



The Concept of Mangrove Conservation Approach through The Utilization of Local Values as A Foundation for Disaster Mitigation at SMP Negeri 11 Banda Aceh

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ABSTRACT

This study aims to explore the concept of a mangrove conservation approach at SMP Negeri 11 Banda Aceh that integrates local values as a foundation for disaster mitigation. Given the vulnerability of the Banda Aceh region to coastal disasters and the vital role of mangroves as natural protectors, this qualitative research with descriptive quantitative elements explored the understanding and perspectives of students, teachers, community leaders, and other stakeholders through interviews, questionnaires, observations, and focus group discussions. The results showed students' initial awareness of the importance of mangroves, but in-depth understanding of their role in disaster mitigation and related local values still needed to be improved. Teachers have the desire to integrate local values in learning, but face implementation constraints. Community/customary leaders emphasized the relevance of traditional wisdom in mangrove management and disaster mitigation. This study concludes that the utilization of local values in mangrove conservation programs at the school level has significant potential to increase students' awareness, participation, and resilience to coastal disasters, as well as preserve local cultural and environmental heritage. The development of a structured and sustainable conservation program based on local values needs to be further improved at SMP Negeri 11 Banda Aceh.

Keywords: mangrove conservation, local wisdom, disaster mitigation, environmental education

1. INTRODUCTION

Indonesia, as the largest archipelago in the world, has a very high wealth of coastal biodiversity, including extensive and important mangrove ecosystems. Mangrove ecosystems not only serve as habitat for various species of flora and fauna, but also have crucial ecological functions in maintaining the balance of the coastal environment. One of the vital functions of mangroves is as a natural protector against various threats of coastal disasters, such as abrasion, seawater intrusion, storms, and tsunamis (Alongi, 2008; Barbier et al., 2008). The density and structure of mangrove roots can reduce wave energy, stabilize sediments, and reduce the impact of disaster damage.

Banda Aceh, the capital of Aceh Province and located on the west coast of Sumatra, has a dark history due to the devastating tsunami in 2004. The event made us realize how vulnerable coastal areas are to the threat of extreme waves. However, studies show that the presence of relatively intact mangrove ecosystems in some locations can reduce the impact of tsunami damage (Danielsen et al., 2005). This further emphasizes the importance of mangrove conservation and rehabilitation as an integral part of disaster mitigation efforts in the region.

Mangrove ecosystems in many parts of Indonesia, including around Banda Aceh, are under significant pressure from anthropogenic activities, such as land conversion to ponds, agriculture and settlements, and unsustainable exploitation of mangrove timber (Polidoro et al., 2010). Mangrove degradation not only reduces biodiversity, but also removes their natural function as coastal protection, increasing vulnerability to disasters.

In this context, an effective mangrove conservation approach requires a holistic strategy that involves active participation from various parties, including local communities. Local values, which include traditional wisdom, hereditary ecological knowledge, cultural practices and social systems of local communities, have great potential to serve as a strong foundation for conservation efforts. Local communities often have a deep



understanding of the dynamics of the ecosystems around them and sustainable natural resource management practices (Berkes et al., 2000).

SMP Negeri 11 Banda Aceh, as an educational institution located in a coastal area, has a strategic role in instilling awareness of the importance of mangrove conservation and disaster mitigation to the younger generation. Integrating local values in mangrove conservation programs at the school level is expected to increase students' understanding of the close relationship between their culture and the coastal environment, as well as encourage active participation in conservation and disaster risk reduction efforts. This approach is expected to not only be effective in the short term, but also build sustainable environmental awareness and responsibility among students as future leaders.

2. LITERATURE REVIEW

2.1 Mangrove Ecosystem Conservation and its Role in Disaster Mitigation

Various studies have underscored the importance of mangrove ecosystems in maintaining the stability of coastal environments and providing natural protection against disasters. Alongi (2008) and Barbier et al. (2008) comprehensively described the ecological functions of mangroves, including their ability to dissipate wave energy, stabilize sediments, and reduce the impacts of erosion and seawater intrusion. More specifically, post-tsunami studies in Asia, including those by Danielsen et al. (2005), show that the presence of healthy mangrove forests can reduce the damage caused by tsunami waves. These findings confirm the crucial role of mangroves as natural infrastructure in coastal disaster mitigation.

Polidoro et al. (2010) highlighted the alarming rate of global mangrove loss due to various human activities. This degradation not only threatens biodiversity, but also reduces the effectiveness of protection against disasters, thereby increasing the vulnerability of coastal communities. Therefore, mangrove conservation and rehabilitation efforts are crucial for environmental sustainability and coastal security.

