

PAPER • OPEN ACCESS

Marine education for coastal and city youth

To cite this article: Tuty Handayani *et al* 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **338** 012045

View the [article online](#) for updates and enhancements.

Marine education for coastal and city youth

Tuty Handayani¹, Riani Widiarti², Elgodwistra Kartikoputro¹

¹Department of Geography, Faculty of Mathematics and Natural Science, Universitas Indonesia, Kampus UI Depok, Depok 16424, Indonesia

²Department of Biology, Faculty of Mathematics and Natural Science, Universitas Indonesia, Kampus UI Depok, Depok 16424, Indonesia

Email: tuty.handayani@ui.ac.id; tutyhand@gmail.com; rianiwid@yahoo.co.id; elgodwistra.k@gmail.com

Abstract. Kepulauan Seribu Regency, which is part of DKI Jakarta Province, has coastal ecosystem whose sustainability needs to be maintained. Marine education, in the form of coastal ecosystem maintenance, is needed by the younger generation in this regency. The purpose of this study is to determine in which age group is most appropriate for intensive education, both for the young generation who come from the city of Jakarta, the biggest city area in Indonesia, and the coastal youth generation of Kepulauan Seribu Coast which are fishermen's children. Peers group consisting of students from Elementary School, Junior High School, and Senior High School, originated from both the City of Jakarta and The Kepulauan Seribu, trained to love the ocean and monitor the preservation of coastal ecosystems. The training was conducted in Kepulauan Seribu area, particularly in Pramuka Island. The activities of the training include coral reef observation techniques using Coral Health Chart method, seagrass condition observation by Seagrass Watch method, mangrove ecosystem density measurement, and awareness of marine biota existence. The result shows that the group of Junior High Schools is the best suited as the participant of the training. In this group, both Jakarta and Kepulauan Seribu students experienced the highest knowledge increase (80%). For elementary school participants, the improvement of knowledge for students coming from Jakarta is higher. Meanwhile, the increase of knowledge of senior high school students is no more than 60% and the students from the Kepulauan Seribu have a higher knowledge increase.

1. Introduction

Kepulauan Seribu Regency, as part of DKI Jakarta Province, is located between 106°19'30" - 106°44'50" East Longitude and 5°10'00" - 5°57'00" South Latitude. The district has 110 verified islands, with only 11 inhabited islands. Besides as settlement, some islands are also used for other purposes, including conservation areas and tourism sites. Some of them are even devoted for tourist resorts, such as Ayer Island, Bidadari Island, Sepa Island and others. (Kepulauan Seribu District, 2016)





Figure 1. Kepulauan Seribu Map

With the increasing number of tourists, adequate facilities are needed. In 2016, Kepulauan Seribu was able to attract foreign tourists and domestic tourists as much as 807,330 people. This is one of the reasons why the local government issued 121 new permits for homestay establishment [1]. However, this policy will also surely increase the exploitation of marine resources.

Exploitation of marine resources in the Kepulauan Seribu, either for tourism or fishery industries, without control, may evoke environmental degradation, especially the declining quality of coastal ecosystems. Tourism industry utilizes a variety of coastal resources as an attraction for tourists. Increasing exploitation of fishery resources can also raise the possibility of disturbance to the marine biota's health and risk environmental damage. Moreover, most fishermen, who are traditional ones, tend to use simple, low cost and not environmentally friendly techniques.

If the utilization of resources is done wisely with the balance between exploitation and conservation, the marine resources will remain sustainable. Achieving that sustainable goal must be started from the awareness of every human being to participate in the protection and conservation of marine life, which also must be owned from an early age.

The conservation psychology approach, the analysis of mutual relationships between people and nature with an emphasis on how to raise human spirit in the conservation of natural resources (Sounders, 2003), needs to be done from an early age. Awareness and education are needed to awaken the passion for loving the sea in the younger generation from the age of the children to the age of adolescence. The young generation that needs to be awakened and educated not only from the Kepulauan Seribu area, but also the youth from the city of Jakarta who became the users of the tourism and fisheries sectors.

The purpose of this study is to find out

1. Which age group is most appropriate to get education for the care of the sea for the younger generation?
2. The difference of level of understanding and awareness about the conservation of the marine environment for the young generation from Jakarta and the young generation of Kepulauan Seribu, who are children of fishermen.

