



Sustainable development based on indigenous knowledge in the coastal area of Aceh Tamiang, Aceh, Indonesia

Zulfan Arico^a, Aulia Rahman^{b,*}, Bachtiar Akob^b, Sri Jayanthi^c, Chairuddin^d

^a Biological Science, Universitas Samudra, Aceh 24416, Indonesia

^b History Education, Universitas Samudra, Aceh 24416, Indonesia

^c Biological Education, Universitas Samudra, Aceh 24416, Indonesia

^d English Language Education, Universitas Samudra, Aceh 24416, Indonesia

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Abstract

The east coast of Aceh has a long coastline, so it has many coastal areas with a variety of natural resources. However, these natural resources are disrupted due to increased activities in coastal areas that affect the quality of coastal ecosystems. If not addressed immediately, this will have an impact on harmony relations between humans and the environment. This study aims to examine the use of indigenous knowledge in the sustainable development of the Aceh Tamiang coastal area. Data were collected through observation, documentation, and in-depth interviews. This study found that indigenous knowledge in fishing communities in the Kuruk III river did not significantly play a role in environmental conservation, especially in preserving the mangrove forest on the Tamiang coast. This is due to the erosion of local knowledge of the fishing community towards the khanduri laot tradition. The erosion of local community knowledge has an impact on the discontinuation of the inheritance of environmental conservation values as a whole. This research suggests to revitalize khanduri laot by expanding the scope of conservation. Panglima laot as the traditional leader of the fishing community needs to convey the intent and purpose of the khanduri laot explicitly to the community so that each individual participant of the khanduri laot tradition has the same perception. The author also suggests encouraging the issuance of village regulations and implementing sanctions for those who violate them.

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Introduction

Indonesia is one of the countries with the longest coastline, so Indonesia has many coastal areas with

various natural resources (Nur, 2021). However, these natural resources are starting to be disturbed due to excessive exploitation of coastal areas such as illegal fishing, which has a direct impact on environmental damage (Chapsos et al., 2019). Increased activity in coastal areas also affects the integrity of coastal ecosystems and results in a decrease in biodiversity and ecosystems (Zhang et al., 2020).

* Corresponding author.

E-mail address: auliarahman1985@unsam.ac.id (A. Rahman).

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On the east coast of Aceh, this problem also occurs. Mangrove forests on the coast of Aceh Tamiang District, East Aceh, North Aceh, Bireuen, Langsa and Lhokseumawe were damaged because they were used as gardens, converted into ponds, settlements, and illegal logging. Likewise, the mangrove forests on the coast of Aceh Tamiang were damaged by various illegal activities (Hanafiah, 2018). Damage to mangrove forests is caused by illegal logging and uncontrolled land conversion. The Non-Governmental Organization (NGO) for the Sumatran Coastal Mangrove Ecosystem (KEMPRa) said that 75 percent of the 23,000 hectares of mangrove forest in Aceh Tamiang Regency was in a badly damaged condition (Harison, 2022). Every year the area of mangrove forests on the east coast of Aceh Tamiang continues to shrink (Hanafiah, 2019). In addition to causing coastal and river abrasion, damage to mangrove forests will also disrupt the balance of coastal ecosystems. These problems give rise to ecological, social, and economic problems (Silva et al., 2019). On the ecological aspect, this problem has implications for the sustainability of coastal areas. Fishing communities also suffer losses due to social and economic deficits. This evidence emphasizes the importance of developing sustainable and resilient coastal areas that are regionally oriented to reduce the vulnerability of systems to natural and social disasters.

The fishing community has an economic interest in the utilization of marine natural resources. They depend a lot on these natural resources. Damage to the marine environment and disasters resulting from the destruction of marine ecosystems are things that need to be anticipated. Local knowledge passed down from generation to generation saves environmental conservation values so that in practice the fishing communities are not trapped in annual ritual practices that have an impact on the ongoing damage to the mangrove ecosystem because it is not properly maintained. Therefore, it is necessary to actualize values in daily practice in utilizing marine resources. In order to balance and integrate information from various stakeholders, the development of sustainable and resilient coastal areas needs to consider the relationship between land and sea, such as natural flows that occur between nature. Sustainability theory is a cross-sectoral concept that is often used in the evaluation of Sustainable Development Goals (Liang & Li, 2020). Sustainability, which is the core mechanism of the SDGs, measures the capacity of the biosphere and human civilization to continue to exist and encourage new development without compromising the capabilities of future generations (Marchese et al., 2018).

