local government, corporate partners, and community leaders. This platform would harmonize schedules, set shared objectives, and monitor progress, ensuring that activities are complementary rather than duplicative.

At the community level, there is resistance from local stakeholders whose livelihoods depend on mangrove resources. Many residents of Pulau Ketam rely on fishing, aquaculture, and occasional wood harvesting, which are sometimes in conflict with conservation objectives. Research has shown that conservation projects that ignore socio-economic contexts are often met with low participation or even resistance (Barbier, 2007; Bennett et al., 2017). To address this, the partnership should integrate livelihood-based solutions into conservation programs. For example, promoting sustainable aquaculture, eco-tourism, and handicraft industries based on mangrove resources can create economic incentives for local communities to protect rather than exploit the ecosystem. Training and micro-financing schemes could further empower communities, ensuring that conservation is perceived as both an environmental and economic opportunity.

From the perspective of corporate involvement, CSR practices remain largely symbolic and short-term. Companies are often interested in tree planting ceremonies or one-off donations, but few are committed to long-term ecological investment. This reflects broader regional trends where CSR is driven by visibility rather than sustainability (Amran et al., 2013; Jamali & Mirshak, 2007). A proposed solution is to reframe CSR from philanthropy toward Creating Shared Value (CSV). UNPAB and PTSS could act as mediators, designing CSR programs that directly benefit corporate sustainability while advancing conservation. For example, fisheries companies could invest in mangrove rehabilitation to sustain fish populations, while tourism operators could partner with academic institutions to develop eco-tourism packages that promote mangrove education. By linking CSR with business interests, corporations would have stronger incentives to commit to long-term conservation partnerships.

Finally, there are logistical and governance challenges. Conducting transnational programs involves navigating visa requirements, travel costs, and differing regulatory frameworks between Malaysia and Indonesia. Moreover, local government priorities in Perlis may focus more on economic development than environmental protection, creating policy gaps that hinder conservation efforts. To mitigate this, the partnership should invest in policy advocacy and government engagement. By producing evidence-based research and policy briefs, UNPAB and PTSS can influence local authorities to integrate mangrove conservation into development plans. Establishing Memoranda of Understanding (MoUs) with local agencies can also ensure official recognition and support for conservation activities, thus reducing bureaucratic obstacles.

In summary, the problems faced by the UNPAB–PTSS partnership, limited resources, weak coordination, community livelihood tensions, superficial CSR practices, and governance barriers, are complex but solvable. The proposed solutions emphasize the creation of sustainable funding models, joint coordination platforms, livelihood-oriented conservation strategies, CSR reframing into CSV, and strong policy advocacy. By adopting these strategies, the partnership can transform its challenges into opportunities, positioning Pulau Ketam as a model site for collaborative mangrove conservation in Southeast Asia.

Methods

The proposed approach for strengthening volunteer management and CSR partnerships in the conservation of mangrove forests at Pulau Ketam is grounded in a participatory and collaborative methodology. This method integrates academic research, community engagement, corporate collaboration, and policy advocacy to ensure that conservation initiatives are both ecologically effective and socially inclusive. The approach recognizes that mangrove conservation cannot be achieved by a single actor; instead, it requires coordinated actions across multiple stakeholders, including academic institutions, local communities, corporations, and government authorities.

The first methodological step is baseline assessment and stakeholder mapping. Before initiating conservation activities, it is essential to conduct a comprehensive ecological and socio-economic survey of the mangrove ecosystem in Pulau Ketam. This includes mapping current mangrove coverage, identifying degraded areas, and analyzing biodiversity conditions, while also assessing community livelihood practices and corporate interests in the area. Stakeholder mapping will help identify key actors—such as fishing communities, aquaculture operators, tourism businesses, NGOs, and local government agencies—and clarify their roles, interests, and potential contributions to conservation. This process ensures that interventions are evidence-based and tailored to the local context.

The second step is structured volunteer management. Building on the findings of the baseline assessment, volunteers will be recruited from universities, schools, NGOs, and the local community. The method involves a clear cycle of volunteer management: recruitment, orientation, capacity building, task assignment, monitoring, and recognition. Training modules will be developed jointly by UNPAB and PTSS to equip volunteers with ecological knowledge (e.g., mangrove biology, biodiversity monitoring, waste management) and social skills (e.g., community engagement, environmental education). Regular monitoring and evaluation will be conducted to assess volunteer performance, while recognition systems such as certificates, awards, or academic credits will be provided to sustain long-term motivation.

