

# The enhancement in comprehension for the younger generation of school age in conserving coastal biodiversity in Kepulauan Seribu, Indonesia

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**Abstract.** Handayani T, Widiarti R, Soepardjo AH, Afriyani F, Burhanuddin E. 2017. *The enhancement in comprehension for the younger generation of school age in conserving coastal biodiversity in Kepulauan Seribu, Indonesia. Ocean Life 1: 20-25.* The exploration and exploitation can lead to the ecosystem and natural resources degradation. Kepulauan Seribu of Special Area of Jakarta has been extensively utilized and developed for tourism area, which could lead to the decreasing of environmental conditions. The awareness for keeping the ecosystem and marine life should be developed since early age. The objective of this research is to determine the level of understanding and ability in conserving the marine environment in their neighborhood for school-age generation. The method used in this study was quantitative with descriptive analysis. Two groups of the Junior High School students of Pulau Tidung and Pulau Harapan of the Kepulauan Seribu were provided training on conservation on coastal ecosystems. The education and training encompass the observation activity for coral reef using the Coral Health Chart method, seagrass condition observation through Seagrass-Watch method, and introduction in the mangrove ecosystem. Based on the study, it can be inferred that the resulting activity indicated the level of understanding of cognitive abilities of two groups of the Junior High School in those two locations has increased. In addition, they affective ability increased sharply toward the students from Pulau Tidung whereas in Pulau Harapan an occurred a large increase in psychomotor abilities. The conclusion of this program is managed to improve the understanding and ability to act for the younger generation in conserving marine and coastal environments.

**Keywords:** environmental education, marine conservation, Pulau Seribu, younger generation

## INTRODUCTION

The education and training of conservation encompass an early stage from the actual principle of conservation. This matter is good to be performed during early age. Therefore, giving the basic education and training for younger generation from the Junior High School students in Kepulauan Seribu, especially Pulau Harapan and Pulau Tidung, are necessary to conduct. The objective of this research is to determine the level of understanding and ability in conserving the marine environment in their neighborhood for school-age generation.

Pulau Harapan and Pulau Tidung are known as part of the National Park of Kepulauan Seribu in Jakarta Bay, Indonesia. Those two islands are included into residential zone from four zones of the National Park (Estradivariet al. 2007; Farhan and Lim 2011). Even though, it included in residential zone, which has a high human activity, there are also a Marine Protected Areas in Pulau Harapan and coral plantation area in Pulau Tidung, which needs to be maintained because the area filled with many marine biodiversity components, such as mangrove, coral-reef fishes, coral transplantations, even terrestrial biodiversity which live in coastal area.

It is necessary to change the way that people think about the conservation of species and ecosystem diversity. In many parts, human activities in small islands exploit

marine resources, degrade aquatic, and cause irreversible losses of biological diversity (Petrossillo, et al. 2007). Those are some reasons why we should educate young generation in small islands environment. By giving the material of coastal ecosystems and its conservation, the young age generation who lives in the small islands will participate and preserve their neighborhood. The participants also need to continue to monitor the observation site and maintain the environment condition during training, including the Marine Protected Areas in those islands

## MATERIALS AND METHODS

This research was conducted in two locations, namely at Pulau Tidung which is a small island lying off close to Jakarta, and Pulau Harapan that lies off the northern part of the Kepulauan Seribu, Jakarta Bay, Indonesia (Figure 1).

To find out how far is the comprehension and the improvement of the participants about the coastal ecosystem conservation in their neighborhood, we used the questionnaire method before and after training (Figure 2). The questionnaires were focused on three specific questions which are: the knowledge of students about their coastal ecosystems (especially mangrove, seagrass, and coral reefs); the awareness on marine conservation in their

island; and the understanding of environmental quality and environmental impacts due to marine tourism. The questionnaires were administered to twenty participants from both island, Pulau Tidung and Pulau Harapan before the next activities (in this context was outfield training activities about coastal ecosystems), and then they were going to answer another questionnaire with the same topics in the last part of this training activities.