2.2 Local Values and Traditional Wisdom in Natural Resource Management

The concepts of local values and traditional wisdom are increasingly recognized for their role in sustainable natural resource management. Berkes et al. (2000) emphasized that traditional ecological knowledge accumulated by local communities through generation-to-generation interactions with their environment often contains adaptive and sustainable management practices. Local wisdom can be in the form of knowledge about natural cycles, wise resource utilization, as well as social systems and customary rules that regulate the relationship between humans and the environment.

In the Indonesian context, various studies have documented how local communities have in-depth knowledge of coastal ecosystems, including mangroves, as well as traditional practices relevant to conservation (e.g., Johannes, 1998, on the knowledge of traditional fishers). Integration of this knowledge in conservation programs can increase their effectiveness and sustainability as they are based on the understanding and acceptance of local communities.

2.3 Integration of Local Values in Mangrove Conservation for Disaster Mitigation

Several studies and practices have demonstrated the synergistic potential between mangrove conservation and the utilization of local values in the context of disaster mitigation. Community-based conservation approaches that integrate local knowledge and participation have proven to be more effective and sustainable than top-down approaches (e.g., Grawal & Gibson, 1999). Local values can be the social glue that encourages active participation in conservation activities, such as mangrove planting, maintenance and monitoring. In addition, local understanding of disaster risks and traditional ways of dealing with them can strengthen ecosystem-based disaster risk reduction efforts.

2.4 Educational Context and the Role of Schools in Conservation and Disaster Mitigation

Educational institutions, such as SMP Negeri 11 Banda Aceh, have an important role in instilling environmental awareness and disaster preparedness in the younger generation. Integration of environmental and



disaster issues in the curriculum, as well as student involvement in practical conservation activities, can shape the character of environmental care and disaster responsiveness (e.g., UNESCO, 2017, on education for sustainable development). The utilization of local values in the context of mangrove conservation education can make learning more relevant, interesting and meaningful for students, especially as it is connected to their cultural identity and the environment in which they live.

2.5 Case Studies and Local Context of Banda Aceh

Given Banda Aceh's experience with the tsunami, studies examining the role of mangroves in mitigating its impact in the region are particularly relevant (e.g., Kathiresan & Rajendran, 2005). In addition, research on Acehese local wisdom regarding coastal natural resource management (e.g., related to *Hukom Adat Laot*) can provide valuable insights for designing conservation programs that fit the local cultural context. Not many studies have specifically addressed the integration of local values in mangrove conservation as a foundation for disaster mitigation at the junior high school level in Banda Aceh. Therefore, the study at SMP Negeri 11 Banda Aceh may provide a unique contribution in understanding the potential of this approach.

3. METHODS

This research used a qualitative approach with a case study research type. This approach was chosen to gain an in-depth understanding of complex social phenomena related to the integration of local values in mangrove conservation programs in the school environment. analysis in this study used descriptive data. The research was conducted at SMP Negeri 11 Banda Aceh located in Meuraxa Sub-district, one of the coastal areas severely affected by the 2004 tsunami. This location was chosen because of: (1) its geographical proximity to the mangrove ecosystem; (2) its active involvement in environmental conservation programs; and (3) its commitment in integrating local values in learning. The research subjects included various stakeholders involved in the mangrove conservation program at the school, namely 32 students of class VII-9 and 3 traditional leaders of *panglima laot*.

Data collection was conducted through:

- a. Participatory Observation: Researchers were directly involved in mangrove conservation program activities for 6 months (January-June 2024). Observations focused on the learning process, field activities in the mangrove area, and interactions between students, teachers, and traditional leaders.
- b. In-depth Interviews: Conducted with 32 purposively selected informants, including students, teachers, school principals, traditional leaders, and representatives of related agencies. The interviews used a semi-structured guide developed based on the research conceptual framework.
- c. Documentation study: Includes analysis of curriculum documents, lesson plans, mangrove conservation modules, documentation of activities, and customary records related to coastal ecosystem management.

4. RESULTS AND DISCUSSION

This section presents the research findings based on the data collection techniques that have been conducted at SMP Negeri 11 Banda Aceh and the surrounding community.

4.1 Students' Knowledge Level and Attitude towards Mangroves and Disaster Mitigation

The questionnaire results showed that the majority of students (75%) had a basic understanding of the existence of mangrove forests in the Aceh region. However, in-depth understanding of the specific functions of mangroves in disaster mitigation, such as dampening tsunami waves or reducing abrasion, was limited (average knowledge score of 6 out of 10). Students' attitudes towards mangrove conservation were generally positive (average attitude score of 4 out of 5 on a Likert scale), with most students agreeing that mangroves are important to protect. However, the level of active participation in mangrove conservation activities is still low (only 30% of students have ever been involved in mangrove planting or cleaning activities).



