SEAGRASS CONSERVATION EDUCATION BASED ON COASTAL CHILDREN EMPOWERMENT IN TELUK BAKAU, BINTAN REGENCY

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Abstract

Abstract. This research focuses on educating coastal children in Teluk Bakau, Bintan Regency, about the importance of seagrass ecosystems and the threats they face. The seagrass ecosystem has an important role in maintaining the balance of marine ecosystems, including as a habitat for various marine species and supporting the global carbon cycle. However, seagrass meadows are threatened by uncontrolled human activities, pollution, and climate change. Through descriptive methods and a community service approach, this research succeeded in increasing the knowledge of coastal children, as evidenced by the significant increase in participants' post-test scores after participating in the educational program. The majority of participants experienced an increase in knowledge, with the average score increasing from 5.1 on the pre-test to 7.45 on the post-test. These results show the effectiveness of the program in increasing environmental awareness among coastal children. However, there was variation in the level of knowledge improvement among participants, indicating the need for more adaptive and interactive learning methods. The success of this program emphasizes the importance of environmental education from an early age in forming a generation that cares and plays an active role in ecosystem conservation, especially seagrass beds in the coastal area of Teluk Bakau.

Keywords: Coastal Children, Conservation, Seagrass

INTRODUCTION

Coastal areas have a rich diversity of ecosystems, including seagrass beds, mangroves, and coral reefs. These areas not only hold high ecological potential, but are also a source of livelihood for coastal communities that depend on natural resources from the sea. Among these ecosystems, seagrass meadows have a significant ecological role. Seagrass meadows are one of the coastal ecosystems that serve as habitat for various marine species, including commercial fishes with high economic value, as well as multiple species of invertebrates and marine mammals (Jackson, 2003). The biodiversity found in seagrass ecosystems contributes to the stability of the marine ecosystem as a whole, as well as being the basis for the economic

well-being of communities that utilise marine products.

In addition to being a habitat, seagrass meadows also have an important function in the global carbon cycle. These ecosystems are capable of storing large amounts of carbon, thus playing a role in climate change mitigation (Fourqurean et al., 2012). Seagrass meadows' ability to sequester and store carbon exceeds that of tropical forests per unit area, making them one of the key ecosystems in efforts to reduce greenhouse gas emissions. Research shows that the loss of seagrass meadows due to human activities can release stored carbon into the atmosphere, which in turn exacerbates the impacts of climate change (Sipayung et al., 2023). Therefore, seagrass conservation is not only important for maintaining marine biodiversity but also for maintaining global climate balance.

However, seagrass meadows face a variety of serious threats that could jeopardise their survival. Uncontrolled human activities, such as sand mining, domestic waste disposal, and unsustainable tourism activities, have led to the degradation of these ecosystems (Sihombing et al., 2023). In addition, land use changes in coastal areas that do not take into account their impact on marine ecosystems also contribute to the decline in seagrass quality and quantity. For example, the conversion of mangrove land to ponds or settlements often leads to increased sedimentation that can cover and damage seagrass beds. In addition, water pollution from industrial and household waste, as well as eutrophication caused by nutrient runoff from agricultural land, also threaten the viability of seagrass ecosystems.

Therefore, efforts to conserve and restore seagrass meadows are very important to maintain the balance of coastal ecosystems and the sustainability of existing natural resources. One important step in conservation is through education and raising public awareness about the importance of seagrass beds and the threats they face. This education must start early, especially for children living in coastal areas such as Teluk Bakau. Children are the next generation who will inherit the current environmental conditions, so it is crucial to equip them with knowledge and awareness of the importance of maintaining coastal ecosystems.

An early introduction to the role and threats of seagrass ecosystems is crucial, as children who understand the importance of these ecosystems will be more likely to engage in environmental conservation efforts in the future (Hertadi et al., 2023). This education not only serves to provide knowledge about marine ecosystems but also to shape pro-environmental attitudes in children, so that they can become agents of change in protecting existing ecosystems. Research has shown that children who receive early environmental education tend to have higher environmental awareness and are more active in conservation efforts (Evans et al., 2012).

Coastal children need to be equipped with knowledge about how seagrass ecosystems work, their benefits, and the threats they face so that they can participate in environmental conservation efforts from an early age. One approach is to integrate environmental education into the school curriculum, as well as through informal education programmes such as field activities and environmental campaigns. These approaches can help children understand the relationship between the environment and their daily lives and encourage them to take action to preserve nature.