2. Methods

This research is conducted in Pramuka Island, which is the administrative capital of Kepulauan Seribu Regency, and the surrounding areas. The island is located around 40 km from Jakarta. Although the coastal ecosystems are not entirely good, there are some islands around Pramuka Island which still has good ecosystem condition. The strength factor of Pramuka Island is the presence of lodgings and other tourism supporting facilities.

This program lasted from 2005 until 2015. Every year, the participants included 15 people from the city of Jakarta and 10 people from Kepulauan Seribu are 10 people, with 250 participants in total. However, not all activities could go as planned due to weather constraints. Thus, only samples in the year with fully carried-out activities are chosen. There are total of 120 participants, consist of 40 students in each elementary, junior high, and high school level. All activities were conducted for five days in Pramuka Island during school holidays.

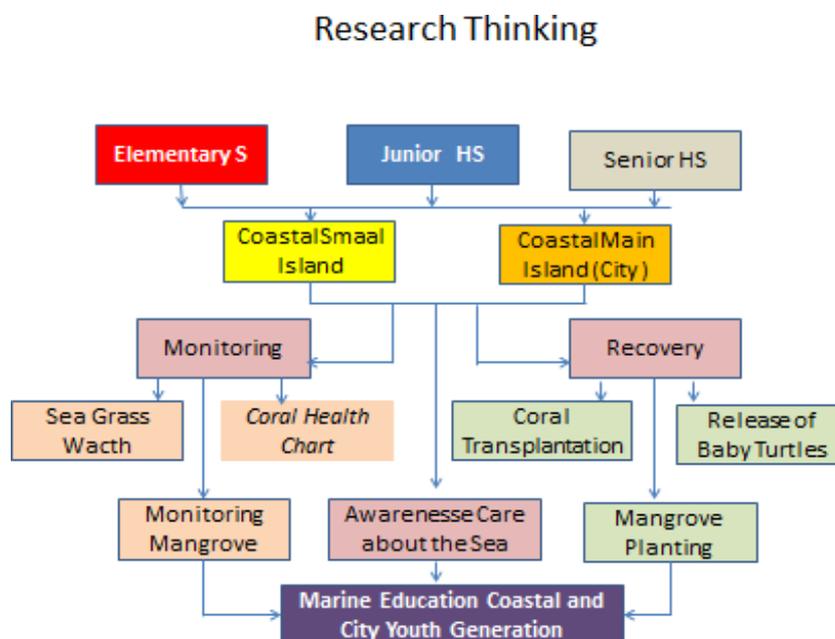


Figure 2. Research Framework

The activity was done in three stages; started by understanding and building the awareness on the sea, continued by monitoring and recovery, and ended by evaluation. The method for understanding and building awareness in each level is adjusted according to age, psychomotor, and cognitive abilities. In monitoring activities, all three levels of education received the same material, including mangrove observation, seagrass growth monitoring by Seagrass Watch method, and coral reef monitoring by Coral Health Chart method. The material is adapted to cognitive and psychomotor abilities for the recovery activities. Lastly, the evaluation was done by focus group discussion and questionnaire filling to obtain the conclusion result of the training and awareness building.

3. Result and Discussion

3.1. Basic knowledge of the ecosystem

The participants' basic knowledge is assessed from the participants' answers when they were given a questionnaire. The contents of the questionnaire contain basic knowledge of coastal ecosystems, understanding and the awareness of the sea, the benefits of conserving the marine environment, and expectations for marine conditions in Indonesia. For understanding and awareness of coastal ecosystems, questions are emphasized on the knowledge of Mangrove, Seagrass and Coral. A participant who is able to answer 50% of questions correctly, is considered to have sufficient basic knowledge.

The evaluation of the training's successes is done by comparing the participants' knowledge before training and afterwards. After the training, the participants are considered aware and cares about the sea if they can answer 80% of the questions correctly. So, if initially the participants were only able to give answers of 50% or less and then after the training correct answers increased to 80%, then the training considered as success.