The third step is CSR partnership development. Instead of relying on ad-hoc or philanthropic CSR, the proposed method emphasizes the Creating Shared Value (CSV) model. This involves aligning corporate sustainability goals with mangrove conservation. Fisheries companies will be engaged to support mangrove rehabilitation as a means of sustaining fish stocks, while tourism operators will collaborate in promoting eco-tourism packages centered

on mangrove education. The role of UNPAB and PTSS will be to mediate and provide scientific expertise, ensuring that CSR initiatives are not only symbolic but also measurable and impactful. A memorandum of understanding (MoU) framework will be established to formalize long-term corporate commitments, monitored by academic partners to ensure accountability.

The fourth methodological component is community-based conservation and livelihood integration. Conservation cannot succeed without addressing the socio-economic realities of the Pulau Ketam community. Therefore, community members will be directly involved in mangrove rehabilitation, eco-tourism development, and alternative livelihood initiatives. Training workshops, supported by both universities and corporate partners, will focus on sustainable aquaculture, handicrafts from mangrove resources, and waste recycling projects. This participatory approach ensures that conservation is perceived as an opportunity for economic empowerment rather than a restriction on livelihood practices.

The fifth step is policy advocacy and institutional alignment. Research findings and lessons learned from volunteer and CSR programs will be documented into policy briefs and presented to local authorities in Perlis. The goal is to mainstream mangrove conservation into regional development planning, ensuring that environmental objectives are institutionalized rather than treated as temporary projects. UNPAB and PTSS will collaborate in producing academic publications, policy recommendations, and public campaigns to increase awareness and strengthen government support.

Finally, the entire approach will be guided by monitoring, evaluation, and adaptive management. A joint monitoring framework will be established to measure ecological outcomes (such as mangrove survival rates, biodiversity levels, and carbon sequestration) as well as social outcomes (such as volunteer retention, community income improvements, and corporate participation). Periodic evaluations will allow stakeholders to adapt strategies based on successes and challenges, ensuring continuous learning and improvement.

In summary, the proposed method combines ecological science, community participation, corporate collaboration, and policy engagement into a unified framework. Through structured volunteer management, strategic CSR partnerships, livelihood integration, and policy advocacy, the UNPAB–PTSS partnership can establish a model of sustainable mangrove conservation in Pulau Ketam. This participatory and multi-stakeholder approach not only addresses immediate ecological challenges but also lays the foundation for long-term environmental resilience and socio-economic development.

The proposed approach integrates ecological science, volunteer management, corporate collaboration, and policy advocacy in order to create a sustainable mangrove conservation model at Pulau Ketam. The stages of this method, the actors involved, and the expected outputs are summarized in the following table:

Table 1. Proposed Approach Method

Stage	Objectives	Key Actors Involved	Expected Outputs
Baseline Assessment & Stakeholder Mapping	Assess ecological conditions and socio-economic dynamics; identify key stakeholders.	UNPAB & PTSS researchers, local community leaders, NGOs, government agencies.	Ecological survey reports, livelihood analysis, stakeholder map.
Volunteer Management	Recruit, train, and mobilize volunteers for mangrove rehabilitation and awareness programs.	University students, NGOs, local youth, community organizations.	Volunteer recruitment system, training modules, regular monitoring and recognition mechanisms.
CSR Partnership Development	Build long-term collaborations with corporations through CSV	Fisheries industry, tourism companies, private sector, UNPAB & PTSS.	MoUs with corporate partners, sustainable funding support, CSR programs

Stage	Objectives	Key Actors Involved	Expected Outputs
	(Creating Shared Value) model.		aligned with conservation goals.
Community-Based Conservation & Livelihood Integration	Empower local communities through sustainable practices linked with conservation.	Local households, cooperatives, NGOs, CSR partners.	Eco-tourism programs, sustainable aquaculture projects, handicrafts and alternative livelihoods.
Policy Advocacy & Institutional Alignment	Mainstream conservation into government policies and regional development agendas.	UNPAB, PTSS, local and regional government, policy makers.	Policy briefs, government recognition, integration of mangrove conservation into development plans.
Monitoring, Evaluation & Adaptive Management	Ensure accountability and improve programs through continuous feedback.	UNPAB & PTSS researchers, corporate partners, local government.	Monitoring reports, biodiversity indicators, volunteer retention data, adaptive strategies for improvement.

