



## SDG 14: LIFE BELOW WATER

Universitas Sumatera Utara (USU) is committed to supporting Sustainable Development Goal (SDG) 14—Life Below Water—through various community service and research initiatives aimed at preserving marine and coastal ecosystems while improving the livelihoods of local communities. Key activities include the development and management of mangrove ecotourism in villages like Lama and Paluh Kurau, which provide both economic benefits and environmental conservation. Projects also encompass empowering local youth to create sustainable income through souvenir production at the Mangrove Tourism Beach and training on the use of bio-fertilizers in mangrove planting to enhance ecological restoration efforts. These efforts demonstrate USU's dedication to fostering sustainable marine practices, enhancing environmental awareness, and supporting economic growth through responsible management of natural resources.

No	Title	Abstract	Outcome	Evident/Attachment
1	<p>Pengelolaan Ekowisata Mangrove Menunjang Pendapatan Masyarakat Di Desa Lama Dan Desa Paluh Kurau Kecamatan Hampan Perak Kabupaten Deli Serdang Sumatera Utara</p> <p>Management of Mangrove Ecotourism Supporting Community Income in Lama Village and Paluh Kurau Village, Hampan Perak District, Deli Serdang Regency, North Sumatra</p>	<p>This study focuses on the management of mangrove ecotourism in Lama and Paluh Kurau Villages, Hampan Perak District, Deli Serdang, North Sumatra, as a means to support community income. The project partnered with local fishermen groups, such as the Pantai Indah Fishermen's Group, and involved international collaborators from UPM Malaysia. The initiative aimed to transform underutilized mangrove resources into productive ecotourism sites by facilitating technical guidance, seedling provisions, and the formation of community management institutions. The activities included training on sustainable mangrove practices, creating visitor-friendly infrastructure, and providing educational outreach. The outcomes highlighted enhanced community skills in managing ecotourism, increased income potential, and strengthened community involvement in environmental conservation. This model demonstrates that with academic support and multi-stakeholder collaboration,</p>	<ol style="list-style-type: none"> <li>1. <b>Enhanced Community Skills:</b> Residents gained valuable knowledge and technical skills in sustainable mangrove management and ecotourism operations, empowering them to take an active role in the development and maintenance of the ecotourism sites.</li> <li>2. <b>Increased Community Income Potential:</b> By transforming mangrove areas into ecotourism destinations, the project created new economic opportunities for local fishermen and community members, contributing to improved livelihoods.</li> <li>3. <b>Strengthened Community Institutions:</b> The formation of local management teams fostered a sense of ownership and collaboration, ensuring the sustainability and effective governance of the ecotourism initiatives.</li> <li>4. <b>Promoted Environmental Conservation:</b> The project emphasized the importance of preserving mangrove ecosystems, leading to greater community engagement in conservation efforts and long-term ecological benefits.</li> </ol>	<p><a href="https://drive.google.com/open?id=1EKyRmDKBUPIn9AMFNEZbjWJZ_NqhSG9J">https://drive.google.com/open?id=1EKyRmDKBUPIn9AMFNEZbjWJZ_NqhSG9J</a></p>