Indigenous knowledge is one of the strengths of society to ensure the continuity of their lives. Indigenous knowledge has governance value for indigenous peoples as an integral part of how our nation and community plan for the future. The responsibility and right to plan for the future are key components of collective self-determination (Whyte, 2017). Indigenous knowledge serves as an important part in the development of sustainable coastal areas. Indigenous knowledge binds, bridges, and connects the community with its environment (Aldrich, 2017). Strong indigenous knowledge can encourage the realization of community capabilities in managing communal natural resources (Musavengane & Regis, 2020). Indigenous knowledge serves as a useful framework for successful sustainable development (Fathy, 2019). Indigenous knowledge as the basis for sustainable development of coastal areas can be started by identifying and maintaining the existence of indigenous knowledge that is positively correlated with environmental and institutional development. Efforts to maintain original knowledge can be done by elevating these positive norms into formal rules that bind members of the community (Oxtavianus, 2014).

Khanduri laot ritual is one of the indigenous knowledge areas for sustainable development in the East coast of Aceh. Khanduri laot still persist to this day in Aceh Tamiang, passed down from one generation to the next through annual rituals. Khanduri laot has noble values that are beneficial for the sustainability of the life of fishing communities and the development of coastal areas. As indigenous knowledge, the khanduri laot plays a role in shaping the understanding of the fishing community about the representation, relations, and identity of environmental conservation, social, cultural (Wasino et al., 2020), economy and ecology (Niswatin et al., 2020). Quality values in khanduri laot are taken from existing community wisdom and other local resources and a sense of creativity. Therefore, the khanduri laot ritual has many teachings to support sustainable development (Renwarin, 2011). The knowledge and values of local communities are recognized as valuable for sustainable development in coastal areas, especially in terms of biodiversity conservation (Pretty & Smith, 2004).

Previous research on climate and sustainable development has more to do with poverty alleviation, disaster mitigation (Sereenonchai & Arunrat, 2020), public education, and rural community development. Based on the results of Tenson's research, indigenous knowledge contributes to community-based development in certain rural communities whose communities are communal (Muyambo, 2019). In addition, indigenous

knowledge is effective in mitigating the effects of natural disasters in coastal areas (Mathbor, 2007). Indigenous knowledge also played a role in the success of several SDGS agendas (Priyadarshini & Abhilash, 2019). Indigenous knowledge also contributes greatly to the community learning process as long as it gets good recognition from across sectors (Mawere, 2015).

The mangrove forest, which spreads from Aceh Tamiang District, East Aceh, North Aceh, Bireuen, Langsa and Lhokseumawe, is not only a place for fishermen to find fish, crabs and shrimp. It also guards against coastal abrasion and protects the fort, which was hit by the tsunami. Thus, the east coast of Aceh has the potential for community economic growth and protecting the environment. Therefore, research on indigenous knowledge and sustainable development in the East coast of Aceh is important. This article examines the use of indigenous knowledge in sustainable development in the coastal area of Aceh Tamiang. This paper argues that indigenous knowledge plays an important role in the sustainable development of coastal areas. The relationship between climate and environmental sustainability in coastal areas can be a model in maintaining coastal areas that are in harmony with economic, social, cultural and conservation development. The development of coastal areas based on indigenous knowledge is relevant to the identity of the local community. This research was conducted in the village of Sungai Kuruk III, Aceh Tamiang, Aceh Indonesia using a qualitative phenomenological approach. The study aims to maximize the role of local knowledge for sustainable development in coastal communities in Aceh Tamiang.