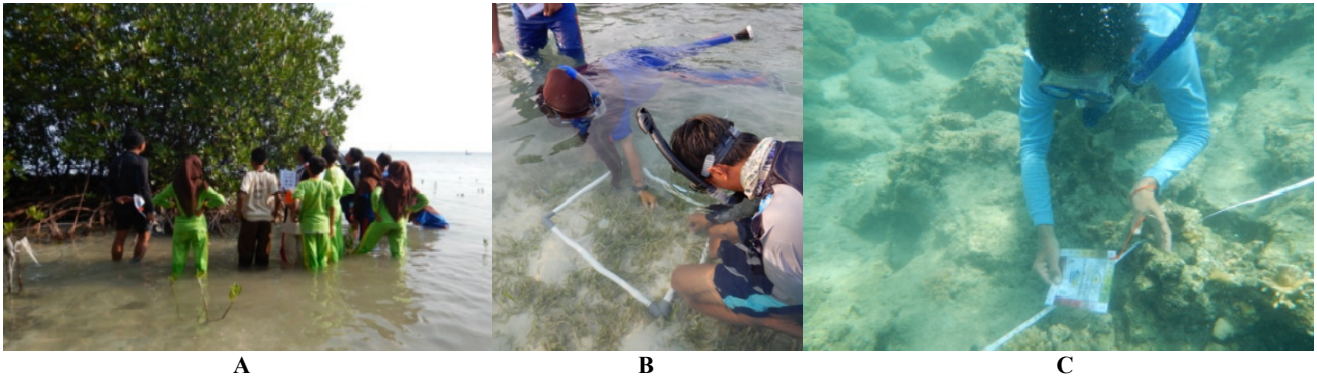
Ten the Junior High School students were selected to be trained as target group for each island. Training method that used to give information about conservation on coastal ecosystems consists of : mangrove ecosystem observation, which are identified the type of mangrove in the locations and measured the density; seagrass observation by using

Seagrass-Watch to learn about seagrass community structure; and also coral observation using Coral Watch method to check the condition of coral health (Figure 3). The result data of seagrass and coral observation will be uploaded to [www.seagrasswatch.org](http://www.seagrasswatch.org) and [www.coralwatch.org](http://www.coralwatch.org) website, so that the data can be used by many stakeholders in ocean field and the participants could also monitor the area more easily (Widiarti and Farid 2007).

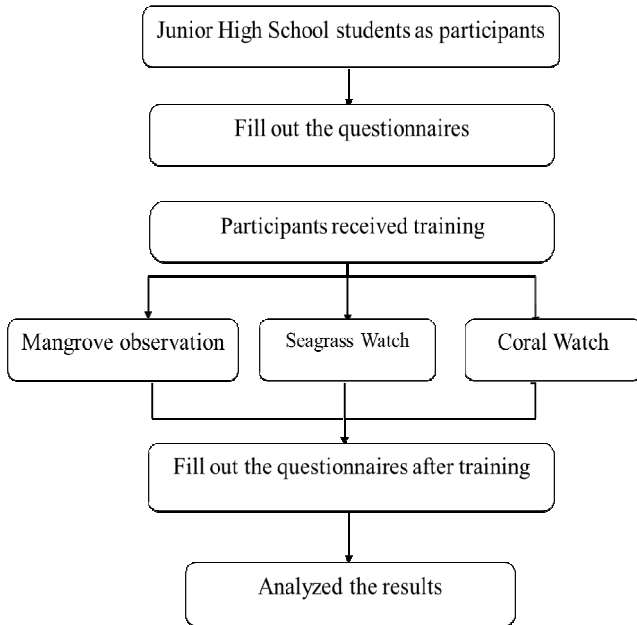
The results of the questionnaires, which has been compiled from discussion, knowledge and skills, are necessary to obtain the competency progress in understanding the need for coastal environment and biodiversity conservation.



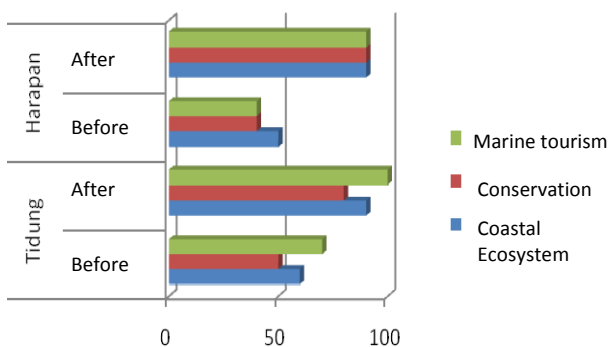
**Figure 1.** Location of research area at Pulau Tidung and Pulau Harapan, Kepulauan Seribu, Jakarta Bay, Indonesia



**Figure 3.** Outdoor activities during training at the Pulau Tidung and the Pulau Harapan, Kepulauan Seribu, Jakarta Bay, Indonesia. A. Mangrove observation, B. Seagrass watch, C. Coral watch



**Figure 2.** The scheme of questionnaires methods for collecting data



**Figure 4.** Student comprehension before and after training

### RESULTS AND DISCUSSION

As can be seen from the Figure 4 shows, the students who obtained training on marine ecosystem, coastal ecosystem, conservation, and marine tourism their knowledge increased after got training compared to that of before training, particularly for the Junior High Scholl students of the Pulau Harapan.