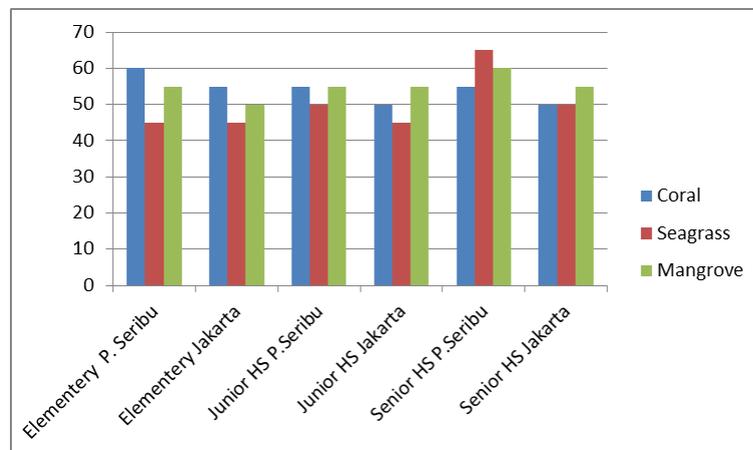


Figure 3. Percentage of Basic Knowledge of The Participants About Coastal Ecosystems

Participants from the Kepulauan Seribu have a higher knowledge of coastal ecosystems than those from Jakarta. Moreover, for Senior High School level, more than 50 percent of the Kepulauan Seribu students have a good basic knowledge of all components of the coastal ecosystem. But, except for the Senior High School level the Kepulauan Seribu students, almost all levels of knowledge about the Seagrass has low percentage. As for the percentage of basic knowledge about mangrove is high at all levels.

3.2. Elementary School Level

The execution of the understanding and raising awareness of the sea activities for the elementary school level is done with relaxing and fun activities. This is attributed to the age of participants who are still interested in playing games, that are:

- Interactive Stickers:** Participants were asked to match snippets of images of sea animals, in order to become a complete and recognizable animal species. From the game, it will be seen participants who already understand a variety of marine animals and the one who just learn at that time. While they learn about the animals, its habitat and life in the sea also introduced.
- Coloring various shapes of marine animals:** From gypsum material, a variety of marine animals are formed. Each participant is asked to give the color according to the true color of the object. Participants are then asked to explain the species of the colored objects and their living environments
- Group competition of drawing the marine environment.** The groups consist of 5 participants. They are asked to pour out the marine environmental ideas as they expect. The variety of objects drawn when describing the marine environment becomes the main scoring points.

Monitoring activities conducted with:

- Introduction of Mangrove Ecosystem.** Aimed at the Elementary School level, it is done by learning to recognize the types of mangroves that grow through the identification of leaves and roots, so they can know the type of mangrove that grows and exist in the area.
- Introduction to coral ecosystems, by snorkeling.** Each group is guided by 2 mentors. On the underwater observations, participants were asked to match their observations using the Coral Health Chart, to find out which coral is still healthy. In addition, participants are also asked to recognize the type of coral they see, according to the explanation given by the mentor.
- The introduction of the seagrass ecosystem, conducted by examining seagrass density and match it with Seagrass Watch Monitoring method.**

Recovery of the marine environment activity conducted with:

Baby sea turtles releasing activity: On the Pramuka Island there is a sea turtle conservation area. From the conservation area, the participants obtained baby sea turtles to be released into the sea. Participants learn to return the animal to its original habitat. This is one of the way to teach how to restore the environment.

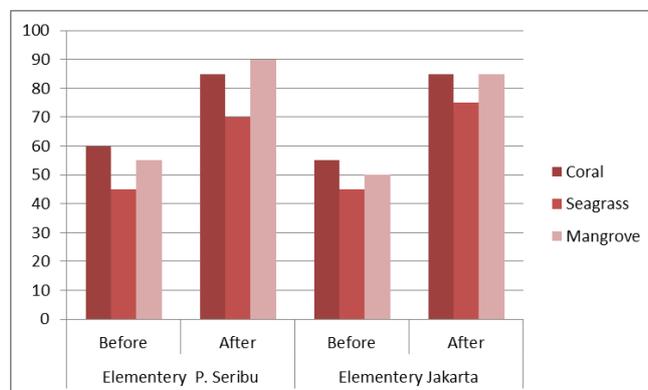


Figure 4. Percentage of Participants with Increased Knowledge About Coastal Ecosystems on Elementary School Level

On this Elementary School level, participants' knowledge about the importance of monitoring and practice increased across all components of the ecosystem, both on Coral, Sea grass and Mangrove. The basic knowledge of students from the Kepulauan Seribu is already higher initially, so the big increase of knowledge was experienced by the students who come from Jakarta. Seagrass was not much known to the student from Jakarta at first, so the increase in knowledge of seagrass is very high.

