

“Tanam bakau” as the environmental recovery program after tsunami of Sunda Strait in 2018: Empowering people for environmentally sustainable

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ABSTRACT--Tsunami that occurred in the Sunda strait area in 2018 ago, not only left humanitarian trauma but also major environmental damages. The area that was experiencing the most severe environmental damage is the coastal area, such as in the Sukajadi village, Carita, Banten. Therefore, an effort must be made to recovery these areas. “Tanam bakau” program is the environmental recovery program which initiated by Universitas Indonesia community engagement team that can be one of the solutions to the problems. By empowering villager of Sukajadi, 1.000 mangrove seedlings are planted in the area around the river estuary. This area has been known take a big role in the ecosystem and also very important to block the waves. The program not only can give effect to the environmental but also economic empowerment by the development of eco-tourism program in the future.

Keywords-- environmental recovery, mangrove, tsunami.

I. INTRODUCTION

Natural disasters have always made man feel helpless in spite of technological advances. Apart from the trail of death and destruction of human property that it left behind, it also caused widespread destruction of ecological habitats with lasting effect on the populations of several species. A tsunami is a wave train consisting of a series of waves, of long wave length (>100 km) and periode (order of hours), generated in a body of water by an impulsive disturbance that vertically displaces the water (WWF, 2019).

Tsunami in Sunda Strait of December 2018 not only left human traumas because of the abandonment of relatives who are victims, but also lost family income because of damage to ships that are used to catch fishes, lose potential income from tourism, and others. On the other hand, the vegetation of the river environment was damaged due to being hit by ships and rubbish. Damaged vegetation causing damage to habitats and ecosystems. As a result,

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the natural potential of food and income for the community, such as fish, crabs, shrimp, shellfish, and others as well reduced (Pattiarachci, 2005).

One solution that can be done is to do repair activities river water environment to the river mouth by planting mangrove trees. Mangroves will be an ideal microhabitat for growth and development of aquatic biota. Mangrove roots growing will improve habitats and ecosystems, encouraging growth of biota productive that can be utilized by the community.

Most of people are familiar with mangrove forests, a group of trees or bushes that live and grow in tidal areas. The presence of mangrove forests plays an important role in maintaining a stable coastline which can protect the coastline from direct waves that could potentially hit and damaging the river (McIvor *et al*, 2013). In addition, another important role of mangrove forest is to protect shores and river banks from damage, such as erosion and abrasion. Mangrove planting activity will begin by meeting with citizens, encouraging citizens to come and realize the benefits of mangrove, and then can be encouraged to collectively create several programs care of planted mangroves and creative economic programs based on recovery estuary river ecosystem.

This study aimed for restoration of the damaged ecosystem area in Sukajadi Village due to the tsunami, establishing ex-situ germplasm microhabitat conservation, development centre natural hatchery centres for fish, crabs, and other biota, and being an educational area that can improve welfare society in Sukajadi Village.

II. METHODS

2.1 'Tanam Bakau' Location

Tanam Bakau is located in Sukajadi Village, Pandeglang Subdistrict, Banten Province. Sukajadi is a village where affected by the tsunami and are bordered by the sea and flowed many large and small rivers that need mangrove forests not only made land to protect beaches and river banks from damage but also a place for spawning fish and marine biota.

2.2 'Tanam Bakau' Design

2.2.1 Make an Action Plan

Planting of mangrove seedlings is planned in the area of degraded land affected by tsunami in Sukajadi Village. After tsunami hit the village, the area is often inundated by sea water during high tides. Mangrove planting at the edge of the initial sea water flow to the direction of residential areas.

2.2.2 Provides mangrove seeds

Community Provision of mangrove seeds planted in critical areas in Sukajadi Village in collaboration with Yayasan Pandu Cendekia. Hundred mangrove seeds of the same size were obtained from Serang, Banten and Jakarta. Mangrove seedlings are planted along the seawater stream that leads to residential areas.

2.2.3 Introducing the mangrove ecosystem

Introduction of mangrove trees and mangrove ecosystems is carried out to community in Sukajadi Village, Carita, Banten. The mangrove introduction activity was attended by more than 70 residents of Sukajadi Village.

Most of the villagers who attended the activity knowing mangroves, but not understanding the great benefits of the mangrove ecosystem. Mangrove introduction activities are expected can revive the community about the importance of planting mangrove that has been damaged after the tsunami hit.

2.2.4 Community involvement and sustainability

Sukajadi Village community is involved in the UI Care Program. Mangrove community groups is formed and play a role in the process planting along critical land which is a seawater overflow area. Apart from that, society also willing to be involved in the maintenance and nursery of mangroves up to finally able to utilize the mangrove land. Sustainability of the future use of mangrove land as a tourist area other than Carita beach area as the main tourist spot. Sukajadi Village Community will be trained as tourist companion, so the land that has been planted with mangroves will have benefits continuously.