2.1 Work Procedure

The implementation of mangrove conservation at Pulau Ketam through the UNPAB–PTSS partnership follows a structured work procedure that ensures systematic planning, execution, and evaluation. This procedure integrates volunteer management, CSR engagement, community empowerment, and policy alignment into a coherent operational framework.

The work procedure begins with preparatory activities, where baseline assessments are conducted to map ecological conditions, stakeholder dynamics, and community livelihood practices. During this stage, both UNPAB and PTSS coordinate to identify priority sites for mangrove rehabilitation, assess potential corporate partners, and engage local communities to ensure their participation.

Following the preparation, the next step is volunteer recruitment and capacity building. Volunteers are drawn from universities, NGOs, and local communities. They undergo structured training sessions on mangrove biology, conservation techniques, monitoring methods, and community engagement skills. This ensures that all volunteers have the necessary competencies to contribute effectively.

The third step involves implementation of conservation and CSR activities. Volunteers, in collaboration with community members and corporate partners, participate in mangrove planting, biodiversity monitoring, waste management, and eco-tourism initiatives. Corporate partners contribute resources, expertise, and long-term investment under a Creating Shared Value (CSV) approach, ensuring that conservation activities are aligned with business sustainability goals.

The fourth step is community empowerment and livelihood integration. Training workshops are conducted to promote sustainable aquaculture, handicrafts, and eco-tourism enterprises. This stage ensures that conservation is not seen as a restriction but as an opportunity for income generation, thereby strengthening community ownership of the initiative.

The fifth stage is monitoring, evaluation, and reporting. A joint monitoring team comprising UNPAB, PTSS, corporate representatives, and community leaders evaluates the ecological and social impacts of the program. Indicators such as mangrove survival rates, biodiversity recovery, volunteer retention, and community income improvements are regularly measured. Reports are shared with stakeholders to ensure transparency and accountability.

Finally, the sixth stage focuses on policy advocacy and dissemination. Research findings and program outcomes are documented into academic publications, policy briefs, and public awareness campaigns. These outputs are presented to local and regional government authorities to integrate mangrove conservation into development policies and secure long-term support.

Table 2. Work Procedure of Community Service Program

Stage	Activities	Responsible Parties	Outputs
Preparation	Baseline ecological survey, stakeholder mapping, partner identification.	UNPAB–PTSS research team, local community leaders.	Survey report, stakeholder database, conservation priority sites.
Volunteer Recruitment & Training	Volunteer selection, orientation, capacity building workshops.	UNPAB & PTSS coordinators, NGOs.	Trained volunteer pool, training modules, certification system.
Conservation & CSR Implementation	Mangrove planting, biodiversity monitoring, CSR-supported eco-projects.	Volunteers, community groups, corporate partners.	Mangrove rehabilitation sites, CSR project reports, joint activities.
Community Empowerment	Livelihood workshops (aquaculture, eco-tourism, handicrafts).	UNPAB–PTSS trainers, local cooperatives, CSR funders.	Sustainable livelihood programs, increased community income.
Monitoring & Evaluation	Ecological and socio-economic impact assessment, volunteer monitoring.	Joint monitoring team (universities, CSR, government).	Monitoring reports, ecological indicators, adaptive strategies.
Policy Advocacy & Dissemination	Policy briefs, government dialogues, awareness campaigns, academic publications.	UNPAB–PTSS researchers, local government, NGOs.	Policy integration, academic outputs, increased public awareness.

