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SUSTAINABLE DEVELOPMENT THROUGH THE PLANTING OF 4,000 MANGROVES ON THE UTAN COAST, SUMBAWA

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Abstrak: Pengabdian ini mengkaji keberhasilan program pengabdian masyarakat melalui penanaman 4000 bibit mangrove di Pesisir Utan, Sumbawa. Program ini menggunakan metode Asset Based Community Development (ABCD) yang melibatkan partisipasi aktif masyarakat setempat, pemerintah daerah, akademisi, dan pemangku kepentingan lainnya. Tujuan utama kegiatan ini adalah untuk meningkatkan kesadaran masyarakat tentang pentingnya ekosistem mangrove serta mendukung aspek lingkungan, sosial, dan ekonomi secara berkelanjutan. Adapun mitra dalam pengabidan ini adalah PT. Solusi Masyarakat Mandiri (SMM) dengan Universitas Teknologi Sumbawa, sedangkan 319 partisipan yang turut hadir meliputi perwakilan dari pemerintah daerah (PEMDA), akademisi, praktisi, mahasiswa, siswa SMA/K, dan masyarakat umum. Kegiatan dimulai dengan talkshow yang berhasil meningkatkan pemahaman partisipan bahwa ekosistem mangrove tidak hanya berdampak positif pada aspek lingkungan, tetapi juga memberikan manfaat signifikan bagi aspek sosial dan ekonomi. Metode penanaman yang diterapkan terbukti efisien, mampu meminimalisir kematian bibit akibat arus laut dan penyakit. Monitoring dan evaluasi dilakukan secara berkala selama 3 bulan, menunjukkan tingkat keberhasilan penanaman awal sebesar 78,25%. Penyulaman dilakukan untuk menggantikan bibit yang mati, yang meningkatkan tingkat keberhasilan penanaman menjadi 91,3%. Hasil ini menunjukkan bahwa metode ABCD dan pendekatan yang diterapkan sangat efektif dan dapat dijadikan acuan untuk program penanaman mangrove di wilayah lain. Secara keseluruhan, program ini berhasil mencapai tujuannya dengan baik, mendukung pelestarian ekosistem mangrove, dan berkontribusi pada pembangunan berkelanjutan. Kolaborasi antara berbagai pihak terbukti penting dalam menjaga dan mengembangkan ekosistem mangrove yang sehat dan produktif.

Kata Kunci: ekonomi, lingkungan, mangrove, Metode ABCD, sosial

Abstract: This community service project examined the success of a program through the planting of 4000 mangrove seedlings in Pesisir Utan, Sumbawa. The program utilized the Asset Based Community Development (ABCD) method, involving active participation from local communities, regional governments, academics, and other stakeholders. This program aims to increase public awareness about the importance of mangrove ecosystems and support sustainable environmental, social, and economic aspects. The partners of this program were PT. Solusi Masyarakat Mandiri (SMM) and the University of Technology Sumbawa, with 319 participants, including representatives from local government (PEMDA), academics, practitioners, college and high school students, and the coastal communities. The program began with a talk show that successfully enhanced participants' understanding that mangrove ecosystems positively impact the environment and provide significant social and economic benefits. The planting method proved efficient, effectively minimizing seedling mortality due to ocean currents and disease. Monitoring and evaluation were conducted periodically over three months, showing an initial planting success rate of 78.25%. Replanting was done to replace dead seedlings, increasing the planting success rate to 91.3%. These results demonstrate that the ABCD method and the approaches implemented are highly effective and can be used as a reference for mangrove planting programs in other regions. Overall, the program successfully achieved its objectives, supporting the preservation of mangrove ecosystems and contributing to sustainable development. Collaboration among various parties has proven essential in maintaining and developing healthy and productive mangrove ecosystems.

Keywords: economy, environment, mangroves, ABCD Method, social

Introduction

Mangrove forests are one of the most effective coastal ecosystems for absorbing greenhouse gas (GHG) emissions compared to other forests. Mangrove forests cover more than 137,000 km² worldwide (Long & Giri, 2011), with 90% located in developing countries (López-Angarita et al., 2016). Indonesia (23%), Brazil (7%), and Mexico (5%) are the countries with the most extensive mangrove vegetation. These ecosystems are highly productive because they provide various ecosystem services, such as timber and crab populations (Duke, 2014), contributing to the well-being of coastal communities (Barbier et al., 2011). Mangrove wetlands are complex socio-ecological systems that hold significant value for the planet but have faced numerous global threats (Semeniuk & Cresswell, 2018). One of the central pressures is the conversion of mangrove forests into aquaculture and agricultural areas (Thomas et al., 2017), which threatens the sustainability of mangrove ecosystem services and their contribution to achieving Sustainable Development Goals (SDGs) (Swamy et al., 2018).

