**MALLOMO: Journal of Community Service**
https://jurnal.umsrappang.ac.id/mallomo/index
Vol 6, No, 2, Juni 2026, pp 1033-1041
ISSN: 2774-7220 (online)

# Community Service Group on Seagrass Ecosystem Management in the Coastal Area of Laikang Village, Takalar Regency

**Hamsiah [1*], Kasmawati [2], Asmidar [1], Eko Saputra[3] , Damis[4]**
[1] Department of Marine Science, Faculty of Fisheries and Marine Sciences, Indonesian Muslim University, Makassar, Indonesia
[2]Department of Fisheries Resource Utilization, Faculty of Fisheries and Marine Sciences, Indonesian Muslim University, Makassar, Indonesia.
[3]Department of Coastal Management and Marine Technology, University of Muslim Indonesia, Makassar, Indonesia
[4]Department of Fisheries Science, Muhammadiyah University of Sidenreng Rappang, Sidrap, Indonesia
Email: hamsiah.hamsiah@umi.ac.id

**Artikel info**

**Abstract.** Ekosistem lamun memiliki fungsi penting baik secara ekologis maupun ekonomi bagi wilayah pesisir. Secara ekologis, padang lamun berperan sebagai daerah asuhan dan perlindungan *(nursery ground),* tempat pemijahan (spawning ground), serta tempat mencari makan *(feeding ground)* bagi berbagai biota perairan, khususnya ikan. Namun, kondisi perairan Desa Puntundo mengalami degradasi lingkungan akibat kerusakan ekosistem lamun dan masih terbatasnya pengetahuan masyarakat mengenai teknik rehabilitasi lamun. Kegiatan Pengabdian kepada Masyarakat (PkM) ini bertujuan untuk meningkatkan pemahaman dan keterampilan masyarakat dalam melakukan rehabilitasi ekosistem lamun melalui metode plug dan frame bambu di kawasan pesisir Desa Laikang, Kabupaten Takalar. Metode yang digunakan meliputi penyuluhan, pelatihan pembuatan media tanam lamun, serta pendekatan partisipatif yang melibatkan masyarakat sejak tahap persiapan hingga pelaksanaan kegiatan. Pelatihan dilakukan berbasis masyarakat dengan mengacu pada standar internasional rehabilitasi lamun melalui teknik transplantasi. Hasil kegiatan menunjukkan bahwa kelompok mitra telah mampu melakukan rehabilitasi lamun menggunakan metode plug dan frame bambu. Monitoring menunjukkan lamun pada frame bambu sebagian mengering akibat paparan sinar matahari saat surut terendah, sedangkan metode plug lebih mampu melindungi tanaman sehingga tingkat kekeringan lebih rendah.

**Abstract.** Seagrass ecosystems play a vital role in both the ecology and economy of coastal regions. Ecologically, seagrass beds serve as nursery grounds, spawning grounds, and feeding

grounds for various aquatic organisms, particularly fish. However, the water conditions in Puntundo Village have suffered environmental degradation due to damage to the seagrass ecosystem and the community's limited knowledge of seagrass rehabilitation techniques. This Community Service (PkM) activity aims to enhance the community's understanding and skills in rehabilitating seagrass ecosystems using the plug and bamboo frame method in the coastal area of Laikang Village, Takalar Regency. The methods employed include outreach, training on seagrass planting media preparation, and a participatory approach involving the community from the preparation stage through to the implementation of the activity. The training was conducted on a community-based approach, adhering to international standards for seagrass rehabilitation through transplantation techniques. The results of the activity indicate that the partner groups have successfully carried out seagrass rehabilitation using the plug and bamboo frame methods. Monitoring revealed that seagrass on the bamboo frames partially dried out due to sun exposure during the lowest low tide, whereas the plug method provided better protection for the plants, resulting in lower levels of desiccation.

**Keywords:**
*Training;*
*Seagrass Transplantation;*
*Bamboo Plug;*
*Frame Method*

**Coresponden author:**
Email: hamsiah.hamsiah@umi.ac.id



## INTRODUCTION

Laikang Village is one of six villages in the Laikang Subdistrict of Takalar Regency, located 15.7 km south of the subdistrict seat. The total area of Laikang Village is approximately 19.6 square kilometers. Generally, the topography of Laikang Village consists of lowlands and coastal areas. Laikang Village borders a coastline of approximately 8 km that features diverse marine ecosystems such as mangroves, seagrass beds, and coral reefs (BKKBN, 2023).