#### Knowledge of coastal ecosystems (especially mangrove, seagrass and coral reefs)

The survey was conducted by means of questionnaire on the coastal ecosystem given to the Junior High School students to complete. There were 7 main questions on mangrove, seagrass, and coral reef to be answered by the students. The main findings are presented in Table 1. Based on Table 1, it can be seen that the knowledge of both groups of students on mangrove, seagrass, and coral reef changed and were improved. In addition, their awareness of the students on the coastal ecosystem conservation would be improved in the future.

On the basis of 20 participants, the students of the Pulau Harapan and the Pulau Tidung are dissimilar in that the students of the Pulau Harapan have much concern on biodiversity and coastal ecosystems than that of the Pulau Tidung. Since the Marine protected area is located in the Pulau Harapan, the knowledge of the Pulau Harapan students are higher. There were many coral transplantation sites in that area, mostly branching coral (*Acropora* sp.) which already one year transplanted. Some of the participants from the Pulau Harapan came from fishermen family background. Therefore, they had high passion to keep their environment healthy by conserving the ecosystems, especially coral ecosystem. They knew that health ecosystem could provide many species of fish in large quantities. As mentioned by Douvere (2008) that the influence of human activities will limit their fishing activity and capacity. The Pulau Harapan is located in north area of Kepulauan Seribu National Park of Jakarta, where marine tourism activities still limited in this area (Farhan and Lim 2011). Degradation of coral reef and seagrass will influence their life. The awareness of coral reef disturbance

and seagrass depletion that will reduce the availability of fish, has already made this group more concerned about conservation. It appears that the increase in psychomotor abilities more visible improvement in the Pulau Harapan target group. The Pulau Tidung Island was dominant on the biodiversity theory, especially on the mangrove ecosystem. This matter arose because of in some parts of the island there is still genuine and long, standing mangrove.

#### **Awareness of marine conservation in their island**

By using Seagrass-Watch and Coral Health Chart method, two participant groups of the Yuniar High School of the Pulau Tidung and the Pulau Harapan practiced in identification, learned community structure of seagrass, and differentiated the healthy and death coral (bleached). The student's group of both islands also learned how to contribute their data, that can be accessed by everyone through the Internet. Evidently, there are the differences in collected the data for marine ecosystem, especially toward coral reefs. Target student group of the Pulau Harapan were more obvious on doing activities in the field, maybe because they like to help their parent fishing. Meanwhile, the Pulau Tidung student group which has been the most partially familiar being in more comfortable life, less resistant to being on the water and much slower to absorb the techniques and how to monitor coral reef. It appears that the increase in psychomotor abilities more visible improvement in the Pulau Harapan student target group.

There are two type areas in the Pulau Tidung, the biggest one is island for residential with so many tourism activities (Tidung Besar Island), and the others are used for mangrove plantation area (Pulau Tidung Kecil), less of human activities (Farhan and Lim 2011). The participants from the Pulau Tidung mostly knew about information to conserve their environment after they learned in location. There were so many differences of coastal condition in Tidung Besar (the biggest one) and Tidung Kecil (the small one). They could found healthy mangrove in research area (Tidung Kecil) like *Rhizophora stylosa*. It lives near the seagrass beds in Tidung Kecil. *Enhalus acoroides* and *Thalassia hemprichii* were also found along its coastal area. They are the most common species of seagrass because the substrate firmness is muddy sand, as it coexistence with mangrove (Azkab 2006). *Thalassia hemprichii* is the most common seagrass in tropic area especially Indonesia. The rhizome, leaves, and roots very strong in any kind of substrates (Mckenzie et al. 2000). One of the functions of seagrass as mammals *Dugong dugong*'s food indicated we need to keep seagrass ecosystem safe to conserve this biota. These mammals would not come to the area with very high human activities. As a producer in coastal area, seagrass also kept dissolved oxygen (DO) in water. Tidung participants had increased their awareness of the effect of human activities by monitored three coastal ecosystems in their island during training. It is good that twenty participants from each island had increased their awareness to keep and

conserve coastal ecosystems (mangrove, seagrass, and coral reefs) safe.

Moreover, mangrove in the Pulau Harapan was less than on Pulau Tidung, but it begins to be planted again recently by the society. Even mangrove conservation became part of the community and government program nowadays. So that they assume the mangroves must be maintained. The knowledge to the identified type of mangroves which found in their environment has increased after they get trained. They had high concern to conserve mangroves. We could find *Rhizophora stylosa* and *Avicennia marina* (juv.) with dominant substrate muddy sand in the Pulau Harapan, there was also *Sonneratia* sp. in the past, but it already was gone. Most of them are result of cultivation.