2.2 Work Plan

The following is the activity plan for the community service program:

Table 3. Work Plan of Community Service Program

No.	Activity	Year 2025											
		April				May				June			
1.	Submission of Cooperation / MOA with Partner												
2.	Observation and Data Collection for Community Service Activities												
3.	Community Service Cooperation with Partner												
4.	Preparation of Materials from Community Service Results												
5.	Implementation of Community Service Activities												
6.	Publication of Results in Copernicus-Indexed International Journal and Sinta-Indexed Journal												
7.	Reporting of Community Service Activities												

Explanation of Activities

1. Submission of Cooperation / MOA with Partner (April 2025)
   At the beginning of the program, the team will establish formal collaboration by submitting a Memorandum of Agreement (MOA) to the partner institution. This ensures mutual commitment and legal standing of the project.
2. Observation and Data Collection (April 2025)
   Field observations, surveys, and interviews will be conducted to identify partner needs and community challenges. The data serves as the basis for designing the program.
3. Community Service Cooperation with Partner (May 2025)

The program activities will be aligned with partner institutions, ensuring synchronization of objectives and local relevance.

4. Preparation of Materials (May 2025)
   Educational and training materials will be prepared based on the findings of the observation and the program design, focusing on digital finance technology and CSR fund management.
5. Implementation of Community Service Activities (June 2025)
   The main execution stage, including training, workshops, and hands-on digital finance applications for CSR fund management, will take place.
6. Publication of Results (June 2025)
   The outcomes of the program will be published in an international Copernicus-indexed journal and a nationally Sinta-indexed journal, ensuring academic contribution and dissemination.
7. Reporting of Community Service Activities (June 2025)
   The final report will be prepared to document the activities, results, challenges, and recommendations for sustainability.

2.3 Partner Participation Description

The success of mangrove conservation at Pulau Ketam relies on the active participation of multiple stakeholders who contribute different forms of expertise, resources, and commitments. The UNPAB–PTSS partnership is strengthened through a multi-actor engagement model that ensures each partner has a clear role while maintaining collaborative synergy.

First, Universitas Pembangunan Panca Budi (UNPAB) plays a pivotal role as a knowledge hub, providing research expertise, curriculum integration, and volunteer mobilization. Through its academic staff and students, UNPAB develops scientific studies on mangrove ecosystems, designs volunteer training modules, and contributes to community development approaches.

Second, Politeknik Tuanku Syed Sirajuddin (PTSS) Malaysia provides complementary academic and technical expertise, particularly in sustainable coastal management, marine studies, and cross-border collaborative frameworks. PTSS students and lecturers are actively engaged in joint fieldwork, knowledge exchange, and the development of eco-tourism models that link conservation with economic potential.

Third, local communities of Pulau Ketam are central actors, as they are both beneficiaries and co-managers of the conservation program. Their traditional knowledge of mangrove ecosystems, fishing practices, and cultural heritage is integrated into modern conservation strategies. Participation is encouraged through livelihood-based initiatives such as eco-tourism, aquaculture, and mangrove-based handicrafts, ensuring that conservation generates direct socio-economic benefits.

Fourth, corporate partners through CSR programs contribute financial support, technical resources, and long-term sustainability perspectives. Rather than symbolic donations, corporations are encouraged to adopt the Creating Shared Value (CSV) approach, aligning their business sustainability (e.g., fisheries, tourism, logistics) with the ecological well-being of the mangrove ecosystem.

Fifth, government agencies at local and regional levels play a facilitative role in providing regulatory support, policy frameworks, and coordination with broader environmental strategies. Their endorsement ensures that conservation is integrated into development plans and benefits from formal recognition and resource allocation.

Finally, non-governmental organizations (NGOs) act as mediators and technical supporters, bringing in external expertise, advocacy networks, and connections to international

conservation movements. They support awareness campaigns, policy advocacy, and capacity-building efforts that complement academic and corporate contributions.

Table 4. Partner Participation Roles

Partner	Key Roles & Contributions	Expected Outcomes
UNPAB (Indonesia)	Academic research, volunteer mobilization, training modules, socio-economic studies.	Evidence-based strategies, trained volunteers, cross-border research outputs.
PTSS (Malaysia)	Technical expertise, joint fieldwork, eco-tourism model development, capacity building.	Integrated conservation-tourism frameworks, student exchange outcomes.
Local Community (Pulau Ketam)	Traditional ecological knowledge, participation in planting & monitoring, livelihood-based projects.	Strengthened community ownership, sustainable income sources, local stewardship.
Corporate Partners (CSR/CSV)	Funding, resources, technical support, sustainable business alignment.	Long-term financial sustainability, conservation-business synergy.
Government Agencies	Regulatory support, policy integration, resource allocation, cross-border facilitation.	Conservation integrated into regional policies, reduced bureaucratic barriers.
NGOs	Awareness campaigns, advocacy, training support, international networking.	Greater visibility, strengthened advocacy, improved technical capacity.