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		sustainable ecotourism can effectively bolster local economies and foster ecological		
2	<p>Pemberdayaan Aparatur Desa Dalam Pengelolaan Mangrove Berbasis Ekowisata Di Desa Tapak Kuda Kecamatan Tanjung Pura Kabupaten Langkat</p> <p>Empowerment of Village Officials in Mangrove Management Based on Ecotourism in Tapak Kuda Village, Tanjung Pura District, Langkat Regency</p>	<p>This community service activity aimed to empower village officials in Tapak Kuda Village, Tanjung Pura District, Langkat Regency, through the development of ecotourism-based mangrove management. The initiative addressed the challenges faced by village officials, including limited knowledge and capability to manage mangrove forests sustainably and develop ecotourism to boost local economic conditions. The program included socialization, training, and participatory approaches to enhance village officials' understanding of mangrove conservation and tourism management. Training focused on changing mindsets, improving service standards, and managing partnerships and collective businesses. The outcomes showed increased skills among village officials in managing ecotourism and organizing partnerships, which contributed to the sustainable development of mangrove resources and improved community income.</p>	<ol style="list-style-type: none"> <li><b>Enhanced Knowledge and Skills:</b> Village officials in Tapak Kuda gained improved understanding and capability in sustainable mangrove management and ecotourism development, enabling them to better utilize local natural resources.</li> <li><b>Improved Service Standards:</b> The training led to better service quality in ecotourism, including hospitality, cleanliness, and environmental management, enhancing the overall tourist experience.</li> <li><b>Strengthened Partnerships and Business Management:</b> Village officials were empowered to organize partnerships and manage collective ecotourism businesses effectively, promoting collaboration with external stakeholders.</li> <li><b>Economic and Environmental Benefits:</b> The program contributed to increased community income through ecotourism activities while fostering a stronger commitment to mangrove conservation, ensuring long-term ecological sustainability and economic resilience.</li> </ol>	<a href="https://drive.google.com/open?id=1AimKkPmVr_QSEs6QsAw58pQLhpnFWH_X">https://drive.google.com/open?id=1AimKkPmVr_QSEs6QsAw58pQLhpnFWH_X</a>
3	<p>Penanaman Mangrove <i>Rhizophora Apiculata</i> Dengan Aplikasi Berbagai Jenis Jamur Di Pulau Sembilan Kecamatan Pangkalan Susu Kabupaten Langkat</p>	<p>This community service project focused on the planting of <i>Rhizophora stylosa</i> seedlings treated with bio-fertilizers in collaboration with the residents of Pulau Sembilan, Pangkalan Susu District, Langkat Regency. The objective was to evaluate the</p>	<ol style="list-style-type: none"> <li><b>Improved Mangrove Growth:</b> The use of bio-fertilizers, particularly <i>Trichoderma sp.</i>, led to significant improvements in the growth parameters of <i>Rhizophora stylosa</i> seedlings, including height, diameter, leaf count, and both fresh and dry weight.</li> </ol>	<a href="https://drive.google.com/open?id=1ej67Bdixj4OZkbJ-Abw2bvUFP7unT2AP">https://drive.google.com/open?id=1ej67Bdixj4OZkbJ-Abw2bvUFP7unT2AP</a>

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	Planting of Rhizophora Apiculata Mangroves with the Application of Various Types of Fungi on Pulau Sembilan, Pangkalan Susu District, Langkat Regency	growth performance of mangrove seedlings treated with various bio-fertilizers such as <i>Trichoderma sp.</i> , <i>Mycorrhiza sp.</i> , and <i>Beauveria sp.</i> , compared to untreated controls. The study utilized a completely randomized design (CRD) with four treatment groups and ten replications. Results indicated that bio-fertilizer applications, particularly with <i>Trichoderma sp.</i> , showed better outcomes in terms of seedling height, diameter, leaf count, fresh weight, dry weight, and leaf area index compared to the control group. The findings emphasize the potential of using bio-fertilizers to enhance mangrove growth and contribute to environmental restoration efforts, supporting the sustainability of coastal ecosystems and improving community engagement in conservation activities.	<ol style="list-style-type: none"> <li><b>Enhanced Community Involvement:</b> The project fostered active participation from the residents of Pulau Sembilan, strengthening community awareness and engagement in mangrove conservation efforts.</li> <li><b>Support for Environmental Restoration:</b> The successful use of bio-fertilizers demonstrated their potential as a tool for ecological restoration, contributing to the health and sustainability of coastal ecosystems.</li> <li><b>Practical Application of Sustainable Practices:</b> The project provided the community with practical experience and knowledge in utilizing environmentally friendly methods for mangrove management, promoting long-term ecological benefits and sustainable resource use.</li> </ol>	
4	<p>Pemberdayaan Komunitas Pemuda Pantai Wisata Mangrove Kampung Nipah Sebagai Upaya Peningkatan Pendapatan Masyarakat Melalui Pembuatan Produk Souvenir</p> <p>Empowerment of the Youth Community at Kampung Nipah Mangrove Tourism Beach as an Effort to Increase Community Income through the Creation of Souvenir Products</p>	This community service initiative aimed to empower the youth of Kampung Nipah, Serdang Bedagai, through economic improvement by developing souvenir production at the Mangrove Tourism Beach. The local Mangrove Conservation Group, in collaboration with a team from Universitas Sumatera Utara, worked to overcome challenges related to limited raw materials and seasonal production of traditional products. To create a more sustainable source of income, the project introduced a digital screen-printing machine, enabling continuous production	<ol style="list-style-type: none"> <li><b>Increased Economic Opportunities:</b> The introduction of a digital screen-printing machine provided the youth of Kampung Nipah with the ability to produce and sell souvenirs consistently, leading to a stable source of income independent of seasonal raw material availability.</li> <li><b>Skill Development:</b> Training in the use of the screen-printing machine and graphic design software (Corel Draw) enhanced the technical skills of the participating youth, empowering them with valuable expertise that can be applied to various entrepreneurial activities.</li> </ol>	<a href="https://drive.google.com/open?id=1qf5uY_NoV32xXSc2gNFUMJib_NS2TX-k">https://drive.google.com/open?id=1qf5uY_NoV32xXSc2gNFUMJib_NS2TX-k</a>