Sustainable development (SD) refers to using natural resources that do not threaten the basic needs of future generations (IPCC, 2021). It aims to balance environmental, economic, and social aspects (Mensah, 2019). In 2015, the 2030 Agenda was adopted, emphasizing commitment to the five Ps: People, Planet, Prosperity, Peace, and Partnership by the United Nations (United Nations, 2015). UN member countries adopted this Agenda as a guide for planning a prosperous future through 17 Sustainable Development Goals (SDGs), 169 targets, and more than 200 indicators in an inseparable and universal strategic plan (Bennich et al., 2020). This Agenda was designed to address various global issues, primarily focusing on reducing poverty (United Nations, 2015). These goals result from continuous efforts and agreements since the Earth Summit in Rio de Janeiro (UN, 1992), continuing to the achievement of the Millennium Development Goals (UN, 2000), and came into effect in 2016 to promote sustainable economic growth, protecting the environment, and promoting social participation (Mensah, 2019).

The Utan coast in Sumbawa Regency mainly consists of coastal villages, with only two villages that are not coastal. Mangroves in the Utan Coast area are still in better condition compared to other sub-districts in Sumbawa, where many mangroves have been cut down for various activities such as shrimp farming, beach recreation, and land clearing for agriculture. As a result, many areas in Sumbawa Regency are experiencing coastal degradation. Natural resources such as mangrove crabs, which have high market value, have not become a significant concern for the community. Thus, converting mangrove ecosystems into cornfields still frequently occurs because mangroves are considered to have only environmental value, not economic or social value.

According to a study by Aidore et al. (2023), South Sorong Regency is one of the producers of mangrove crabs due to a 77,596-hectare mangrove forest ecosystem. In 2020, mangrove crab production in South Sorong Regency reached 360,852,500 lbs per year, with an average daily production of around 200 kg and a monthly average of 1,300 kg. This condition can be a reference for preserving mangrove ecosystems in Sumbawa to improve the economy,

environment, and society simultaneously.

Typically, mangrove planting occurs in areas that have been degraded (Duryat et al., 2023; Eddy et al., 2019). However, it is far better to first provide outreach in areas where the mangrove ecosystem is preserved. This activity also sets an example for planting participants to directly see a relatively good ecosystem, with the planting becoming even better, reflecting areas with damaged mangroves. Based on the experience of several organizations that have carried out planting in previously degraded regions of Sumbawa, it has had a less significant impact due to the diminishing awareness of the local community about the importance of mangrove ecosystems. Therefore, the initial step must be to change the community's mindset about the importance of mangrove ecosystems for sustainable environmental, social, and economic development. This step aligns with the United Nations' 2030 Sustainable Development Agenda, emphasizing coastal ecosystem protection and poverty alleviation. To address this, PT. Solusi Masyarakat Mandiri, in collaboration with the University of Technology Sumbawa, is working to raise community awareness and expand mangrove forests, enabling the community to sustainably manage mangrove ecosystems in economic, social, and environmental aspects.

Methods

The planting activity of 4000 mangroves took place on September 16, 2023, in the coastal area of Panyengar Hamlet, Utan District, Sumbawa Regency, West Nusa Tenggara (See Figure 1). Three hundred nineteen participants attended this activity, including representatives from local government, academics, practitioners, college and high school students, and the coastal communities. The presence of these various stakeholders reflects a shared commitment to support efforts to preserve the mangrove ecosystem in the region.

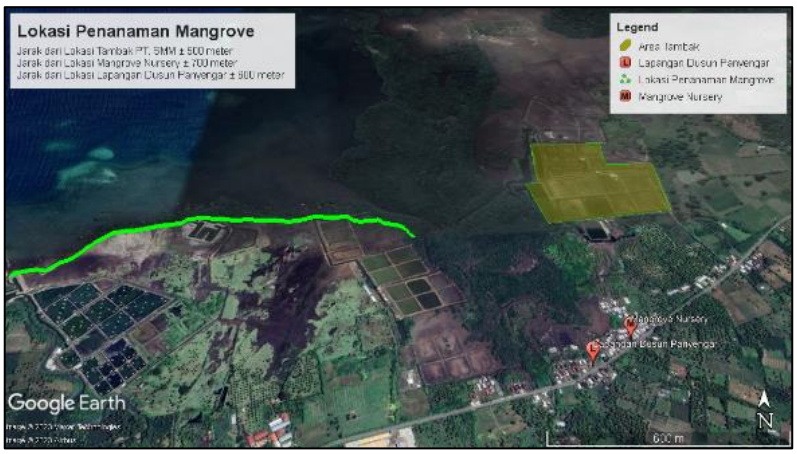

Figure 1. Planting locations for 4000 mangroves

The implementation stages of the program were carried out in one day, but the initial stages were carried out in collaboration with partners, namely PT. Solusi Masyarakat Mandiri (SMM) and Best Aquaculture Practice (BAP) monitor and evaluate mangrove growth for three months (See Figure 2). The initial step of the activity involved a short discussion with the heads of the Environment Service and the Sumbawa Regency Maritime and Fisheries Service to discuss

permits and invite relevant agencies to attend the 4000 mangroves planting event. This process is then continued with the preparation of a whole series of planting events and monitoring and evaluation activities to ensure the success of future mangrove growth.