3.3. Junior High School Level

Understanding and awareness raising of the sea activities is done with the individual poster contest. The posters that are made contain about the current marine life and their expectation about marine life in the future. Understanding and awareness raising activities are also done with speed quizzes. Speed quizzes done in pairs, two people per group. The subjects for the quizzes were about Coastal Ecosystems and Sea Conservation.

Coastal ecosystem monitoring activities were similar to those undertaken on elementary school level, but with different levels of depth. In the introduction of mangrove ecosystem, the participants are given the knowledge on how to calculate the area of mangrove with transect technique. Introduction of coral reef ecosystems is done by observing live corals and dead corals using the Coral Health Chart and calculating the area. The introduction of seagrass is done by assessing health and calculating seagrass density with Seagrass Watch Monitoring method.

As for the restoration of the marine environment is done by planting mangroves. Junior high school students are considered to have been able to restore the ecosystem that once existed by replanting the mangrove. The mangroves planting is done per group, where each group planted an area of 10 meters by 5 meters.

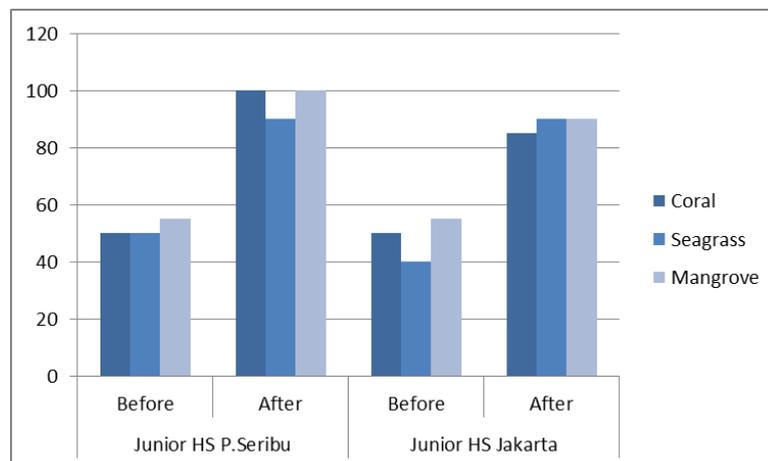


Figure 5. Percentage of Participants with Increased Knowledge About Coastal Ecosystems on Junior High School Level

Improved mangroves and seagrass monitoring skills on the junior high school level is very high. After completing the educational and awareness program, more than 80 percent succeeded in having the expected ability. Of the three ecosystems that were studied, the knowledge about seagrass is the most significantly increased.

3.4. Senior High School Level

On the Senior High School level, the understanding and awareness raising of the sea activities is done with the Focus Group Discussion. As a trigger for discussion materials, a coastal and marine environment issues themed movie was played. Each group consists of five people, then they presented the results of the analysis and efforts to overcome the environmental problems of coastal and marine. Assessment done by the mentors by comparing the results of the discussion before the training activities and afterwards.

In the coastal and marine ecosystems monitoring activity, the basic material is the same as for junior high school level. The difference lies in its level of analysis. After being able to calculate the area and density of the mangroves, the participants were requested to analyze the cause of the mangrove condition that has been studied, compared to the ideal conditions of mangrove plants. On coral reef monitoring during snorkeling, they started observing live corals and dead coral and assessed with the coral health chart and uploaded the results on an international site engaged in coral rescue. For example, the results were uploaded at <https://www.coralwacth.org>. While for Seagrass introduction, it was done by assessing health and calculating seagrass density with the *Seagrass Watch Monitoring* method.

Coastal ecosystems restoration for this level is done by coral transplantation activity. The transplant result is planted around Pramuka Island. This activity requires group cooperation especially when planting in the sea. Swim skill is needed in this activity. Nevertheless, the increase of participants from Jakarta for coral monitoring was higher than participants from the Kepulauan Seribu.