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		<p>of T-shirts and other fabric souvenirs that could be sold to tourists year-round. The program included training on operating the equipment and using graphic design software like Corel Draw, enhancing the technical skills of the youth involved. This initiative supported the local economy by diversifying the range of products available and ensuring consistent income for the community.</p>	<ol style="list-style-type: none"> <li>3. <b>Sustainable Product Offering:</b> The community now has the capacity to produce non-seasonal souvenir products, such as T-shirts, ensuring a continuous supply for tourists and increasing the appeal of the Mangrove Tourism Beach as a destination.</li> <li>4. <b>Community Empowerment:</b> The involvement of local youth in managing the new equipment fostered a sense of ownership and initiative, encouraging active participation in boosting the local economy and sustaining community-led tourism efforts.</li> </ol>	
5	<p>Meningkatkan Kunjungan Wisatawan Melalui Maksimalisasi Potensi Pariwisata Di Pantai Mangrove Serdang Bedagai</p> <p>Increasing Tourist Visits by Maximizing Tourism Potential at the Mangrove Beach of Serdang Bedagai</p>	<p>This community service project aimed to enhance the tourism potential of Kampung Nipah's Mangrove Beach in Serdang Bedagai. The initiative addressed the issue of low tourist interest and economic benefits for the local community by providing new facilities to make the area more attractive and comfortable for visitors. Supporting amenities such as LED lights along the bridge, colorful bean bags, swings, tables, and umbrellas were introduced to improve aesthetics and comfort. The project aimed to increase tourist visits, boost community income, and educate visitors about mangrove conservation. The outcome showed increased tourist numbers, enhanced visitor experiences, and economic benefits for the local population. The active participation of Kampung Nipah residents</p>	<ol style="list-style-type: none"> <li>1. <b>Increased Tourist Visits:</b> The new facilities and enhanced aesthetics at Kampung Nipah's Mangrove Beach led to a significant rise in the number of visitors, boosting the location's popularity as a tourist destination.</li> <li>2. <b>Economic Improvement:</b> The local community experienced an increase in income due to the growth in tourism, which stimulated economic activities such as sales of local products and services.</li> <li>3. <b>Enhanced Visitor Experience:</b> Tourists benefited from a more comfortable and attractive environment, complete with amenities like bean bags, swings, and LED-lit pathways, which improved their overall visit.</li> <li>4. <b>Community Engagement and Sustainability:</b> The residents of Kampung Nipah actively participated in maintaining and managing the new facilities, fostering a sense of ownership and promoting sustainable tourism practices</li> </ol>	<p><a href="https://drive.google.com/open?id=1Z8lfXeXo-fWfkMCDbL8WG8HoMuJfi_0y">https://drive.google.com/open?id=1Z8lfXeXo-fWfkMCDbL8WG8HoMuJfi_0y</a></p>