Literature Review

In carrying out development, focusing on economic growth alone is not enough to improve the quality of the environment. Therefore, creating a consistent, coherent, and effective environmental policy framework is critical to improving the quality of the environment that supports well-being and enables long-term economic development (das Neves Almeida et al., 2017). Involving local communities in development is a very realistic option considering that the environment has a close relationship with the community. Moreover, the community has local knowledge of maintaining environmental ecosystems that have been passed down from generation to generation. Involving local communities in this matter impacts the emergence of a development perspective that is friendly to the community and the environment.

Sustainable development is a middle-ground development concept, using local potential, such as local knowledge possessed by the community for progress. Such can replace the development paradigm that so far has tended to be destructive. Participatory development will perpetuate and strengthen social capital to carry out local development by prioritizing community collective action (Mohan & Stokke, 2000). It is hoped that sustainable development based on local knowledge will attract the attention of other regions that have the same problem.

Indigenous Knowledge

Indigenous knowledge is a set of interactions between the economic, ecological, political, and social environments in a group or groups with a strong identity, drawing the existence of local resources through patterned behavior that is passed down from generation to generation to cope with change. They are people with a long history of living in an area, identify with it and have retained most of their linguistic, cultural, social and organizational characteristics that distinguish them from the surrounding population and dominant culture (Eyong, 2007). The concept of the customary knowledge system is understood by some as only customary knowledge. Indigenous knowledge refers to what indigenous peoples know and do, and what they have known and done for generations—a practice that has evolved through trial and error and has proven to be flexible enough to deal with change.

Indigenous knowledge is generated by community members through trial and error as members search for solutions to their everyday problems taken from existing community wisdom and other local resources and a sense of creativity. It is passed down orally (although this changes) from one generation to the next, is usually not found in school curricula (although this is changing), and is generated in certain local contexts, although influenced by knowledge generated in other contexts (which means the development of coastal areas based on indigenous knowledge is relevant to the identity of the local community, is dynamic and not static). Such is constantly changing, produced and reproduced, although perceived by outsiders/external observers as static, emphasizing cooperative communalism because it seeks to include all children in society (Mawere, 2015).

Indigenous knowledge in this research is owned by the fishing community in Sungai Kuruk III village, Aceh Tamiang Regency. Indigenous knowledge has a correlation with fishermen's education in community development as a social learning process that functions to empower

communities and involve them as citizens in collective activities aimed at social, economic, cultural development and environmental conservation. Indigenous knowledge is built on trust and positive norms in order to achieve common goals.

Sustainable Development

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development is a concept that emerged in the context of increasing awareness of the ecological crisis. The concept of sustainable development is a compromise between growth and conservation (Du Pisani, 2006).

The principles of sustainable coastal area development include: (1) The principle of balance: the development of coastal areas must be based on a commitment to a balance pattern between economic development, socio-culture and conservation; (2) The principle of community participation: Involving the community in the development of coastal areas; (3) Conservation Principles: Having concern, responsibility and commitment to environmental conservation (nature and culture); (4) The principle of integration: Management takes into account the condition of the ecosystem and is synergized with the development of various sectors; (5) Law enforcement principles: Sustainable management must be developed in accordance with existing regulations, and carried out with law enforcement and applicable regulations to ensure legal certainty (Binilang et al., 2018). A comprehensive legal framework is required for the proper management and utilization of resources for sustainable development and the well-being of its population (Shamsuzzaman, 2017).

The concept of sustainable development is broadly an attempt to combine growing concerns about various environmental issues with socioeconomic issues. Sustainable development has the potential to address fundamental challenges for humanity, now and in the future (Hopwood et al., 2005).

Methodology

This study uses a qualitative approach. The data collected relate to the indigenous knowledge of fishing communities and other forms of sustainable development in coastal areas. This research was conducted in Sungai Kuruk III Village, Seruway District, Aceh Tamiang District, Aceh, Indonesia. The social environment in Sungai Kuruk III is dominated by fishing communities.

The object of the research is the *khanduri laot* ritual as a form of indigenous knowledge of fishing communities for sustainable development in the coastal area of Aceh Tamiang. The focus of this research is the relationship between indigenous knowledge and sustainable development in the coastal area of Aceh Tamiang. The data sources of this research are informants, phenomena, events, processes, behaviors, activities, and documents.