One ecosystem specifically found in Laikang Village is the seagrass ecosystem. Seagrass ecosystems serve important functions both ecologically and economically. Ecologically, seagrass beds serve as a foundation for the sustainability of fish resources by acting as nursery grounds, spawning grounds, and feeding grounds. Seagrass beds have high secondary productivity and provide significant support for fish abundance and diversity (Gillanders 2006). Economically and socially, seagrass ecosystems also provide environmental services to communities (Tebaiy and Mampioper, 2017). Given the various functions and benefits of seagrass beds for the environment and humanity, it is imperative that the sustainability of this ecosystem be preserved so that it can continue to provide ecosystem services for the benefit of humankind. Riniatsih et al. (2018) state that seagrass ecosystems serve

several critical functions, including acting as spawning grounds, nursery grounds, and feeding grounds for various marine organisms.

According to Rauf et al. (2017), seagrass ecosystems are a vital component of coastal areas because they play a crucial role as protectors; not only do seagrasses have the ability to stabilize bottom sediments but they also help prevent sediment from easily eroding. Additionally, seagrasses produce their own sediments that enrich the water. Based on these functions, seagrass can serve as a reference in the strategic management of coastal areas with the aim of maintaining or enhancing the stability of the coastal environment.

The lack of awareness regarding the functions and benefits of seagrass ecosystems has led to a reduction in seagrass coverage. Given the current state of seagrass ecosystems, rehabilitation efforts are necessary so that the benefits of seagrass can once again be realized by coastal communities, particularly fishermen who rely on catching various marine species, especially fish. The condition of the coastal waters of Puntondo in Laikang Bay is dominated by marine debris in the form of plastic waste originating from domestic waste, and the presence of seaweed cultivation activities and tourism activities by the Puntondo Environmental Education Center (PPLH) has an impact on the condition of the existing seagrass.

Seagrass ecosystem rehabilitation activities are still rarely carried out due to a lack of public awareness compared to mangrove and coral reef ecosystems; therefore, through this community service initiative, we aim to introduce coastal communities to the method of seagrass transplantation using the plug and bamboo frame technique. Kadmaer (2019) states that bamboo frames are easily obtainable, reasonably priced, and environmentally friendly. This activity aims to determine how to rehabilitate seagrass ecosystems using the plug and bamboo frame method in the coastal area of Laikang Village, Takalar Regency.

## Data and Methodology

This Community Service Program (PkM) will be conducted over a five-month period, from June to November 2024, in the coastal area of Laikang Village, Laikang Subdistrict, Takalar Regency. The location was selected because the area has experienced seagrass ecosystem degradation due to coastal activities and a lack of community knowledge regarding seagrass rehabilitation techniques. The data used in this activity consists of primary data obtained through field observations, interviews, documentation, and the results of seagrass growth monitoring following the transplantation process. Observations were conducted to determine the initial condition of the seagrass ecosystem, the extent of damage, and the characteristics of the aquatic substrate suitable for rehabilitation activities.

**The tools and materials** used included a machete or saw for cutting bamboo, a small shovel for digging the substrate, 25 cm PVC pipes as protective media for seagrass seedlings in the plug method, metal rods as supports for the transplantation installation, and containers for storing seagrass seedlings prior to planting. The seagrass seedlings used are sourced from nearby areas that are still in good condition and suitable for transplantation.

**The activity was** implemented in several stages. The first stage involved educating community groups on the importance of seagrass ecosystems for the sustainability of coastal resources and on seagrass rehabilitation techniques using the transplantation method. The second stage consisted of training on the preparation of transplantation media using PVC pipes for the plug method and bamboo for the bamboo frame method. This is followed by hands-on seagrass transplantation at the

rehabilitation site, involving the community in a participatory manner from tool preparation, seedling planting, to maintenance.

**Activity evaluation** was conducted through monitoring the survival rate of the transplanted seagrass for approximately two months after planting. Additionally, an assessment was made of the condition of the rehabilitated ecosystem to evaluate the seagrass's ability to grow and adapt to the new environment. The level of community participation was also evaluated to determine the involvement of partner groups in the sustainable rehabilitation and maintenance of seagrass.

## Results and Discussion

### Training on Seagrass Transplantation Methods

An outreach activity was conducted for the Bina Pesisir group in Laikang Village, Laikang Subdistrict, Takalar Regency. Many community members are still unaware of the importance of seagrass ecosystems as habitats for various species of marine life, fishing grounds, sediment traps, and more. Before carrying out the seagrass transplantation, an explanation was first provided regarding the objectives and benefits, as well as the methods for using bamboo plugs and frames to conduct seagrass rehabilitation.