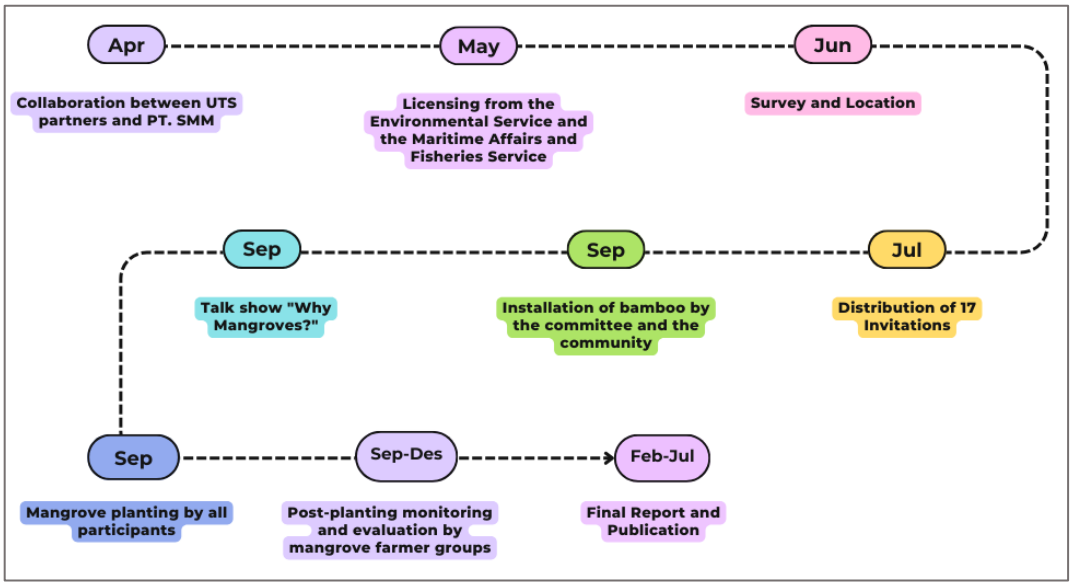

Figure 2. Flow chart of dedication for planting 4000 mangroves

The method used in this action to plant 4000 mangroves is the Asset Based Community Development (ABCD) method, which focuses on strengthening the resources and potential in the community to create positive change (Alhamuddin et al., 2022). The community service activity for planting 4000 mangroves, which focuses on sustainable aspects and encouraging positive change, the ABCD method is very suitable. In this service, the following observations will be made:

1. Talkshow about Mangrove Ecosystems: The ABCD method was used to organize a talk show that focused on local knowledge and experience about mangroves. This talk show involves resource persons from the community who are experts in this issue, aiming to increase public awareness of the importance of mangrove conservation for sustainable development. Before the talk show, participants filled out a questionnaire to assess their initial knowledge about mangrove ecosystems, which is generally limited to environmental, economic, and social aspects. After the talk show, participants are expected to have a more comprehensive understanding of the benefits of mangroves from these three aspects.
2. Mangrove Planting: The ABCD method helps involve communities in mangrove planting activities by utilizing local resources and potential. Communities contribute through labor, local environmental knowledge, and access to suitable locations for planting. This approach ensures the project is more sustainable because it involves active participation from the community. This activity also includes an evaluation of the effectiveness of the planting methods implemented, which is measured through a post-activity questionnaire.
3. Monitoring and Evaluation: The ABCD method allows farmer groups to monitor and evaluate program. Monitoring and evaluation focuses on the growth of mangroves planted

for three months. This is done because, at the age of 3 months, mangrove seedlings are considered to have strong roots, so the chances of being carried away by the waves are smaller. Farmer groups play a role in collecting data and reporting results. They report the mortality of planted trees and the average height of plants every week. In addition, they also reported on the replanting carried out after the death of existing trees to ensure the long-term sustainability and success of the mangrove planting project.

Data collections

Data was collected through two main instruments, questionnaires, and monitoring reports, and then further data processing was carried out.