Informants of this research include: Panglima laot, Tengku Imuem, and fishing communities. Informants were selected using purposive sampling technique. Informants were selected from individuals and communities who know, understand, and are directly involved in the *khanduri laot* ritual in Sungai Kuruk III.

Data Collection

Data were collected through observation, documentation, and interviews. Data analysis was carried out by data reduction, data presentation, and drawing conclusions. In descriptive analysis, the results of in-depth interviews and observations are presented descriptively to support and strengthen the discussion.

Data Analysis

The collected data were analyzed using the Interactive Analysis model proposed by Milles and Huberman (Miles & Huberman, 1994). First, data reduction, namely, the selection process, focusing on simplification, abstracting and transforming rough data that emerge from written notes in the field. Second, presenting data by compiling information so as to provide the possibility of drawing conclusions and taking action. The form of data presentation in this study can be in the form of narrative text in the form of field notes, matrices, graphs, networks, and charts. Third, drawing conclusions. Efforts to draw conclusions are carried out by researchers continuously while in the field. From the beginning of data collection, the qualitative researcher begins to look for the meaning of things, noting regular patterns (in the theoretical record), explanations, possible configurations, causal pathways, and propositions.

Results and Discussion

Aceh Tamiang Coastal Condition

Aceh Tamiang is one of the districts in Aceh Province. The administrative area of Aceh Tamiang Regency

consists of 12 sub-districts. The coastal area of Aceh Tamiang Regency has a characteristic mangrove population which is located on the beach, so it is close to residential areas. Mangrove forests as a whole are scattered in the Districts of Seruway, Bendahara, Banda Mulia, and Banyak Payed. Mangroves in Aceh Tamiang are important habitats for several fishery commodities as well as the sea turtle (*Batagur borneensis*). Tuntong laot (turtle) is one of the unique animals and species of the turtle family whose habitat is found in the mangrove ecosystem in the coastal area of Aceh Tamiang Regency, and the habitat for laying eggs is the coastal area. The existence of its population in nature is currently threatened with extinction caused by natural factors and community activity factors (Setyoko, 2019).

The coast of Aceh Tamiang is one of the main producing areas for quality tiger shrimp (*Penaeus monodon*) and has consistently been a source of broodstock needs for tiger shrimp hatcheries/hatchery facilities throughout Indonesia. Windu shrimp is one of the fishery commodities that has high economic value and is an export commodity that is in demand by the world market. In addition, the Aceh tiger shrimp is known as one of the best quality shrimp in the world and is known as the black tiger or tiger shrimp (Tjahjo et al., 2019).

The increasing number of human activities for the exploitation of natural resources causes a reduction in the potential and biodiversity and allows the extinction of biota as a result of habitat destruction. Based on the results of a 2017 spatial analysis conducted by WWF-Indonesia in collaboration with the Faculty of Agriculture, Syiah Kuala University, there is a decrease in the mangrove area in Aceh Tamiang Regency from 2013 to

2017 of 1,342 ha. This decline in mangrove area is the largest compared to the decline in mangrove areas in other parts of Aceh Province. The decline in the value of the mangrove area is due to the shift in the function of mangrove forests to oil palm land, ponds, and the need for raw materials for making charcoal wood (Rizal, 2020). Damage to the mangrove forest ecosystem in Aceh Tamiang in the last 5 years can be seen in [Table 1](#).

Based on the data in [Table 1](#), the main cause of mangrove damage is illegal logging of mangroves to be used as raw material for charcoal. This form of damage is consistently encountered throughout the year. The next level that causes mangrove damage is that there is a shift in the function of the mangrove area into rice fields, ponds and oil palm land (Rizal, 2020).