Before carrying out the seagrass transplantation, an explanation was first provided regarding the objectives and benefits, as well as the method of using bamboo plugs and frames for seagrass rehabilitation. (Figure 1)


***Figure 1.*** *Explanation of seagrass rehabilitation through transplantation*

### Preparation For Planting

Before planting, the tools and materials to be used in the planting process are prepared (Figure 2). The tools and materials used are: 1) A machete or saw, 2) A small shovel for digging, 3) Pipes cut into 25-cm lengths, 4) Metal rods for support, and 5) Containers for the seagrass seedlings.

***Figure 2.*** *Bamboo frame, pipe, and seagrass seedlings (Enhalus acoroides)*

## The Implementation of Seagrass Transplantation

After the training session and preparation of the tools and materials to be used, planting begins on the prepared plot. The plug and bamboo frame method, in brief, is as follows:

**Plug method,** is a seagrass rehabilitation technique that involves transferring seagrass seedlings along with their natural substrate to a rehabilitation site. This method aims to maintain the stability of the seagrass roots and growing medium, thereby increasing the success rate of transplantation. Seagrass donor samples are collected near the transplantation site to minimize plant stress and ensure that the environmental conditions of the source site match those of the planting site. Seagrass seedlings are collected using PVC pipes while preserving their natural substrate to maintain stable root and growing medium conditions, ensuring that the seedlings remain fresh and are able to adapt well after transplantation. The process of collecting seagrass seedlings along with their substrate using a PVC pipe is shown in Figure 3. This technique involves inserting the PVC pipe into the substrate until the seagrass seedlings, along with the sediment inside, can be lifted intact. Subsequently, the collected seagrass seedlings are planted in pre-prepared holes using a PVC pipe of the same size as that used during the seedling collection process. After the planting process is complete, the PVC pipe is left in place for approximately 14 days to protect the transplanted seedlings from the effects of ocean currents and waves during the initial adaptation period. After this adaptation period, the PVC pipe is then slowly removed so that the seagrass can grow and develop naturally in its new environment.

***Figure 3.*** *The process of collecting seagrass seedlings along with the substrate using PVC pipes as a transplantation medium.*

**The bamboo frame method** is a seagrass rehabilitation technique that uses a bamboo frame as a support structure and a substrate for seagrass seedlings to attach to at the transplantation site. This method involves assembling bamboo into a frame, then tying or attaching the seagrass seedlings to the frame before placing it on the seabed. The use of bamboo frames aims to keep the seagrass in a stable position against currents and waves during the adaptation process. In addition to being readily available and environmentally friendly, bamboo is also relatively inexpensive, making it effective for community-based seagrass rehabilitation.

The bamboo frame method begins with the creation of a 1.25 × 1.25 m transplant plot divided into 25 sections, with a spacing of approximately 25 cm between sections. The plot is constructed using bamboo to support the seagrass seedlings during the rehabilitation process. The shape and design of the bamboo frame used in the transplantation activity can be seen in Figure 4. The use of the bamboo frame aims to maintain the stability of the planting area and facilitate the arrangement of seagrass seedlings at the rehabilitation site.

***Figure 4****. Shape of the bamboo frame used*

Next, iron anchors are prepared to reinforce and secure the plot, ensuring it remains stable against the effects of currents and waves. The anchors consist of four pieces of iron with a diameter of approximately 12 mm and a length of 50 cm for each corner of the plot, as well as 50 pieces of iron with a diameter of approximately 5 mm and a length of 20 cm, used to clamp and secure the seagrass seedlings to the substrate. The shape of the iron anchors securing the plot can be seen in Figure 5.

*Figure 5. Plot retaining iron anchor (Permatasari et al., 2017)*

The next step is installing the plots at the transplantation site by driving the iron anchors into each corner of the bamboo frame. Seagrass seedlings are collected from the donor area using a crowbar driven into the substrate at an angle of approximately 30°, then rotated clockwise until the seagrass seedling is lifted along with a portion of its substrate. After that, a planting hole 3–5 cm deep is made at the transplant site, then the seagrass seedling is placed into the hole and secured using the metal anchor to keep it stable. The hole is then covered again with natural substrate. The process of seagrass planting using the sprig-anchor method on a bamboo frame is shown in Figure 6.