Questionnaire

Completing the Pre-Activity Questionnaire: Before the talk show or planting, participants fill out a questionnaire to measure their initial knowledge regarding the mangrove ecosystem, which includes environmental, economic, and social aspects. Talkshow about Mangrove Ecosystems: After the talkshow, participants again filled out questionnaires to assess their increased understanding of the benefits of mangrove ecosystems from environmental, economic, and social aspects. Questionnaire link at https://bit.ly/Kuesioner-Efektivitas-Penanaman-Mangrove. Completing the Post-Activity Questionnaire: After the planting activity, participants are asked to complete a questionnaire that includes an assessment of the effectiveness of the planting method implemented. It consists of a statement on the efficacy of the techniques used in this project. All questionnaires are submitted via the Google Form link platform for pre and post-tests; namely https://bit.ly/Pre-and-Post-Test-Penanaman-Mangrove-Utan, distributed at the beginning of participants registering.

Monitoring Reports

Weekly reports from farmer groups regarding the number of seeds that survived, died, were embroidered, and survived after embroidery. The community is involved in collecting data and analyzing and reporting the results of mangrove planting regularly to ensure the long-term sustainability and success of the project. This data is used to assess the effectiveness of planting success rates and overall project impact.

Analysis of the Success of Mangrove Planting

A simple calculation measured the success of planting 4000 mangrove seedlings. Monitoring and evaluation methods are carried out periodically by farmer groups for three months. The following are the steps for calculating the percentage of success in mangrove planting:

1. Count the number of seeds that survive every week starting from post-planting, from week 1 to week 12, or for three months.

2. Calculate the number of seeds that died by subtracting the number of seeds that survived from the total number of seeds planted.
3. Calculate the level of success of planting after embroidery is carried out by subtracting the number of seeds planted from the number of seeds embroidered, which has been deducted from the number of seeds that survive after embroidery.

Calculating the success rate used the ABCD method in this case study twice to see the success rate with monitoring and the success rate of planting accompanied by replanting. The formula for calculating the success rate of mangrove planting is as follows:

$$\text{Success Rate (\%)} = \left(\frac{\text{number of seedlings that survive}}{\text{Total number of seedlings planted}} \right) \times 100$$

Results and Discussion

The general description of the location of the community service program

Utan Subdistrict is part of Sumbawa Regency, located in the east, predominantly lowland, and bordered by the Flores Sea to the north. It covers an area of 155.42 km² and has nine villages: Stowe Brang, Tengah, Sabedo, Motong, Orong Bawa, Labuhan Bajo, Pukat, Jorok, and Balebrang. The majority of the villages in Utan Subdistrict are coastal, with only two villages not being coastal. These villages follow the coastline from east to west, with the Flores Sea to the north and boundaries with Batulanteh, Rhee, and Buer Subdistricts to the south, east, and west, respectively. Utan Subdistrict has a population density of 237.08 people/km², with 18,199 males and 18,648 females (Badan Pusat Statistik Indonesia, 2023). The community in Utan Subdistrict primarily depends on agriculture, with a smaller portion utilizing the fisheries sector as a steady income source.

Utan Subdistrict has several aquaculture farms, including the shrimp farm of PT. Solusi Masyarakat Mandiri (PT. SMM). Due to the importance of sustainable development by utilizing existing natural resources, PT. SMM, in collaboration with the University of Technology Sumbawa (UTS), has planted 4,000 mangroves. This action aims to involve the younger generation, particularly the local community, in mangrove planting as a sustainable income source due to the biodiversity of mangrove ecosystems, including mangrove crabs. Mangrove crabs from the genus *Scylla serrata* are commonly found in the coastal areas of Sumbawa, especially in the Utan Subdistrict. However, the local community has not seriously utilized mangrove crab resources despite being one of the most valuable crustaceans in the Indo-Pacific region.

The capture and cultivation of mangrove crabs in Asia have been conducted for decades and serve as a significant income source for small-scale fishing communities in the region and a vital protein source (Yulianto et al., 2019). Scylla serrata is the most economically important species among the four Scylla species due to its large size and high demand in domestic and export markets (Flint et al., 2021). Therefore, strengthening related institutions is highly expected to facilitate the sustainable utilization of mangrove ecosystem resources. Institutional strengthening materials are included in the talk show theme at the 4,000 mangroves planting event.

Talkshow on the Importance of the Mangrove Ecosystem

The talkshow at the mangrove planting event is crucial as it provides a platform to educate and raise awareness among the community about the importance of sustainable management of mangrove ecosystems. Experts and stakeholders can share knowledge, experiences, and best practices in mangrove management through the talk show, including maintenance strategies, habitat preservation, and climate change mitigation. This allows for active participation from the community and strengthens their commitment to protecting mangrove ecosystems for a better future. The talk show for the 4,000 mangrove planting event features three main speakers (Figure 3). The first speaker is the Rector of the University of Technology Sumbawa (UTS), with a presentation titled "Multi-Stakeholder Partnerships in Mangrove Planting." The second speaker is the Secretary of the Environmental Agency of Sumbawa Regency, discussing "The Role of Mangroves in Addressing Climate Change." The final speaker is a lecturer in Aquatic Resource Management from Unsa, whose topic is titled "Education and Environmental Awareness."