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		<p>in maintaining and managing the site supports sustainable tourism development and environmental stewardship.</p>	<p>that align with environmental conservation goals.</p>	
6	<p>Membangun Sistem Pengendalian Perilaku Nyampah Pengunjung Taman Wisata Mangrove Kampung Nipah Melalui Pendekatan Kebudayaan (Edukasi, Pengorganisasian Dan Penyediaan Sarana Penampung Sampah)</p> <p>Building a Visitor Waste Disposal Behavior Control System at Kampung Nipah Mangrove Tourism Park Through a Cultural Approach (Education, Organization, and Provision of Waste Containers)</p>	<p>This community service project aimed to develop a behavior control system for managing visitor waste disposal at Kampung Nipah Mangrove Tourism Park, located in Dusun III, Sei Naga Lawan, Serdang Bedagai, North Sumatra. The initiative addressed issues of unmanaged waste, particularly plastic, which threatens both the park and surrounding marine environments. The project involved participatory and persuasive methods, including Focus Group Discussions (FGD) and educational sessions about the environmental impact of plastic waste. The team facilitated the creation of a visitor behavior control system that encouraged park staff, from ticket attendants to security and maintenance teams, to engage visitors in responsibly handling their waste. Supporting tools such as portable trash bags and strategically placed transparent waste bins were introduced. The outcomes showed an increased willingness among staff to educate and motivate visitors, promoting a cleaner, more sustainable park environment that aligns with conservation efforts and enhances visitor experience.</p>	<ol style="list-style-type: none"> <li>1. <b>Improved Waste Management Practices:</b> The development and implementation of a visitor behavior control system significantly enhanced waste disposal practices within Kampung Nipah Mangrove Tourism Park, leading to a cleaner and more sustainable environment.</li> <li>2. <b>Increased Staff Engagement:</b> Park staff, including ticket attendants, security, and maintenance personnel, became more proactive and confident in educating and encouraging visitors to manage their waste responsibly.</li> <li>3. <b>Enhanced Visitor Experience:</b> The installation of transparent waste bins and the provision of portable trash bags made it easier for visitors to dispose of waste properly, contributing to a more pleasant and environmentally friendly experience.</li> <li>4. <b>Strengthened Environmental Conservation:</b> The project reinforced the park's commitment to ecological preservation, aligning waste management practices with broader conservation goals and helping to protect the surrounding marine and mangrove ecosystems.</li> </ol>	<p><a href="https://drive.google.com/open?id=1FNyPCT5AwWBd3ay_Vg2dICS5dUhWg5Ev">https://drive.google.com/open?id=1FNyPCT5AwWBd3ay_Vg2dICS5dUhWg5Ev</a></p>



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7	<p>Pembuatan Pupuk Biocarno Dari Sampah Organik Laut Untuk Meningkatkan Pendapatan Kelompok Tani Nelayan Abadi Di Desa Kuala Indah</p> <p>Production of Biocarno Fertilizer from Marine Organic Waste to Increase the Income of the Abadi Fisherman Farmer Group in Kuala Indah Village</p>	<p>This community service project aimed to empower the Abadi Fisherman Farmer Group in Kuala Indah Village, Batu Bara Regency, by transforming marine organic waste into Biocarno fertilizer. The project sought to address the environmental issue of marine waste while simultaneously providing economic benefits to local farmers. Through training and technical guidance, farmers learned the process of creating Biocarno fertilizer using materials such as marine organic waste, cow dung, rice straw, Azolla, and bioactivators like EM4 and molasses. The activity involved workshops, hands-on practice, and continuous mentoring, culminating in enhanced farmer skills, increased environmental awareness, and the potential for sustainable income generation. The positive engagement of village officials and the active participation of farmers demonstrated the community's commitment to environmental management and economic self-sufficiency.</p>	<ol style="list-style-type: none"> <li>1. <b>Enhanced Farmer Skills:</b> Members of the Abadi Fisherman Farmer Group gained new knowledge and hands-on experience in producing Biocarno fertilizer, empowering them with valuable agricultural and environmental management skills.</li> <li>2. <b>Economic Opportunities:</b> The project created potential for additional income for the farmer group by enabling them to produce and sell high-quality organic fertilizer, contributing to economic self-sufficiency.</li> <li>3. <b>Environmental Benefits:</b> By utilizing marine organic waste, the project reduced pollution in the coastal areas, promoting cleaner ecosystems and demonstrating sustainable waste management practices.</li> <li>4. <b>Community Engagement:</b> The active participation of farmers and support from village officials fostered a sense of community involvement and responsibility, enhancing collaboration for future environmental and economic initiatives.</li> </ol>	<p><a href="https://drive.google.com/open?id=1G8GLelDalMjINlibEUmi5TheKFUGGXAI">https://drive.google.com/open?id=1G8GLelDalMjINlibEUmi5TheKFUGGXAI</a></p>