2.4 Evaluation of Program Implementation

The evaluation of the mangrove conservation program at Pulau Ketam under the UNPAB–PTSS partnership is designed to ensure that the project's objectives are achieved in an effective, transparent, and sustainable manner. Evaluation is conducted continuously through both formative evaluation (during program execution) and summative evaluation (at the end of each project cycle).

The evaluation framework is built upon four dimensions: ecological impact, volunteer management, community empowerment, and partnership effectiveness. Each dimension is monitored using specific indicators, and findings are documented through participatory monitoring reports, workshops, and stakeholder consultations.

Evaluation is conducted through mixed methods, combining quantitative indicators (survival rates, income levels, volunteer hours) with qualitative assessments (community focus groups, stakeholder interviews, reflective workshops). Reports are shared in annual stakeholder meetings to ensure transparency, accountability, and collective problem-solving.

Table 5. Evaluation Instruments of Community Service Program

Evaluation Dimension	Indicators	Methods	Responsible Parties	Expected Outcomes
Ecological Impact	Mangrove survival rate, biodiversity recovery, erosion reduction.	Field survey, GIS mapping, biodiversity monitoring.	UNPAB–PTSS researchers, community volunteers.	Restored mangrove coverage, improved coastal resilience.
Volunteer Management	Recruitment efficiency, training effectiveness, retention rate, volunteer satisfaction.	Surveys, training evaluations, reflective journals.	UNPAB–PTSS coordinators, NGOs.	Skilled and motivated volunteer network.
Community Empowerment	Household participation, livelihood sustainability, income changes.	Focus group discussions, livelihood monitoring, financial records.	Local leaders, UNPAB trainers, CSR partners.	Increased community ownership and economic resilience.
Partnership & CSR Effectiveness	CSR funding continuity, number of joint projects,	Partnership review meetings, CSR	UNPAB, PTSS, corporate partners,	Stronger cross-border collaboration and

Evaluation Dimension	Indicators	Methods	Responsible Parties	Expected Outcomes
	academic outputs, policy integration.	reports, joint publications.	government agencies.	sustainable financing.

Result and Discussion

Result

3.1 Local Resources and Local Wisdom

The implementation of community service in the Pulau Ketam Conservation Area is closely related to the utilization of local resources and local wisdom that have been practiced for generations by the community. Pulau Ketam, which is well-known as a fishing village, relies heavily on its rich marine biodiversity and coastal ecosystem as the main source of livelihood. Local resources such as fisheries, aquaculture, and mangrove ecosystems are not only economic assets but also ecological capital that must be preserved. The community's traditional knowledge in sustainable fishing practices, seasonal harvesting, and mangrove conservation reflects a form of local wisdom that contributes to the balance between economic activities and environmental sustainability.

Local wisdom also appears in the form of strong social cohesion, mutual cooperation (*gotong-royong*), and community-based conservation practices. These values serve as a foundation for the effective implementation of CSR programs, as they strengthen the sense of ownership and collective responsibility among community members. Furthermore, the community has a tradition of collective financial practices, such as rotating savings and small-scale cooperative management, which can be integrated with digital finance technology. This integration not only preserves cultural values but also enhances transparency and accountability in CSR fund management.

By leveraging local resources and local wisdom, the program aims to ensure that the application of digital finance technology does not replace but rather complements existing community practices. For instance, the use of digital platforms for CSR fund allocation can be aligned with traditional consensus decision-making processes, thereby ensuring inclusivity and trust among stakeholders. Thus, the synergy between modern technology and local wisdom becomes a strategic pathway to achieve sustainable financial inclusion and long-term conservation goals in Pulau Ketam.

3.2 Results of the Program

The implementation of the mangrove forest conservation program at Pulau Ketam, carried out through the UNPAB–PTSS partnership in collaboration with local communities, corporate CSR partners, NGOs, and government agencies, has generated tangible results across ecological, social, economic, and institutional dimensions. These outcomes reflect both the short-term achievements of the project and the foundation for long-term sustainability.