Figure 3. Talk show on planting 4000 mangroves

Before and after the talk show, participants were directed to fill out a questionnaire highlighting the importance of mangrove ecosystems in environmental, economic, and social aspects as part of an evaluation to assess participants' understanding of sustainable management. This questionnaire aims to measure participants' level of awareness and knowledge about the role of mangrove ecosystems in maintaining environmental sustainability, supporting the local economy, and strengthening the social aspects of coastal communities. Thus, the data obtained from this questionnaire can be the basis for identifying areas that need increased understanding and determining steps to improve sustainable management of mangrove ecosystems.

Based on the results of the questionnaire (Figure 4), it was revealed that most participants had a fairly good understanding of the importance of mangrove ecosystems for the environment. However, it was found that only a few participants fully understood the importance of mangrove ecosystems in the context of economic impacts and especially social aspects of society. This shows the need to increase awareness and understanding of the financial and social benefits produced by mangrove ecosystems. With this deeper understanding, the public can better understand the importance of protecting and maintaining mangrove ecosystems for

environmental sustainability and supporting the economic and social welfare of coastal communities. Therefore, more intensive educational efforts and targeted educational programs are needed to increase understanding of the benefits of mangrove ecosystems in various aspects of life.

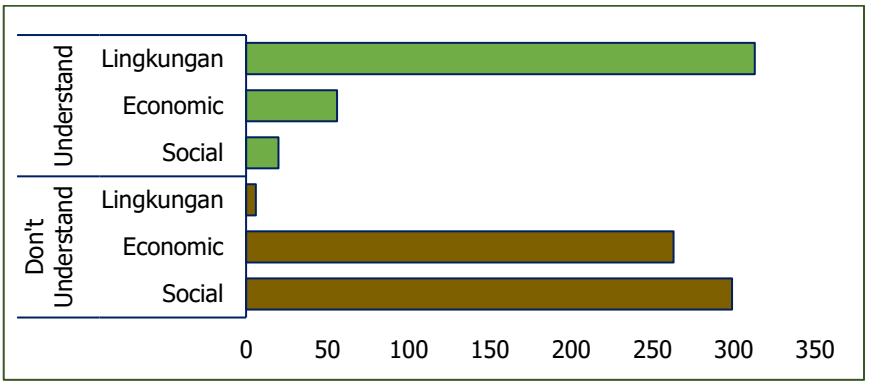

Figure 4. Level of Knowledge of Participants Regarding the Importance of Mangrove Ecosystems (Before the Talk Show)

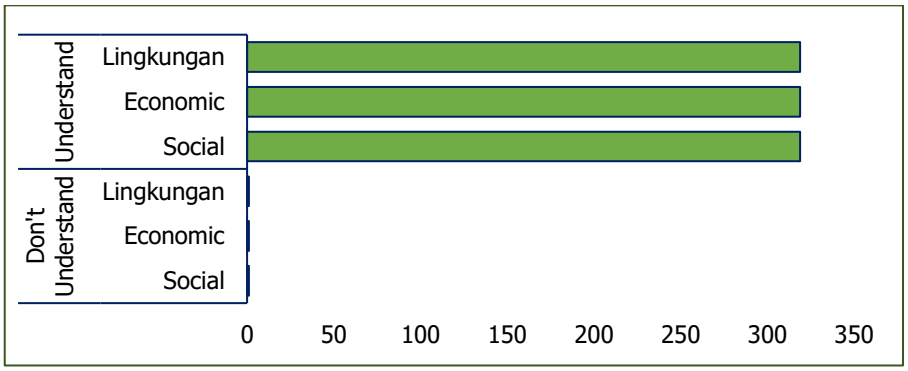

Figure 5. Level of Knowledge of Participants Regarding the Importance of Mangrove Ecosystems (After the Talk Show)

After the talk show, participants experienced a significant increase in understanding of the vital impact of the mangrove ecosystem, not only limited to the environment but also in the context of economic and social impacts on society (See Figure 5). Through in-depth discussions and providing information from experts and stakeholders, participants became more aware of the economic value generated by mangrove ecosystems, such as in the fisheries, tourism, and coastal protection sectors. Participants also began to understand how mangrove ecosystems influence the social welfare of coastal communities, for example, by maintaining local traditions, creating jobs, and improving the overall quality of life. With this more comprehensive understanding, it is hoped that participants will be more motivated to be involved in efforts to preserve and sustainably manage mangrove ecosystems and fight for policies that support the economic and social sustainability of coastal communities.

Action to Plant 4000 Mangroves

Implementing the planting of 4000 mangroves involves educating planting participants about appropriate methods for planting mangroves in coastal areas (Figure 6). The planting

method uses stakes measuring 1 m long and 5 cm wide, grown in the ground with the outside of the stake facing the sea. Mangrove seeds are placed on the side of the stake so that the stake can protect them. Furthermore, the mangrove seeds are tied to stakes using raffia rope to prevent the seeds from being carried away by sea currents.