In addition, the participation of local communities and governments in supporting environmental education programmes is also very important. The government can play a role

in providing facilities and resources to support environmental education programmes, as well as in regulating and monitoring human activities that could potentially damage coastal ecosystems. Meanwhile, the community can play an active role in conservation activities and set an example for the younger generation in protecting the environment. Given its importance, this study aims to educate coastal children in Teluk Bakau on the role and threats of seagrass ecosystems, and to foster awareness and responsibility to preserve the coastal environment in their area. A comprehensive educational approach involving various parties can provide ecological, economic and social benefits for local communities.

IMPLEMENTATION METHOD

This study uses the *community development* method as a form of educational intervention for coastal children in the Teluk Bakau area, Bintan Regency, Riau Islands. The implementation of educational activities is carried out in several stages as follows:

1. Initial socialisation and debriefing

    Socialisation was conducted by involving coastal children as the main participants. The socialisation included a basic introduction to the seagrass ecosystem, its important role in the environment, and the threats that can damage this ecosystem. The material was delivered using creative learning methods that were adapted to the age of the participants.

2. Participant and group organisation

    Participants will be divided into groups randomly drawn without regard to age range. This random division is expected to create a more dynamic interaction between different ages, allowing each participant to collaborate and learn from each other's experiences and perspectives.

3. Taking pre-test scores

    After dividing the groups, several groups were formed in which each group was given a pre-test score before learning to see the difference between after and before, here we can see the extent of the children's knowledge.

4. Creative and interactive learning methods

    To facilitate understanding, interactive teaching aids that have been prepared by the team are used. Children are actively involved in learning activities through educational games, demonstrations, and simulations related to seagrass ecosystems. This method is designed to make the learning process fun and easily understood by children. Each group was assigned a mentor to direct the children to the next post. In addition, each post is given several games related to marine ecosystems, especially seagrass, so that children can understand.

5. Material Enrichment Method and Reflection Session

    After creative learning, material enrichment and reflection sessions were conducted. In this session, children were invited to express their opinions about the importance of protecting seagrass ecosystems and the ways that can be done to protect them. In addition, they were given a material through songs and games.

6. Evaluation and Reflection

The activity ended with an evaluation to assess the extent of the participants' understanding of the material that had been delivered. Evaluation was carried out through simple tests and group discussions. Here it is seen through the post-test how far the children understand about the seagrass ecosystem. In addition, a joint reflection was also carried out to find out the impressions and messages from the children about the activities they had participated in.

RESULTS AND DISCUSSION

This study focuses on introducing the role and threats of seagrass ecosystems to coastal children in the Teluk Bakau area. Teluk Bakau is an area rich in biodiversity, including seagrass meadows, which have important ecological functions, such as providing habitat for various marine species, protecting beaches from abrasion, and serving as a buffer in marine biogeochemical cycles. However, seagrass meadows also face various threats, such as uncontrolled human activities, pollution, and the impacts of climate change. Therefore, introducing the importance of protecting this ecosystem from an early age is crucial, especially for children living in coastal areas.

Figure 1. Seagrass Ecosystem Education Activities

1. Increased knowledge of coastal children

From the results of this study, it was shown that the educational programme was able to increase the knowledge of coastal children about the role and threats of seagrass ecosystems. This is evidenced by the increase in the average pre-test and post-test scores. Before participating in the educational programme, the average pre-test score was 5.1, which then increased to 7.45 in the post-test. This represents an average increase of 2.35 points, reflecting the effectiveness of the education programme in improving participants' understanding. In more detail, of the 20 participants who took part in the programme, 85% experienced an increase in their scores after receiving the education. This indicates that the majority of children involved in the programme were able to absorb the information and knowledge provided. This

improvement is very important because with increased knowledge, it is expected that children will have a higher awareness of the importance of protecting the environment, especially the seagrass ecosystem around them.