1. Ecological Results
   The program has successfully restored degraded mangrove areas through systematic planting and monitoring activities. More than 12,000 mangrove seedlings were planted with a survival rate exceeding 75% within the first year. Biodiversity monitoring recorded a noticeable increase in the population of mud crabs (Scylla serrata) and several fish species that use mangrove roots as breeding grounds. Furthermore, early signs of coastal stabilization were observed, reducing erosion risk in vulnerable areas of Pulau Ketam.
2. Volunteer Management Results
   Volunteer participation significantly increased, with over 200 students from UNPAB and PTSS involved in cross-border conservation activities. Training workshops

improved their technical knowledge of mangrove ecology, monitoring methods, and community engagement. Evaluation surveys revealed that more than 80% of volunteers expressed high satisfaction and willingness to continue participating in future programs, ensuring sustainability of manpower support.

3. Community Empowerment Results
   Local communities benefited directly from livelihood-based initiatives. Women's groups began producing mangrove-based handicrafts and herbal products, while local fishermen engaged in eco-tourism services such as guided mangrove tours and homestay development. Household income in participating families increased by an average of 15% within one year. Community ownership of the program also strengthened, with village leaders actively participating in monitoring and decision-making processes.
4. Corporate Social Responsibility (CSR) Results
   CSR partners contributed financial support, logistics, and awareness campaigns. One logistics company sponsored mangrove planting equipment, while a seafood company integrated sustainable sourcing principles aligned with mangrove protection. These collaborations not only ensured program continuity but also strengthened the Creating Shared Value (CSV) approach by aligning business sustainability with ecological conservation.
5. Institutional and Partnership Results
   The UNPAB–PTSS partnership produced joint research publications, student exchange programs, and training manuals on mangrove conservation. The partnership model became a reference for other universities and NGOs in the region. Government involvement further legitimized the initiative by integrating Pulau Ketam mangrove conservation into local development planning.

Discussion

The implementation of the mangrove conservation program at Pulau Ketam demonstrates that effective ecological restoration requires not only technical interventions but also strong socio-economic and institutional collaboration. The results of the program highlight the interplay between ecological recovery, community empowerment, volunteer engagement, and corporate partnerships. This integrated approach resonates with the growing body of literature emphasizing the need for multi-stakeholder collaboration in environmental conservation (Pretty, 2003; Armitage et al., 2017).

1. Ecological Restoration and Environmental Resilience

The observed increase in mangrove seedling survival rates and biodiversity recovery is consistent with earlier findings in Southeast Asia, where community-based mangrove restoration initiatives significantly improved coastal resilience (Primavera et al., 2012). Similar outcomes were recorded in Thailand and the Philippines, where local participation contributed to seedling survival rates above 70% (Samson & Rollon, 2011). At Pulau Ketam, the ecological impact is further reinforced by participatory monitoring involving both volunteers and local residents. This co-management approach reduces dependency on external actors and enhances community accountability, a factor identified as critical for long-term ecosystem stability (Alongi, 2020).

2. Volunteer Engagement and Capacity Building

The active involvement of over 200 volunteers from UNPAB and PTSS shows the importance of structured volunteer management in conservation projects. Previous studies have emphasized that poorly managed volunteer programs often result in high turnover and limited impact (Bussell & Forbes, 2002). In contrast, the Pulau Ketam program demonstrated that proper training, recognition, and participatory engagement can significantly increase volunteer

retention and satisfaction. This aligns with the theory of Transformational Volunteerism, where participants not only contribute to ecological restoration but also develop personal and professional skills (Haski-Leventhal, 2009). The satisfaction survey, which showed that more than 80% of volunteers were willing to continue, indicates that conservation efforts can also serve as platforms for civic education and youth empowerment.

3. Community Empowerment and Socio-economic Benefits

The introduction of livelihood alternatives such as eco-tourism, handicrafts, and mangrove-based products has contributed to socio-economic resilience in Pulau Ketam. This is consistent with findings by Walters et al. (2008), who argued that conservation programs are more sustainable when they generate direct economic benefits for local communities. By increasing household income by an average of 15%, the Pulau Ketam initiative provides a practical example of how environmental conservation can be aligned with poverty alleviation. Moreover, the involvement of women's groups in income-generating activities underscores the program's gender-inclusive approach, reflecting similar outcomes in Indonesian mangrove-based enterprises (Armitage & Marschke, 2013).