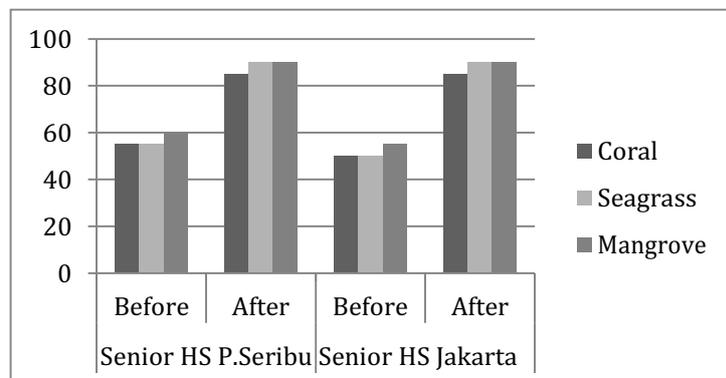


Figure 6. Percentage of Participants with Increased Knowledge About Coastal Ecosystems on Senior High School Level

Among the three components of the Coastal Ecosystem, the improvement of Sea Grass monitoring capability is the highest, since before the training both Kepulauan Seribu and Jakarta students do not really know the benefits of Seagrass. Coral Monitoring has increased considerably high in both students from Jakarta and Kepulauan Seribu. They find it very interesting to monitor using the Coral Health Chart and upload it to the international website. The Kepulauan Seribu student has known the mangrove for a long time, so the knowledge increase is not as much as the increase of the student's knowledge coming from Jakarta.

3.5. Skill Improvement Based on Level of Education

After all activities are completed, it is necessary to evaluate the success rate of the training. The results of the evaluation can be seen from the table below (Table 1).

Tabel. 1. Percentage of participants' skill improvement

Level	Coral	Seagrass	Mangrove
Elementery P. Seribu	42	56	64
Elementery Jakarta	55	67	70
Junior HS P.Seribu	82	80	82
Junior HS Jakarta	90	89	82
Senior HS P.Seribu	55	38	50
Senior HS Jakarta	70	80	64

Source: Data processing 2017

In general, the increased knowledge and concern on coastal and marine ecosystems is higher for the participants that came from Jakarta. This is because the initial basic capability of the Kepulauan Seribu participants is already high. So, when the participants reach the same ability after training, the skill of Kepulauan Seribu students looks not much improved. Seagrass knowledge and awareness improvements are generally lower than those for other ecosystems. But for Elementary School, the increase in Seagrass monitoring is higher than coral. For their age, Seagrass is more easily observed on shore, compared to corals which the observations should be done with snorkeling.

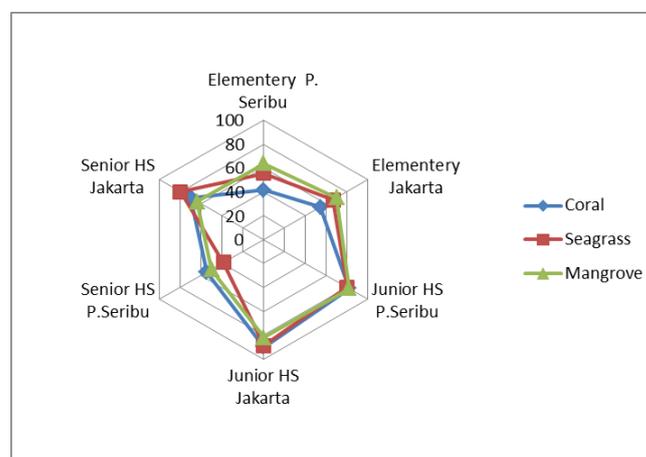


Figure.7. Participant's Skill Improvement Based on Education Level

Based on increased knowledge and concerns on coastal and marine areas, the participants on Junior High School level experienced the highest knowledge increase, whether for knowledge of Coral ecosystem, Seagrass and Mangrove, for both participants from Jakarta and Kepulauan Seribu. While for the participants on Senior High School level, although participants from Jakarta experienced improvement in knowledge of Seagrass by 80%, but for other ecosystem, the improvement is less than 70%. Even for the Senior High School students of Kepulauan Seribu, the increase is less than 60%. While the highest increase of knowledge and awareness for Elementary School participants is only 60%.