The status of forest areas and water conservation in the province of Aceh is determined by the Ministry of Forestry. However, almost the entire mangrove forest area in Aceh Tamiang is included in the coastal village of Tamiang. Village communities interact directly with the use of mangrove areas every day. Thus, when there are illegal timber harvesting activities or the conversion of mangrove forest areas, the village government tends to be unable to do anything because most villages in Aceh Tamiang District do not have rules at the village level that can be used by the village to prevent timber harvesting, Mangroves (Aceh, 2021). Despite the kenduri laot tradition that is held every year by the coastal community of Tamiang, the damage to the mangrove area has not been controlled. Without sustainable development of coastal areas, such will constantly damage the diversity of species and ecosystems found in the coastal areas of Aceh Tamiang Regency.

Table 1 Conditions of Mangrove Forests in Aceh Tamiang in 2018–2022

Year	Condition	Causes
2018	About 85 percent of the mangrove forests spread across the sub-districts of Seuruway, Bendahara, Banda Mulia, and Banyak Payed, are in damaged condition.	Cutting down mangroves to make ponds or oil palm plantations The encroachment carried out by the community is mostly financed by the owner of the charcoal kitchen, which amounts to more than 200 units (Hanafiah, 2018)
2019	Almost 23,000 hectares of mangrove area are owned by Aceh Tamiang Regency and more than 75 percent are in damaged condition	Uncontrolled control and conversion of land functions as well as logging of mangroves to be used as raw materials for charcoal (Waspada, 2021)
2020	70 hectares of mangrove forest area converted to community function.	The conversion of mangroves into rice fields (Wiguna, 2020)
2021	The remaining 25 percent of the 23,000 Ha mangrove mangrove forest (Setyadi, 2021). In Tanjung Keramat, there are about 318 hectares of mangrove forest left, most of which are bare.	Mangrove forest destruction in Tamiang occurs due to illegal logging and land conversion (Aceh, 2021).
2022	There is still rampant looting of mangroves in Aceh Tamiang	Used as raw material for charcoal (Suparmin, 2022)

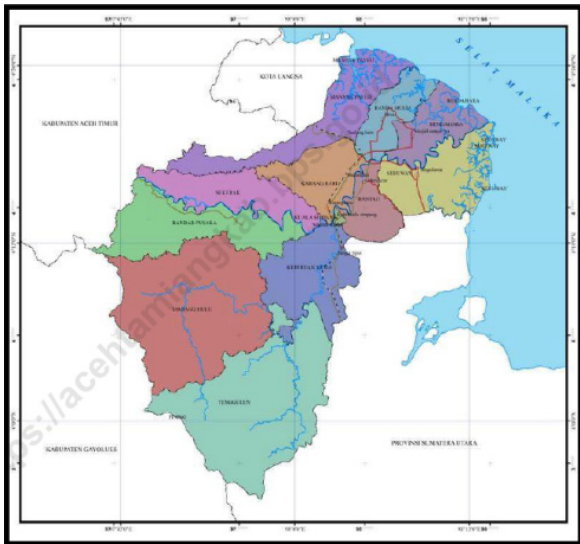


Figure 1 Aceh Tamiang District Map

Source: Badan Pusat Statistik Kabupaten Aceh Tamiang (2022).

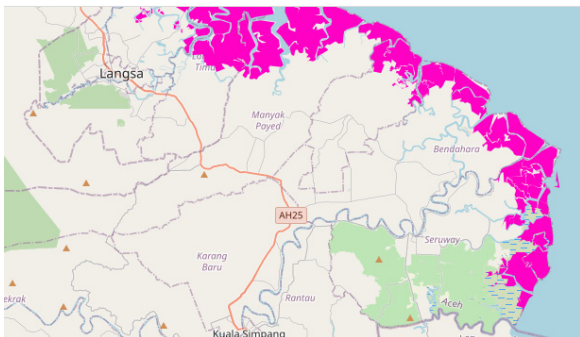


Figure 2 Map of Mangrove Area with Purple Indicator

Source: Lapan (2019).