III. RESULTS AND DISCUSSION

Mangrove planting activities began by introducing mangrove ecosystems to the Sukajadi Villager. The workshop was provided by our team and supported by lecturers from Department Biology, Universitas Indonesia. This activity was packaged in the form of counselling and sharing sessions with villagers in Sukajadi Village on Friday, July 26, 2019. This activity was attended by more than 70 participants from villagers (Figure 1.). The focus of this extension is to provide information related to the role of mangroves in the ecosystem. Some of the points emphasized is the role of mangroves in the rehabilitation of ecosystems that have been damaged by the tsunami and the role of mangroves as fortress that protect and block from tsunami waves. The mangrove provide to reduce vulnerability of coastal communities and support recovery following hazard impact.



Figure 1: Socializing the role and benefit of Mangrove in ecosystem to villagers of Sukajadi.

The majority of the villagers of Sukajadi have general knowledge about mangrove forests. The results of interviews with Sukajadi Villager showed that more than 61% of respondents knew about mangroves (Figure 2.). It is because their lived around the beach. However, people do not yet have knowledge about the benefits of mangrove ecosystems. They do not know about what we can got from mangrove ecosystem directly or indirectly and services. Mangrove provided nursery ground and habitat for numerous marine species such as fish and shrimp.

Also, protection from storms for coastal communities (Wodehouse & Rayment, 2019). The dense aerial root systems and branches help attenuate waves. For waves hazard young and small mangroves can already be effective. Storm surges hazard can defence with mangrove through aerial root systems and canopies obstruct flow structures (Spalding *et al*, 2014).

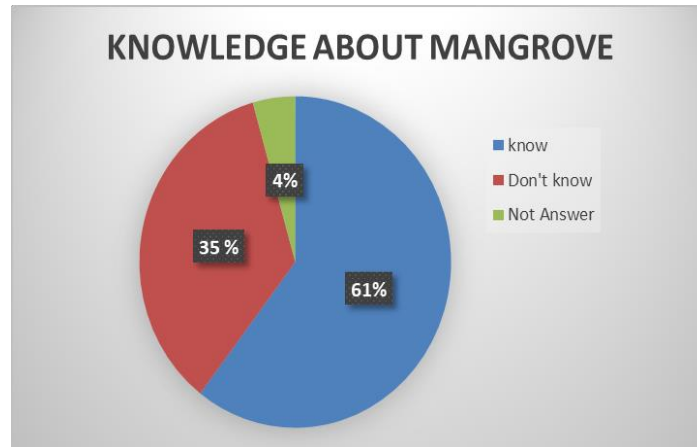


Figure 2: Sukajadi villager knowledge about mangrove

The day after sharing information about mangroves with the community, villagers was invited to be involved in Mangrove planting (Figure 3.). Furthermore, villagers were delivered information about the variety of mangrove which suitable with the environmental condition. Also, we asked activists and participants of the planting to indicated as accurately as possible the boundary of the planted area. The stated planting spacing used 1-2x2m (Wodehouse & Rayment, 2019).

Mangrove planting is carried out along the tidal area to the residential area. The focus of mangrove planting is in areas directly affected by tides and areas with ecosystems damaged by the tsunami. Especially, the river estuaries where mangrove growing as well. Site selection with these criteria is intended for ecosystem rehabilitation. Mangrove replanting is carried out the following month. In this case, student from other University was invited. Mangrove replanting focused on area that used to be tourism area around the Carita Beach.



Figure 3: Mangrove planting activities

The last day of the UI Care program was a sharing session with community leaders, environmental activists and local government or stakeholders (Figure 4). Discussions about the mangrove ecosystem rehabilitation plan at future will be held in the Carita area. In addition, the community is invited to commit to be actively involved in mangrove maintenance and nursery so that they can ultimately utilize the mangrove area. Rehabilitation can claim success after 5-11 years, because this indicated probable long-term survivorship and eventual reestablishment of mangrove stand (Wodehouse & Rayment, 2019). It means, needed villager, activist, and stakeholder commit. Sustainability of the utilize of mangrove ecosystems in Carita is a tourist area besides Carita beach as a major tourism spot. Sukajadi villagers are trained as tourist friends, so that land that has been planted with mangroves has benefits as a means of ecotourism. This program also supported by Ecolodge who is participate to maintained the growth and development of mangrove.



Figure 4: After Sharing and discussion

IV. CONCLUSION

“Tanam bakau” was already planted in Sukajadi Village. The mindset of Sukajadi villagers has been successfully transformed to independently relying on the practice of mangrove plantation. Sustainably of this program can felt after 5-11 years. In future, mangrove ecosystem can used to block tsunami waves and develop into eco-tourism community.

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