

APPLICATION OF SPIDER CORAL SCIENCE AND TECHNOLOGY AS A SOLUTION TO REPAIR DAMAGED CORAL REEFS IN THE COASTAL AREA OF TOURISM

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Abstract

One of the famous tourist areas in Southeast Maluku Regency is Ngiarwarat Beach in Ohoidertawun village, this beach is a favorite tourist area for local people and tourists from outside the region because the location which is easy to reach from the city center, with a distance of 30 minutes using two-wheeled and four-wheeled vehicles. The results of the survey conducted by the PKM-PM team together with partners found that the bottom location of the waters whose coral reefs were severely damaged with an area of approximately 120 x 90 meters or the size of a football field. The purpose of the implementation of the PKM-PM Program is to create 20 units of coral spiders. The monitoring results showed that there was no mucus on each coral sapling, which explains that the transplanted coral reefs are healthy and growing well. With these results, it indicates that the location of the waters is very good, especially the good brightness and low sedimentation rate help the coral reef grow well. For the Illegal Fishing hazard training activities and Counselling for tourism awareness promotion of beach cleanliness, it has been carried out the results of understanding of partners and the community have obtained an average level of community understanding above 95%, where partners and the community already understand how to make and carry out transplantation through coral spiders, as well as their maintenance, understanding related to the dangers of illegal fishing and tourism awareness promotion.

Keywords: Coral reef, Illegal fishing, Tourist beach, Transplantation,

INTRODUCTION

One of the famous tourist areas in Southeast Maluku Regency is Ngiarwarat Beach, this beach which is located in Ohoidertawun village, Kei Kecil District, is a favorite tourist area for local people and tourists from outside the region because of its location which is easy to reach from the city center, with a distance of 30 minutes using two-wheeled and four-wheeled vehicles. In addition to presenting a beautiful and cool scenery, this beach also has the beauty of very beautiful coral reefs, this provides its own added value because tourists can do water sports to enjoy the waters of Ngiarwarat Beach which has beautiful coral reefs, as stated by Hamid (2017), that the kei islands are located in the world's coral triangle (*coral triangle*) which is one of the indicators that the waters have a fairly high level of biodiversity and there are many different types of coral reefs, where there are 76% of 798 species of coral reefs found in the waters of Southeast Maluku Regency.

Partners in this PKM-PM activity are the Tourism Awareness Group (POKDARWIS) with the name Ohoidertawun Mandiri (OTW Mandiri) led by Mr. Samuel S. Woersok and 8 members, this group was formed by the village government with their daily task of maintaining and preserving the location of tourist attractions owned by the village (2 tourist sites) including monitoring the marine environment, they confirmed that there was damage to coral reefs due to *illegal fishing* in the past.

Hasil survei yang dilakukan oleh tim PKM-PM bersama-sama dengan Mitra kelompok sadar wisata (POKDARWIS) OTW Mandiri, selain kondisi terumbu karang yang masih sangat indah juga

It was found that the bottom location of the waters whose coral reefs were severely damaged with an area of approximately 120 x 90 meters or the size of a football field

Coral reef damage occurs due to 2 factors, namely due to natural conditions and human activities, natural conditions that generally occur are coral diseases and changes in temperature and ocean currents, while damage due to human activities includes excessive use of marine resources, based on information obtained from the surrounding community, coral reef damage occurs due to human activities, because in the past this area was often used by fishermen as a fishing location with illegal methods or using explosives and fish poison, regardless of the fact that the community has been aware of the impact of illegal fishing activities, but the relics due to this process are still visible until now, this is as explained by Burke (2011) the fishing process using explosives and poisons will produce a large number of fish catches which are only momentary because after that the location no longer has fish because The coral reef that is the home of the fish has been damaged.

The Community Service Student Creativity Program is proposed in an effort to solve partner problems, namely how to repair damage to coral reefs covering an area of 120 x 90 meters as a result of illegal fishing activities using explosives and poisons.

The purpose of the implementation of the PKM-PM Program with the title: Application of *Spider Coral Science* and Technology as a solution to repair damaged coral reefs in the Tourist Coastal Area is to make 20 units of *spider coral* or in scientific terms *Mars Coral Spiders* or MARRS (*Mars Accelerated Coral Reef Reef Rehabilitation System*).