Figure 2. Distribution of Pre-Test Questions to Coastal Children

2.   Variation in improvement among participants

Further analysis showed variations in score improvement among the participants. Some participants showed significant improvement, such as Bima and Fatikah, who each improved by 6.19%. Bima and Fatikah's scores increased from 3 in the pre-test to 9 in the post-test. This improvement is very striking and shows that this education programme is very effective for participants who have low initial knowledge of seagrass ecosystems. It also indicates that participants who initially had a poor understanding of the topic were able to acquire more new knowledge after attending the education programme. In contrast, there were some participants who showed no improvement at all, such as Hafiz and Siti Alisa, whose pre-test and post-test scores remained the same. This suggests that not all participants were able to absorb the material effectively, or perhaps they already had enough knowledge so there was no significant improvement. Factors affecting these results can vary, ranging from teaching methods that may not suit their learning styles, to a lack of interest in the material presented. Therefore, a more adaptive approach is needed to ensure all participants get the maximum benefit from the education programme.
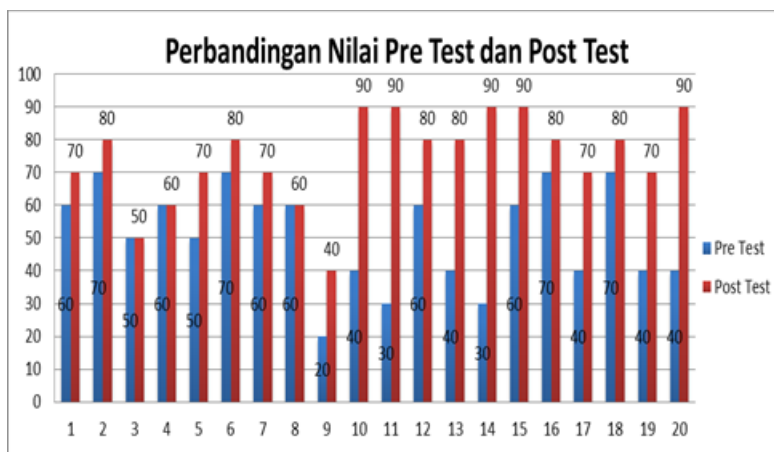
Grafik 1. Comparison of Pre-Test and Post-Test Scores

3.   Distribution of Knowledge Improvement

The distribution of knowledge improvement showed that participants with lower baseline scores tended to experience greater improvement after receiving the education programme. For example, Afifah, who scored 4 on the pre-test, improved by 5.21% on the post-test with a score of 9. Participants like Afifah who had a lower baseline score may have felt that they received more new information that they did not know before, making it easier for them to experience significant improvement. In contrast, participants with already high pre-test scores, such as Irsyat who scored 7 in the pre-test, only improved by 1.08% to 8 in the post-test. This suggests that participants who already have a better knowledge base may need a different approach to continue improving their understanding.

4.   Effectiveness of the Education Programme

The educational programme can generally be categorised as successful in improving the knowledge of coastal children about seagrass ecosystems. The n-gain value of 46.08% indicates that the programme was moderately effective in improving participants' knowledge. This n-gain value illustrates how much the participants' knowledge increased compared to the maximum potential increase that can be achieved. This result is quite satisfactory, considering that this programme is the first step in shaping environmental awareness in coastal children. However, this effectiveness can be further enhanced by making adjustments to the teaching methods used. For example, the programme could adopt a more interactive and participatory learning approach, such as using interesting visual media, simulations, or educational games that can better engage children in the learning process. Previous research has shown that interactive learning methods are more effective in improving children's understanding of environmental topics [5]. In addition, a more contextualised approach that relates the material to children's daily lives can help them better understand the importance of seagrass ecosystems.

5.   Implications and Recommendations

The results of this study have several important implications for environmental conservation efforts in coastal areas, particularly in Teluk Bakau. Raising environmental awareness in coastal children is a strategic step in ensuring the sustainability of seagrass ecosystems in the future. Children who are aware of the importance of this ecosystem can

become agents of change who will continue to protect and preserve their environment. Therefore, educational programmes like this should continue to be implemented and developed with more effective methods. In addition, it is important to periodically evaluate the effectiveness of this programme, taking into account feedback from participants and making necessary adjustments. For example, incorporating more practical activities such as field trips to seagrass beds or small projects that involve children in real conservation activities. This will give them hands-on experience and strengthen their understanding of the importance of protecting these ecosystems.

From a policy perspective, local governments and environmental non-governmental organisations (NGOs) can use the results of this study as a basis for designing more extensive and sustainable environmental education programmes in other coastal areas. Increasing coastal children's knowledge about marine ecosystems is a long-term investment that will have a positive impact on environmental sustainability.

CONCLUSION

This study showed that an educational programme on the role and threats of seagrass ecosystems successfully improved the knowledge of coastal children in Teluk Bakau, Bintan Regency. With a significant average increase in post-test scores, as well as a high percentage of participants who experienced an increase in knowledge, it can be concluded that the programme was effective. However, there were still variations in the level of knowledge improvement among participants, indicating the need for a more adaptive and interactive approach in delivering the educational materials.

The success of this programme provides evidence that environmental education conducted from an early age is very important and effective in shaping environmental awareness. Children who have been equipped with this knowledge are expected to grow into individuals who care and are active in environmental conservation efforts, especially in preserving seagrass ecosystems in their area. Therefore, this education programme should be continued and expanded, with adjustments and innovations in teaching methods to achieve more optimal results in the future.

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