3.6. Level of Understanding and Awareness of The Participants from Jakarta and Kepulauan Seribu.

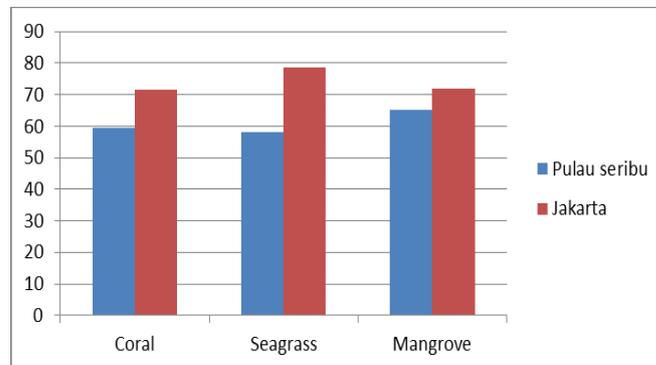


Figure 8. Improvement Percentage of Coastal Ecosystems Knowledge of Jakarta and Kepulauan Seribu Participants

Overall, the increase of understanding and awareness for coastal environments is higher among participants from Jakarta. Skill increase of participants from Jakarta is highest in seagrass ecosystem, then coral ecosystem, and mangrove ecosystem. While the highest increase that experienced by the participants from the Kepulauan Seribu is on the mangrove ecosystem instead. The difference is because seagrass is an ecosystem that is less well known by participants from Jakarta, so after participating in the activity, the participant's knowledge increases sharply. While mangrove although well known by participants from the Kepulauan Seribu, but so far it receives lack of attention.

4. Conclusion

Based on the improvement of monitoring capability, as well as increased awareness about coastal and marine ecosystems, Junior High School's education level has increased by 80%. For Senior High School level, the increase is not more than 60%. While for Elementary level is generally lower than Senior High school.

Almost all of the components show that participants from Jakarta experience more knowledge increase compared to the participants from the Kepulauan Seribu. This is because the participants' initial knowledge of the Kepulauan Seribu is already high. However, from the standard of achievement, both participants from Thousand Islands and from Jakarta, the ability increased by about 60%.

References

- [1] Dinas Pariwisata Kabupaten Kepulauan Seribu 2017 Kepulauan Seribu Terbitkan 121 Ijin Home Stay. Jakarta Tourism & Culture Office
- [2] Clayton S D and Carol D S 2012 *Introduction: Environmental and Conservation Psychology*. *The Oxford Handbook of Environmental and Conservation Psychology*. (Oxford: Oxford University Press.)
- [3] Cutter-Mackenzie A, Edwards S M, Boyd W 2014 Young children's play and environmental education in early childhood education, Springer Science & Business Media, Switzerland
- [4] Djoehaeni. Heny. (2014) Model Pembelajaran Pendidikan Lingkungan Hidup pada pendidikan anak usia dini. *Jurnal Edutech*. Year 13th . Vo.1.No 1.

- [5] Gale.Tim and Jennifer Hill.(2016) Ecotourism and Environmental Sustainability: Principle and Practice Roudledge Publiser. Abingdon New York USA
- [6] Handayani, Tuty. Riani Widiarti, Harsono Soepardjo (2016) Peningkatan Masyarakat Lokal dalam Melakukan Kegiatan Konservasi di Lingkungan Pesisir Kepulauan Seribu, DRPM UI
- [7] Handayani, Tuty. Elgodwistra Kartikoputro. A Harsono Soepardjo. (2016). Youth Education in Self Preoaring as Marine Ecotourisme Guide in Kepulaun Seribu. Advances in Social Science, Educational and Humanities Research Vol.79. Atlantis Press Publisher.
- [8] Kabupaten Administrasi Kepulauan Seribu. (2017). Profil Wilayah. Pemerintah Kabupaten Administrasi Kepulauan Seribu. Co.Id
- [9] Mckenzie, L. J., W. J. Lee Long, R. G. Coles and C. A. Roder. 2000. Seagrass-watch: community based monitoring of seagrass resources. Biol. Mari. Medit. Vol 7 (2): 393-396
- [10] Robert, Julian. (2007). Marine Environmental Protection and Biodiversity Conservation : The Aplication on Future Development of The IMO’S Particularly Sensitive Sea Area Concept. Springer Verlag Berlin Haidelberg
- [11] Warsa. Andri and Baiq Ida Purnawati (2010) Kondisi Lingkungan Terumbu Karang di Daerah Perlindungan Laut Pulau Pramuka Kepulauan Seribu. BAWAL Widya Riset Perikanan Tangkap. Vol. 3.No 2
- [12] Widiarti, R dan M. A. Farid. 2007. Pendidikan lingkungan laut dan pesisir untuk anak. Jurnal Mitra Bahari. Vol 2 (1): 1-5