The benefits of this activity, in addition to repairing the damaged marine environment, can be a pilot for coral reef rehabilitation in the Kei Islands, in an easy and cheap way through the *Spider Coral method*. Because the *spider coral* method is very easy and cheap to apply to water locations, it is hoped that it can be emulated for water locations affected by *illegal fishing* or coral damage, considering that the coral reef transplanting method with spider coral has never been done in the Kei Islands. In the long run, the location will be beautiful with coral reefs and the abundance of reef fish can make this location a fish catch area and marine tourism.

LITERATURE REVIEW

Coral reef ecosystems in marine waters are very important and have a role for life, such as fish, non-fish and other biota, in addition, good coral reef ecosystem conditions are often used as marine tourism locations, such as snorkeling and diving, because coral reef ecosystems have high beauty value (Erwan, 2016).

Various activities carried out by humans such as illegal fishing, activities that are not environmentally friendly and global climate change have caused the condition of coral reef ecosystems to be damaged, so that the condition of good living coral cover is decreasing, while those that are damaged are increasing (Sadili *et al.*, 2015).

Coral transplantation technology is an effort to restore coral reefs through grafting or cutting live corals to be planted elsewhere or in places where corals have been damaged. This aims to restore or establish natural coral reefs (Sadili *et al.*, 2015).

One of the easy coral transplant methods is with coral spiders or in scientific terms Mars Coral Spiders or MARRS (Mars Accelerated Coral Reef Rehabilitation System) spiders, where this method is a system designed to stabilize coral reefs, reduce coral debris, provide a basis for coral habitat restoration and can increase coral reef biodiversity. Spider Coral is made in a hexagonal

shape with a size of 60 x 60 cm with coral fragments as the seeds can fill the sides of this unit and are shaped like spider webs can withstand strong currents and wave action, William (2019).

It is hoped that with the improvement and conservation activities of the marine environment through the spider coral method, it can become a pilot for sustainable tourism management so that the Kei Islands, which are famous for various types of coral reefs and very abundant types of reef fish, also have a high level of biodiversity, will always exist until the future, Hamid (2022).

RESEARCH METHOD

The implementation time of the Community Service Student Creativity Program (PKM-PM) is for 4 months, which starts from May to August 2024 and is located at Ngjarwarat Tourist Beach. The implementation method that is carried out solves various partner problems, namely training and mentoring methods. The activities of the Community Service Student Creativity Program (PKM-PM) are carried out with the following stages of activities:

1. Meetings with accompanying lecturers and coordination meetings with partners
2. Making *Spider Coral* and the labeling process
3. Laying of *Spider Coral* and coral transplantation and Introduction of *Spider Coral* to the community
4. Evaluation and Monitoring

RESULTS AND DISCUSSION

The creation of 20 units of *coral spiders* or in scientific terms *Mars Coral Spiders* or MARRS (*Mars Accelerated Coral Reef Rehabilitation System*) spiders, is a system designed to stabilize coral reefs, reduce coral debris, provide a basis for coral habitat restoration and can increase coral reef biodiversity. *Spider Coral* is made hexagonal with a size of 60 x 60 cm with coral fragments as seeds can fill the sides of this unit and its shape is like a spider web can withstand strong currents and wave action, William (2019). The materials used include R10 type iron bars, welding wire, sandpaper, cable ties, while the tools used are hacksaws, welding tools, roll meters, iron benders.

After the spider coral is ready, then labeling is carried out, the *spider coral* labeling process is intended to facilitate monitoring during the coral reef transplant process, the goal is to be able to see the growth and health of the coral reef. So later initial measurements will be carried out as basic data, and then monitoring will be carried out every 2 weeks to see the growth and health of coral reefs. For labeling, it is deliberately colored to indicate the location of the placement, because each coral spider is placed in 4 different locations. The process of making *spider coral* takes approximately 2 weeks with a total of 20 units.

As many as 20 units of *spider corals* are ready and have been labeled, they are placed in water locations with a minimum depth of 3 meters at the lowest low tide or the highest tide of 7 meters, so that it does not interfere with boat traffic or tourists who want to see *spider corals* more easily. The installation form is planted on the bottom of the water. For more details, you can see the following picture.