Figure 6. Planting of 4000 mangroves

After that, participants were also evaluated regarding the level of effectiveness of the planting method that had been taught, to assess the extent to which the method was effective or perhaps ineffective according to the participants' perception. This evaluation helps to determine the extent of participants' understanding and skills in applying correct mangrove planting techniques. By obtaining feedback from participants, organizers can evaluate the talk show's success and the training methods used, as well as identify areas that need improvement in the future. This helps ensure that educational activities such as talk shows can provide maximum benefits and encourage effective implementation of mangrove conservation practices.

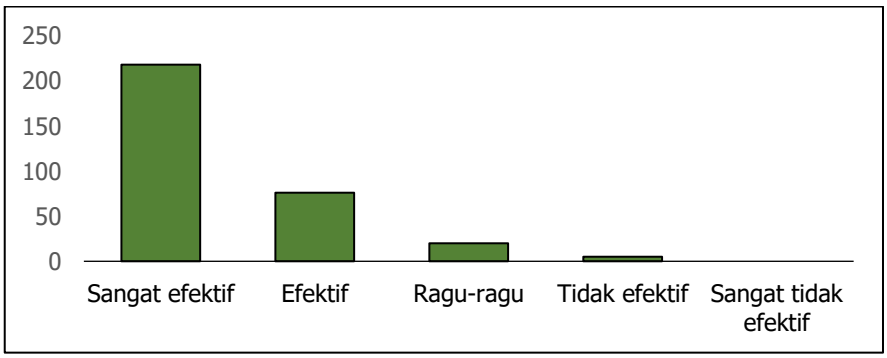

Figure 7. Level of effectiveness of planting methods applied for the most efficient mangrove planting

Based on the data from the questionnaire (Figure 7), it was found that the planting system using stakes was considered very effective for implementing mangrove planting in the Utan coastal area, mainly because the intensity of sea waves is relatively low. This method is considered effective because it does not require enormous costs and follows mangrove restoration requirements, including growing location, mangrove species, planting techniques, and water systems, as suggested by (Sagala et al., 2024). Thus, using fixed stakes is the right choice and can potentially be an effective solution in restoring and maintaining the mangrove ecosystem in the Utan coastal area.

Monitoring and Planting Mangrove Seedlings

Planting mangroves involves not only the planting process and then being left without the proper strategy. According to Lewis & Brown (2014), many mangrove rehabilitation efforts in Indonesia have failed, and the main contributing factor is the mistaken view that mangrove rehabilitation can be carried out easily through planting primarily using seeds of the Rhizophora sp genus. Therefore, using the ABCD method requires a more sophisticated strategy, empowering local communities to monitor and plant new mangrove seedlings for three months regularly. Table 1 shows the results of monitoring data and replanting mangrove seedlings after planting.

Table 1. Data on Monitoring and Planting Mangrove Seedlings

Week	Seedlings Survived	Seedlings Died	Replanted Seedlings	Seedlings Alive After Replanting
1	4000	143	143	0
2	3857	97	97	0
3	3760	100	100	9
4	3660	110	110	16
5	3550	90	90	17
6	3460	70	70	8
7	3390	50	50	13
8	3340	80	80	16
9	3260	60	60	19
10	3200	40	40	43
11	3160	30	30	121
12	3130	20	20	260
Total Seedlings Survived				3130
Total Seedlings Died				870
Total Replanted Seedlings				870
Total Seedlings Alive After Replanting				522

Monitoring results indicate that a new leaf grows each month, and the height of the mangrove seedlings increases by 5 cm during the 3-month monitoring and replanting period. During this period, approximately 870 new mangrove seedlings were required for replanting due to the death of previously planted seedlings. The replanting of new mangrove seedlings is influenced by several factors, including:

1. Seedling Death: Seedlings often die due to lacking water when the sea recedes too far from the shore. This type of death typically occurs in planting areas closer to the land.
2. Pests and Diseases: Some seedlings were unsuitable for planting because they were already affected by pests or diseases. According to the local community, extreme weather can also affect the resilience of mangrove seedlings against pest or disease attacks.
3. Sea Tidal Waves: It is essential to plant mangrove seedlings as profoundly as possible so that during high sea waves, the seedlings can maintain their position, aided by firmly planted stakes.