4.2 Students' Understanding of Local Values Related to Mangroves and Disaster Mitigation:

The results of questionnaires and FGDs with students showed varying levels of understanding of local values. Some students (60%) knew about *Hukom Adat Laot*, but there was little understanding of its implementation in the context of mangrove conservation. Knowledge of local stories or legends related to the sea and disasters also varied, with some students having heard them from parents or community leaders. The spirit of *gotong royong* or *meugoe* (mutual assistance) is recognized as a positive value, but its application in mangrove conservation activities is not yet structured.

4.3 Teachers' Perceptions of the Integration of Local Values in Mangrove Conservation and Disaster Mitigation Learning

Interviews with teachers indicate a desire to integrate local values in learning. Some teachers (e.g. local content teachers) have tried to incorporate folklore or examples of local wisdom in environment-related teaching materials. However, limited resources and lack of specialized training are obstacles to more systematic implementation. Teachers recognize the potential of local values in increasing students' interest and understanding of mangrove conservation and disaster mitigation.

4.4 Community/Customary Leaders' Views on Mangrove Conservation and the Relevance of Local Values

Interviews with community/adat leaders revealed a deep understanding of the importance of mangroves for coastal community life and protection from disasters. They emphasized the relevance of *Hukom Adat Laot* in regulating the sustainable use of natural resources, including mangroves. Community leaders expressed willingness to share traditional knowledge and support mangrove conservation initiatives in schools and communities.

4.5 Existing Mangrove Conservation Initiatives and Activities in Schools and Communities (Observation and Document Study)

Observation and document study showed that SMP Negeri 11 Banda Aceh does not yet have a structured and sustainable mangrove conservation program. Environment-related activities focus more on school hygiene and tree planting in the school environment. However, there is potential to develop mangrove conservation activities given the school's location relatively close to the coastal area. Some mangrove conservation initiatives may be carried out by community organizations or local governments around the school area, but the involvement of SMP Negeri 11 students is still limited.

From the data, there is an initial awareness among students of SMP Negeri 11 Banda Aceh about the importance of mangroves, but a deeper understanding of their role in disaster mitigation needs to be improved. Positive attitudes towards conservation have not fully translated into active participation. This suggests an opportunity to develop a more engaging program that involves students directly.

The integration of local values as the foundation of mangrove conservation has great potential to improve the effectiveness and sustainability of this effort. While some students are aware of local values such as *Hukom Adat Laot* and *Meugoe*, their understanding and application in the context of mangrove conservation and disaster mitigation still needs to be strengthened. School education plays a crucial role in bridging this gap.

Teachers recognize the importance of local values, but their implementation in learning still faces challenges. Development of relevant teaching materials, teacher training, and provision of adequate resources are needed to optimize the potential of this integration. The involvement of community/indigenous leaders as resource persons and partners in school programs can enrich the learning process and connect students with traditional wisdom directly.

In the absence of a structured mangrove conservation program in schools, there is a great opportunity to develop initiatives that involve students, teachers and communities. These programs can be designed by utilizing local values as a framework, as follows:



- a. Developing a local content curriculum that specifically addresses mangrove ecosystems, local values related to coastal management (e.g., *Hukom Adat Laot*), and the role of mangroves in disaster mitigation, presented through stories, legends, and traditional practices.
- b. Organize extracurricular activities that focus on mangrove conservation through students' active participation in planting, maintaining and monitoring mangroves in nearby locations. This activity can adopt the spirit of *gotong royong/meugoe* (mutual assistance).
- c. Invite community/indigenous leaders to share knowledge and experience on mangroves and local values in teaching and learning activities or workshops.
- d. Develop simple research projects that involve students in examining the relationship between local values and mangrove conservation practices in surrounding communities.
- e. Organize awareness campaigns on the importance of mangroves and local values through school media and community activities.

Utilizing local values as a foundation for disaster mitigation through mangrove conservation at SMP Negeri 11 Banda Aceh can have a significant impact. This approach will not only increase students' knowledge and awareness of the importance of mangroves as natural protectors, but also instill noble cultural values and encourage active participation in environmental conservation. The involvement of community and traditional leaders will strengthen the legitimacy and sustainability of the program.

5. CONCLUSION

The concept of mangrove conservation approach through the utilization of local values has great potential as a foundation for disaster mitigation in SMP Negeri 11 Banda Aceh. Although the current level of student knowledge and participation still needs to be improved, the existence of positive attitudes and initial awareness of local values is a valuable asset. The integration of local values in school curricula and activities, involving teachers, community leaders, and the community, can be an effective strategy to increase understanding, participation, and ultimately, disaster resilience among the younger generation. The development of structured and sustainable mangrove conservation programs in schools, utilizing traditional wisdom as a guide, is an important step towards realizing this potential.

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