Figure 1. Coral transportation and transplant process

Transplantation is carried out by tying the donor coral to *the spider coral* using cable ties, the part of the coral that is used as a donor is less than 10 cm long attached to an iron medium. For the survival of the transplanted corals, donor corals are taken at the same water location, at the location where the coral reef has been damaged. The process of laying *the coral spider* can be seen in the following image.

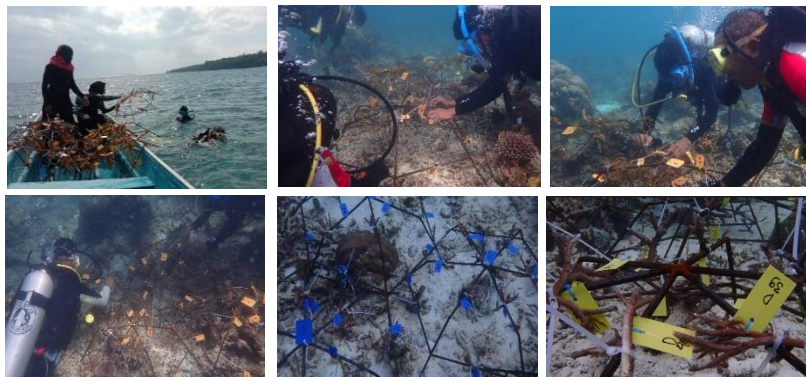


Figure 2. Spider coral laying process

An additional activity carried out is the introduction of the benefits of the coral transplant process using the *coral spider* method, its cheap manufacture and great benefits are expected that the community in the future can do the same, namely making *coral spiders*. In addition to introducing the benefits of *coral spiders* to the community, another goal is to expect the community to be able to maintain and monitor the development of *coral spiders*, because one of the keys to the success of marine conservation activities is the active role of the community.

This monitoring activity is carried out 2 times a month until this program ends and after this program ends, it will continue 1 time a month. Monitoring was carried out to see the growth of transplanted corals and the activity of reef fish in *coral spiders*, Haris (2011).

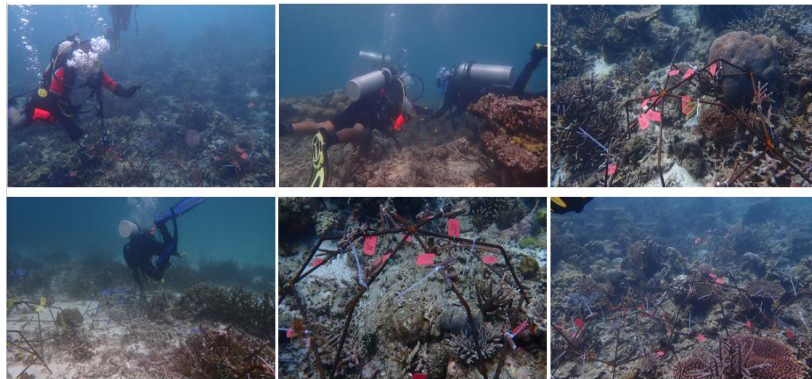


Figure 3. Monitoring activities for the development of coral reef transplantation

The monitoring results showed that there was no mucus on each coral sapling, which explained that the transplanted coral reefs were in good health and growing well. With these results, it indicates that the location of the waters is very good, especially the good brightness and low sedimentation rate help the coral reef grow well. In addition, several types of reef fish were also found that began to make spider corals as homes, with the results of this monitoring describing that transplant activities were successful, and there have been repairs to damaged coral reefs.

CONCLUSION

The monitoring results showed that there was no mucus on each transplanted coral sapling, which explains that the transplanted coral reefs are healthy and growing well. With these results, it indicates that the location of the waters is very good, especially the good brightness and low sedimentation rate help the coral reef grow well. In addition, several types of reef fish were also found that began to make *spider corals* as homes, with the results of this monitoring describing that transplant activities were successful, and there have been repairs to damaged coral reefs.

The *spider coral* method is very easy and cheap to apply to water locations, so it is hoped that it can be emulated for water locations affected by *illegal fishing* or coral damage, considering that the coral reef transplant method with spider coral has never been done in the Kei Islands.

This PKM activity also answers the 14th goal of the 17 SDGs (*Sustainable Development Goals*) or Sustainable Development Program, namely Ocean Ecosystems: preserving and utilizing marine resources in a sustainable manner for sustainable development.

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