The success rate of mangrove planting over three months without replanting the dead seedlings is as follows:

$$\text{Success Rate (\%)} = \left(\frac{\text{number of seedlings that survive}}{\text{Total number of seedlings planted}}\right) \times 100$$

$$\text{Success Rate (\%)} = \left(\frac{3130}{4000}\right) \times 100\%$$

$$\text{Success Rate} = 78.25\ \%$$

The success rate for planting mangrove seedlings during monitoring was 78.25%. This result was achieved thanks to the dedication of farmer groups who routinely improve the position of seedlings and carry out intensive care through continuous monitoring. This proactive approach ensures that each seedling receives optimal conditions to grow and develop, thereby increasing the chances of survival of the mangrove seedlings. Maintenance activities include adjusting the position of seedlings that may be displaced by currents, providing additional nutrition if necessary, and monitoring the health of each seedling to detect and treat problems early. This effort reflects the strong commitment of farmer groups to maintaining the sustainability of the mangrove ecosystem in Pesisir Utan, Sumbawa.

Not only monitoring, farmer groups also replant dead seeds to maintain the number of seeds planted so that planting success is achieved even higher, namely as follows:

Seedlings Survived = Total seedlings planted – (Total seedlings replanted – Seedlings alive after replanting)

Seedlings Survived = 4000 – (870 – 522)

= 4000 – 348

= 3652

Then, the replanting success rate is calculated as follows:

$$\text{Success Rate (\%)} = \left(\frac{\text{number of seedlings that survive}}{\text{Total number of seedlings planted}}\right) \times 100$$

$$\text{Success Rate After Replanting} = \left(\frac{3652}{4000}\right) \times 100$$

$$\text{Success Rate After Replanting} = 91.3\ \%$$

After replanting, the number of seeds that grow is calculated again based on signs of the appearance of new leaves and the strength of the position of the stems and roots embedded in the soil. As a result, 348 additional seedlings succeeded in growing, bringing the total number of surviving seedlings to 3652 (Figure 8). Thus, the percentage of success increased significantly to 91.3% after monitoring and replanting were carried out by the farmer group. This approach shows the effectiveness of maintenance and replanting efforts carried out routinely by farmer groups, which ensure the survival of mangrove seedlings and improve the health and stability of the mangrove ecosystem as a whole. This success emphasizes the importance of farmer groups' active role and commitment to maintaining and developing the mangrove ecosystem in Pesisir Utan, Sumbawa, as well as their contribution to environmental conservation efforts and the sustainability of coastal ecosystems. Based on this, the ABCD approach in the mangrove planting project can be said to be successful and suitable for application for the growth of mangrove seedlings.

Figure 8. Documentation of mangrove seedlings resulting from monitoring and replanting

This success has an ecological impact by increasing the function of coastal protection and biodiversity and a significant social and economic impact. Socially, mangrove planting projects can raise environmental awareness and create job opportunities for local communities involved in planting and maintenance. Economically, a healthy mangrove ecosystem can increase local fisheries productivity and support fishermen's livelihoods. Thus, the success of this project provides sustainable benefits for the community and the surrounding environment.

Conclusion

The conclusion of the community service project, which involved planting 4,000 mangrove seedlings on the Utan Coast, Sumbawa, showed very positive results. This activity was carried out using the Asset-Based Community Development (ABCD) method, which involved active participation from the local community, government, academics, and other stakeholders. The talkshow event successfully increased participants' understanding that the mangrove ecosystem has a significant positive impact not only on the environmental aspect but also on the social and economic aspects of the region. This understanding is crucial for creating sustainable development and raising awareness about the importance of mangrove conservation.

The planting method proved efficient and effective in the Utan Coast area. This method successfully minimized seedling mortality due to sea currents, diseases, and other factors. Regular monitoring and evaluation over three months showed an initial planting success rate of 78.25%. After replanting the dead seedlings, the planting success rate significantly increased to approximately 91.3%. Overall, the ABCD method in this mangrove planting project has shown excellent results. This success can serve as a reference for mangrove planting programs in other areas, with the hope of contributing to the preservation of mangrove ecosystems and supporting sustainable development in various regions. This effort also underscores the importance of collaboration among multiple parties in maintaining and developing a healthy and productive mangrove ecosystem.

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also expresses gratitude to the Subdistrict Head of Utan, the Village Head of Stowe Brang, the Hamlet Head of Panyengar, and the community of Panyengar Hamlet. May our collective efforts provide a lasting positive impact on the environment and the local community.

Reference

Aidore, H. J. Y., Dara, A., Lermating, K. F., & Makatika, S. A. (2023). Pemasaran Kepiting Bakau Secara Tradisional Oleh Masyarakat Kampung Sayolo Distrik Teminabuan Kabupaten Sorong Selatan. *Jurnal Administrasi Terapan, 2*(2), 329-339. https://doi.org/10.31959/jat.v2i2.1954

Alhamuddin, Adwiyah, R., & Hamdani, F. F. R. S. (2022). Inovasi bisnis era new normal melalui kampung virtual sepatu kreatif untuk meningkatkan daya saing produk UKM alas kaki di Kota Bandung. *Transformasi: Jurnal Pengabdian Masyarakat. 18*(1), 121-136. https://doi.org/10.20414/transformasi.v18i1.4901