Some of the participants from the Pulau Harapan target group came from fishermen family. So they had high passion to keep their environment healthy by conserving the ecosystems, especially coral ecosystem. They knew that healthy ecosystem could provide many species of fish in large quantities. The awareness of coral reef disturbance and seagrass depletion that will reduce the availability of fish, has already made this group more concerned about conservation (Table 2). Most of the parents of the Pulau Tidung target group are not fishermen. Most of them work in tourism fields, such as being a guide, sell some souvenirs or opened restaurants.

#### **Understanding on environmental quality and environmental impacts due to marine tourism**

The Pulau Harapan participants who used to refuse about input of human activities because it could threaten their environment filled the questionnaires with very open-minded about marine tourism. They explained about their answers during the discussion after training. They learned that their coastal environment would damage not only because of marine tourism, but their awareness about how to keep their environment conserved, especially there is Marine Protected Area on the island. They consider their role in the future conserving their environment, especially coastal ecosystems. So if there would be marine tourism on their island, they will make it as marine ecotourism as to conserve and save the ecosystems (Table 3).

Another opinion came from target group in the Pulau Tidung, which is become a tourism region since early twenty-first century. The condition made most of participant lack of awareness about the conservation of their environment before they filled the questionnaires and trained. They knew that with high quantities of tourism, it did not give some affect to their daily life. Tidung Besar had its coastline reduce lately (Farhan and Lim 2011), it could not be denied that marine tourism had role in it. But during the training, we found *Millepora* (fire coral) along Tidung coastline, and it's not good for tourism activities in that area. Therefore, the participants had learned about dangerous biota in coastal ecosystems. *Millepora* is one of the branching coral which very danger, because it could make irritation on skin (Barbier et al. 2011).

**Table 1.** Questionnaire results on coastal ecosystem

Questions	Alternatives answers before training	Awareness	Answer after training	Awareness
What do you know about mangrove?	Nothing	****	Nothing	-
	Know without reason	***	Know without reason	***
	Explaining the question	**	Explaining the question	***
What is function of mangrove for your neighborhood?	Don't know	***	Don't know	
	Answer with samples	**	Answer with samples	**
	Explaining to some samples and reasons	**	Explaining to some samples and reasons	***
What do you know about seagrass?	Not answer	****	Not answer	*
	Answer for simple reason	*	Answer for simple reason	***
	Explaining reasons		Explaining reasons	**
How important seagrass to your neighborhood?	Do not know	**	Do not know	
	Important, no reason	****	Important, no reason	**
	Explaining reasons	*	Explaining with reasons	****
What do you know about coral reefs?	Sea rocks	*	Sea rocks	
	Sea plants	****	Sea plants	
	Sea animal	*	Sea animal	****
How important coral reefs in your neighborhood?	Important without reason	****	Important without reason	**
	Important, explaining the reasons	*	Important, explaining the reasons	***
How is the effect of human activities on coral reefs?	Hesitate	***	Hesitate	*
	Human activities not good for coral reefs	***	Human activities not good for coral reefs	****

**Table 2.** Questionnaire results on conservation

Questions	Alternatives answers before training	Awareness	Answer after training	Awareness
What do you know about conservation?	Nothing	****	Nothing	
	Know without reason	***	Know without reason	***
	Explaining the question	**	Explaining the question	***
What kind of conservation have you done to your neighborhood?	Not answer	****	Not answer	*
	Answer with simple samples	**	Answer with simple samples	****
	Explaining with samples	*	Explaining with samples	**
How important is conservation for your neighborhood?	Do not know	***	Do not know	
	Important	**	Important	****
	Explaining reasons	*	Explaining reasons	****

**Table 3.** Questionnaire results on marine tourism

Questions	Alternatives answers before training	Awareness	Answer after training	Awareness
What do you know about marine tourism?	Nothing	****	Nothing	-
	Not much	****	Not much	*
	Explaining the question	**	Explaining the question	***
How is the potential for marine tourism in your neighborhood?	Not answer	****	Low	**
	Refuse with reasons	**	Good, they want to develop their island	****
	Marine Protected Area	*	Neutral	*
Would you like join if there were marine tourism on your island?	Not answer	****	Yes	****
	Hesitate	**	Hesitate	***
	Depend on their parents	**	Depend on their parents	**

The aesthetic appeal of marine environment, especially coastal ecosystems, could be the plus point for small islands to made marine tourism. Public awareness of nature could keep the marine protected area safe. One of the human activities influence in the Marine Protected Area is humans as top predator are generally being removed, but in turn they could come back at great number as visitors. Those are some effects of human activities in marine communities (Milazzo et al. 2002). Those reasons also could be the reason why participants, especially target group from Harapan Island had big hesitation about marine tourism in their neighborhood.

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