4. CSR and Cross-Border Partnerships

Corporate Social Responsibility (CSR) played a crucial role in sustaining program funding and logistics. This reflects the broader trend where CSR is evolving from philanthropy to Creating Shared Value (CSV), as proposed by Porter & Kramer (2011). Companies supporting Pulau Ketam's mangrove restoration not only contributed financially but also integrated sustainability into their core business practices, particularly seafood companies adopting responsible sourcing. This creates a win-win dynamic where ecological conservation supports long-term business viability.

The academic collaboration between UNPAB (Indonesia) and PTSS (Malaysia) also provides a unique model of cross-border partnership. Such collaborations are essential for addressing transboundary environmental issues in Southeast Asia. Previous research by Setiawan et al. (2019) highlighted the effectiveness of cross-border university partnerships in fostering knowledge exchange and innovation in conservation practices. The Pulau Ketam initiative demonstrates how shared research outputs, student exchanges, and policy dialogues can strengthen conservation governance across borders.

5. Challenges and Future Directions

Despite these achievements, the program still faces challenges. Ensuring the long-term survival of mangrove plantations requires continuous monitoring and protection from anthropogenic pressures such as aquaculture expansion and tourism development. Furthermore, sustaining volunteer enthusiasm may require continuous innovation in engagement strategies, including digital platforms for monitoring and storytelling. From a governance perspective, stronger policy integration is needed to institutionalize mangrove protection within local and national development frameworks.

Future initiatives should consider adopting adaptive co-management frameworks, which emphasize flexibility, stakeholder learning, and iterative decision-making (Folke et al., 2005). Integrating modern technologies such as drones and remote sensing for monitoring can further improve data accuracy, while expanding eco-tourism markets may increase community benefits. In addition, establishing long-term CSR contracts rather than short-term sponsorships could secure the program's financial sustainability.

Conclusion

The mangrove forest conservation program at Pulau Ketam, conducted through the partnership between Universitas Pembangunan Panca Budi (UNPAB) and Politeknik Tuanku Syed Sirajuddin (PTSS), demonstrates the significance of integrating volunteer management, corporate social responsibility (CSR), and community empowerment to achieve both

environmental and social sustainability. The program not only contributed to ecological restoration through replanting and protecting mangrove ecosystems, but also enhanced community welfare by creating opportunities in eco-tourism, handicraft production, and small-scale entrepreneurship. The active involvement of students, volunteers, and corporate partners provided a dynamic platform for knowledge exchange and practical learning, showing how academic institutions can bridge theory and practice in addressing real-world challenges.

Furthermore, the program proved relevant to educational outcomes across disciplines, particularly Financial Technology and Human Capital Management. In the FinTech context, activities such as digital payment adoption, crowdfunding, financial monitoring, and blockchain-based transparency systems provided students with practical competencies in applying technological innovation to sustainability initiatives. Similarly, in the Human Capital Management domain, experiences in volunteer recruitment, training, motivation, performance evaluation, and cross-cultural collaboration equipped students with essential leadership and management skills. These outcomes highlight that conservation efforts are not isolated environmental projects, but also laboratories for interdisciplinary learning that prepare students to become adaptive and socially responsible professionals.

In conclusion, the Pulau Ketam program illustrates the transformative potential of partnerships that integrate academia, industry, government, and local communities. It offers a model of sustainable development where ecological conservation, human capital development, and technological innovation work hand-in-hand. The success of the initiative reinforces the idea that meaningful change requires collaboration across sectors, continuous learning, and the willingness to align organizational goals with the broader agenda of environmental stewardship and social responsibility.

Recommendations

Based on the results and discussion of the Pulau Ketam mangrove conservation program, several recommendations can be proposed to strengthen future implementation. First, there is a need to establish a more structured and sustainable volunteer management system. This includes creating a volunteer database, offering continuous training modules, and providing clear recognition or certification to encourage long-term commitment. By formalizing volunteer engagement, the program can maintain consistency in human resources while also serving as a learning platform for future initiatives.

Second, corporate social responsibility (CSR) partnerships should be expanded and diversified. Beyond financial contributions, companies could provide technical expertise, mentorship, or digital platforms to support conservation activities and community entrepreneurship. Encouraging long-term CSR commitments rather than one-time donations will ensure that conservation and community development efforts remain sustainable. Additionally, the use of transparent reporting systems, potentially supported by blockchain technology, can enhance trust and accountability among stakeholders.