Badan Pusat Statistik Indonesia. (2023). Pertanian, Kehutanan, Peternakan dan Perikanan. *Statistik Indonesia: Statistical Yearbook of Indonesia*, *73*, 281–354. https://www.bps.go.id/id/publication/2023/02/28/18018f9896f09f03580a614b/statistik-indonesia-2023.html

Barbier, E. B., Hacker, S. D., Kennedy, C., Koch, E. W., Stier, A. C., & Silliman, B. R. (2011). The value of estuarine and coastal ecosystem services. In *Ecological Monographs* (Vol. 81, Issue 2). https://doi.org/10.1890/10-1510.1

Bennich, T., Weitz, N., & Carlsen, H. (2020). Deciphering the scientific literature on SDG interactions: A review and reading guide. *Science of The Total Environment*, *728*, 138405. https://doi.org/10.1016/J.SCITOTENV.2020.138405

Duke, N. (2014). The importance of mangroves to people: A call to action. In *United Nations Environment Programme World Conservation Monitoring Centre.*

Duryat, Santoso, T., Riniarti, M., Rodiani, & Imron. (2023). Penanaman Mangrove untuk Perbaikan Sanitasi dan Peningkatan Kualitas Lingkungan Hidup. *Jurnal Pengabdian Kehutanan dan Lingkungan*, *2*(2), 111-123. http://dx.doi.org/10.23960/rdj.v2i2.8113

Eddy, S., Iskandar, I., Ridho, M. R., & Mulyana, A. (2019). Restorasi hutan mangrove terdegradasi berbasis masyarakat lokal. *Jurnal Indobiosains, 1*(1), 1-13.

Flint, N., Anastasi, A., De Valck, J., Chua, E. M., Rose, A. K., & Jackson, E. L. (2021). Using mud crabs (Scylla serrata) as environmental indicators in a harbour health report card. *Australasian Journal of Environmental Management*, *28*(2). https://doi.org/10.1080/14486563.2021.1923579

IPCC. (2021). *Climate Change 2021: The Physical Science Basis | Climate Change 2021: The Physical Science Basis*. IPCC Sixth Assessment Report. https://www.ipcc.ch/report/ar6/wg1/

Lewis, R. R., & Brown, B. (2014). Ecological Mangrove Rehabilitation: a field manual for practitioners. *Education*.

Long, J. B., & Giri, C. (2011). Mapping the Philippines' mangrove forests using Landsat imagery. *Sensors*, *11*(3). https://doi.org/10.3390/s110302972

López-Angarita, J., Roberts, C. M., Tilley, A., Hawkins, J. P., & Cooke, R. G. (2016). Mangroves and people: Lessons from a history of use and abuse in four Latin American countries. In *Forest Ecology and Management* (Vol. 368). https://doi.org/10.1016/j.foreco.2016.03.020

Mensah, J. (2019). Sustainable development: Meaning, history, principles, pillars, and implications for human action: Literature review. *Cogent Social Sciences*, *5*(1). https://doi.org/10.1080/23311886.2019.1653531

Sagala, P. M., Bhomia, R. K., & Murdiyarso, D. (2024). Assessment of coastal vulnerability to support mangrove restoration in the northern coast of Java, Indonesia. *Regional Studies in Marine Science*, *70*, 103383. https://doi.org/10.1016/J.RSMA.2024.103383

Semeniuk, V., & Cresswell, I. D. (2018). Australian mangroves: anthropogenic impacts by industry, agriculture, ports, and urbanisation. In *Coastal Research Library* (Vol. 25). https://doi.org/10.1007/978-3-319-73016-5_9

Swamy, B. P. M., Kaladhar, K., Anuradha, K., Batchu, A. K., Longvah, T., & Sarla, N. (2018). QTL Analysis for Grain Iron and Zinc Concentrations in Two O. nivara Derived Backcross Populations. *Rice Science*, *25*(4). https://doi.org/10.1016/j.rsci.2018.06.003

Thomas, N., Lucas, R., Bunting, P., Hardy, A., Rosenqvist, A., & Simard, M. (2017). Distribution and drivers of global mangrove forest change, 1996-2010. *PLoS ONE*, *12*(6). https://doi.org/10.1371/journal.pone.0179302

United Nations. (2015). *THE 17 GOALS | Sustainable Development*. Sustainable Development Goals. https://sdgs.un.org/goals

Yulianto, B., Sunaryo, Nur Taufiq, S. P. J., Djunaedi, A., Subagiyo, Santosa, A., & Soegianto, A. (2019). Survival and growth of mud crab (Scylla serrata forsskål, 1775) reared in crab bucket recirculating aquaculture system. *Ecology, Environment and Conservation*, *25*, S92-S101. Diakses di: https://doc-pak.undip.ac.id/id/eprint/10059/1/2019-Survival_and_growth_of_Mud_Crab-EEC-16.pdf