***Figure 6.*** *Seagrass planting using the sprig-anchor method on a bamboo frame*

## Activity Monitoring

After about a month, our team went to the field to evaluate and monitor the results of the seagrass planting using the plug and bamboo frame transplantation method. The monitoring results showed that the plants on the pipes and the upper parts of the bamboo frames had dried out due to exposure to sunlight during low tide; however, the lower parts (roots) remained strong and the seagrass was growing well (the leaves were still green), with a survival rate of 70%. When we conducted the transplanting activity in the field, the water level had already risen (high tide), so we were unable to identify the areas that were still flooded during low tide. The monitoring results can be seen in Figure 7 below:

***Figure 7.*** *Condition of the seagrass after planting; the roots are growing well*

Seagrass ecosystem rehabilitation through transplantation has been widely practiced, but in the village of Laikang it has never been done at all due to a lack of information and resources needed to carry out seagrass rehabilitation. This contrasts with mangrove ecosystems, where planting is relatively easy, whether through nurseries or by directly planting mature seeds. The main challenge in seagrass rehabilitation is tidal conditions; therefore, transplantation must be carried out during the lowest tide, and planting sites must be selected in areas still submerged in water. Planting during the lowest tide facilitates the collection of donor plants, and when planting—whether using pipes or frames—it is easier to create planting holes and secure the plants with ropes to the frames. Until now, frames have typically used metal structures, but by using bamboo frames—a natural material—the process is more environmentally friendly because they will eventually decompose on their own.

As a result of this PkM training activity, the partner group (Bina Pesisir) has learned how to transplant seagrass using the plug and bamboo frame method to restore damaged seagrass ecosystems and has come to understand the critical importance of preserving these ecosystems, given their significant role in coastal areas.

## Conclusion

Based on the above description, it can be concluded that the Community Service (PkM) activities carried out by the Coastal Development Group in the coastal area of Laikang Village, [County], proceeded smoothly and according to schedule. The results achieved include the group's ability to rehabilitate the seagrass ecosystem through transplantation using the plug method and bamboo frames. Monitoring results indicate that the seagrass plants only had their upper parts dry due to exposure to sunlight during the lowest low tide, particularly those in the bamboo frames, whereas with the plug method, only a portion dried out because the plants were protected by PVC pipes. It is hoped that the fishing community and local government will continue to cooperate in maintaining the sustainability of coastal ecosystems (mangroves, seagrass, and coral reefs).

## Acknowledgements

We would like to express our gratitude to the Rector and the Chair of the Indonesian Muslim University Foundation for their support in making this event possible; to the Chair of the Indonesian Muslim University's LPkM for providing the facilities and guidance during the event; to the Chair of the Bina Pesisir group for their cooperation; and to all parties involved in this event.

## References

BKKBN. 2023. "Profile of Laikang Village." Retrieved from (https://kampungkb.bkkbn.go.id/kampung/44133/desa-laikang).

Gillanders, B. M. 2006. "Seagrasses, Fish and Fisheries. In: Larkum AWD, Orth RJ, Duarte M (Eds.)." Seagrasses: Biology, Ecology and Conservation, Springer, Netherlands.

Kadmaer, E. M.Y., E. Almohdar, and P. P. Letsoin. 2019. "Community Service Program on Seagrass Transplantation in Ohoi Dian." NGAYAH Journal of Science and Technology Applications. Vol. 10(1):70–76.

Miming., Hamsiah, and Asmidar. 2023. "Survival of Transplanted Seagrass (Enhalus scoroides) Using

the Metal Rack Technique in the Waters of Bontosua Island, Pangkep." Jurnal Insan Tani. Vol. 2(2):182–91.

Permatasari, A., I. Karlina, and H. Irawan. 2017. "Growth Rates of the Seagrass Species (Syringodium isoetifolium) Using Polybag and Sprig Anchor Transplantation Techniques at Different Plant Densities in Rhizomes in the Waters of Kampe, Malang Rapat Village." Intek Aquaculture. Vol. 1(1):1–14.

Rauf, A., A. Asni, Hamsiah, and Asmidar. (2017). "Evaluation of Site Suitability for Baronang Fish (Siganus canaliculatus) Cultivation in Seagrass Bed Ecosystems on the West Coast of South Sulawesi." Indonesian Aquatic Journal. Vol. 2 (1):58–63.

Riniatsih, I., Hartati, R., Rejeki, S., & Endrawati, H. (2018). "Study of Macrozoobenthos Diversity in Transplanted Seagrass Habitats Using an Environmentally Friendly Method." Journal of Tropical Marine Science. Vol. 21 (1):29–36.

Tebaiy, S., and Mampioper, D.C. (2017). A Study of Seagrass Potential and Patterns of Interaction in the Utilization of Seagrass Fisheries Resources (Case Study of the Villages of Kornasoren and Yenburwo, Numfor, Papua). Journal of Tropical Fisheries Management. Vol. 1 (1):59–69.