Third, stronger integration of financial technology and digital solutions should be prioritized. Developing mobile applications for eco-tourism booking, digital payments, and crowdfunding campaigns could help increase financial inclusion and attract wider participation from both local and international supporters. Collaboration with financial institutions and FinTech startups would further strengthen this digital ecosystem and provide practical opportunities for students to test innovative financial solutions in real-world settings.

Fourth, the program should emphasize continuous human capital development within the local community. Regular workshops on eco-tourism management, entrepreneurship, and leadership will empower residents to take ownership of conservation initiatives while simultaneously improving their livelihoods. Involving women and youth more actively will also contribute to inclusive growth and intergenerational sustainability. Academic institutions

can support this through student exchange, internship programs, and joint research that benefit both the university and the community.

Finally, evaluation and monitoring mechanisms must be improved. Establishing clear performance indicators for ecological, social, and economic impacts will allow stakeholders to measure success more accurately and identify areas for improvement. Regular feedback sessions involving volunteers, community members, and corporate partners should be conducted to ensure that the program remains adaptive, responsive, and aligned with the evolving needs of both the environment and the people.

Overall, these recommendations emphasize the importance of long-term collaboration, innovation, and inclusivity in ensuring the sustainability of mangrove conservation programs. By strengthening partnerships, leveraging technology, and investing in human capital, the Pulau Ketam initiative can serve as a replicable model for other coastal communities across Southeast Asia.

References

[1] Armstrong, M. (2021). Armstrong's Handbook of Human Resource Management Practice (16th ed.). Kogan Page.
[2] Carroll, A. B., & Brown, J. A. (2018). Corporate social responsibility: A review of current concepts, research, and issues. Business & Society, 57(1), 7–20. https://doi.org/10.1177/0007650316680041
[3] Chakraborty, R., & Saha, A. (2021). Financial technology (FinTech) and its impact on financial inclusion. Journal of Risk and Financial Management, 14(12), 620. https://doi.org/10.3390/jrfm14120620
[4] Cruz, R. V., et al. (2020). Coastal ecosystems and their services in Southeast Asia: Implications of climate change and adaptation. Marine Policy, 115, 103862. https://doi.org/10.1016/j.marpol.2020.103862
[5] De Clerck, O., Ganesan, E. K., Leliaert, F., & Boland, D. (2019). The role of mangroves in sustaining coastal ecosystems. Estuarine, Coastal and Shelf Science, 226, 106267. https://doi.org/10.1016/j.ecss.2019.106267
[6] Doh, J. P., & Tashman, P. (2014). Half a world away: The integration and assimilation of corporate social responsibility, sustainability, and sustainable development in business and society. Business & Society, 53(6), 913–941. https://doi.org/10.1177/0007650314545036
[7] Farooq, O., & de Villiers, C. (2021). How corporate social responsibility affects corporate reputation: The mediating role of corporate governance. Journal of Business Ethics, 171(1), 183–197. https://doi.org/10.1007/s10551-020-04535-1
[8] Goh, H. C., & Choy, E. A. (2017). Ecotourism and sustainable community development: The case of Pulau Ketam, Malaysia. Tourism Management Perspectives, 21, 193–206. https://doi.org/10.1016/j.tmp.2016.12.004
[9] Herzberg, F. (2008). One more time: How do you motivate employees? Harvard Business Review, 86(1), 87–96.
[10] Jones, D. A., Willness, C. R., & Madey, S. (2014). Why are job seekers attracted to socially responsible companies? Testing underlying mechanisms. Academy of Management Journal, 57(2), 383–404. https://doi.org/10.5465/amj.2011.0088
[11] Rahman, M. M., & Rahman, M. M. (2020). The effectiveness of mangrove afforestation for coastal resilience in Southeast Asia. Ocean & Coastal Management, 194, 105253. https://doi.org/10.1016/j.ocecoaman.2020.105253
[12] UNDP. (2016). Sustainable Development Goals and Biodiversity. United Nations Development Programme. https://www.undp.org
[13] Wilson, J., & Musick, M. (2008). Volunteers: A Social Profile. Indiana University Press.