The Khanduri Laot as Indigenous Knowledge in the Sungai Kuruk III Fishing Community, Aceh Tamiang

Khanduri laot is one of the ancestral traditions that are still preserved by the people of Sungai Kuruk III Village, held as an expression of gratitude to God who has given his gift in the form of abundant marine catches and safety at sea. *Khanduri laot* tradition is followed by the fishing community and their extended families. The tradition begins with the implementation of walking ratib. The walking ratib ritual is carried out with dhikr at night after finishing the isya prayer by men along the road starting from the beginning of the village's entry to the end of the village. They will start the dhikr by saying Lailahailallah along the way carrying flags, whips and torches to light the way. In the ritual there should be no electric light at all. Every community house must turn off

the lights when the ratib ritual is carried out. Based on the belief of the Sungai Kuruk III community, walking ratib is believed to exorcise evil spirits in the village.

Khanduri Laot is held to celebrate the sea. It is held once a year, for one day, starting from morning to finish, and is centered on Kuala Berango Beach, which is the meeting point of a small river with the ocean. The fishing community depart using their respective boats through a small river and gather on Kuala Berango beach. The equipment for Khanduri Laot includes two white chickens and a three-year-old black male goat. Next, chicken and mutton are cooked to be used as side dishes to be eaten together.

After eating together, the event continues with praying together. This is the main event of the Khanduri Laot. The next event is the head and body of the goat being rearranged using coconut dregs and waste and then re-stitched to form a complete campsite. The scavenger hunt is led by the Sea handler and assisted by several residents accompanied by prayers to God so that fishermen would be given abundant catches and kept out of harm's way while at sea. After the release of the goat's head, there is a joint remembrance and prayer led by the Imam of Sungai Kuruk 3 Village.

Khanduri laot is one of the ways for the Sungai Kuruk III community to get closer to God. It is a form of community gratitude for marine catches and safety while at sea. Based on people's beliefs, sea feast brings peace because the ritual aims to keep fishermen from various difficulties while at sea by asking God for forgiveness. Tengku Imuem Sungai Kuruk III believes it is wrong not to perform the *khanduri laot* ritual. The people of Sungai Kuruk III feel that something is not right if they do not carry out the ritual of the *khanduri laot*. They have a belief that sea feasts will increase fish catches and prevent fishermen from accidents and forgetting their way home. The purpose of this ritual is to ask God to provide lots of fish and protect the fishermen from the dangers at sea. The fishing community believes that if the *khanduri laot* ritual is not carried out, it will wreak havoc and hinder the livelihood of the fishermen.



Figure 3 Khanduri laot activity on the Sungai Kuruk III, Aceh Tamiang

Source: Observation result (2021).

Khanduri laot is led by panglima laot. Panglima laot holds a position as a traditional leader in the coastal area. One of its roles is to hold khanduri on the sea coast. This ritual is called khanduri laot or khanduri tron u laot “down to the sea” which is performed every year. Panglima laot is the highest leader of the fishing community who regulates the businesses and activities that can be carried out by the fishing community.

Panglima laot is an institution domiciled in the marine area and functions to regulate the management of natural resources in coastal and marine areas (Puspita, 2017). Panglima laot also functions to assist local governments in carrying out development in the traditional fisheries sector and preserving customs and habits in fishing communities. Panglima laot has the task of maintaining and supervising the provisions of customary law and sea customs; coordinating and supervising every fishing effort in the sea; resolving disputes/disputes that occur between fellow members of the fishermen or their groups; managing and organizing traditional sea ceremonies; guarding and supervising so that the trees on the beach are not cut down; liaison agency between fishermen and the government; and improving the standard of living of coastal fishermen.

Panglima Laot is a fisherman leader who is legally responsible for coordinating one or more fisherman’s operational areas, and at least one fisherman’s settlement. The duties and responsibilities of panglima laot include supervising and maintaining the implementation of the customary law of the panglima laot, resolving various disputes related to fishing and holding traditional marine ceremonies. Panglima laot has an obligation to protect the marine environment from damage, such as not being allowed to use fishing gear that is not environmentally friendly and implementing marine customary law.

The Panglima laot is a leader who guides local fishermen in Aceh with broad powers including determining the type of equipment used in fishing, allowing non-local fishermen to fish in their territory, resolving disputes and conflicts between fishermen, finding mooring places, maintaining taboos in fishing activities, and imposing penalties for violators (Manan, 2016). Panglima laot has always been a peacemaker when there is a dispute involving the coastal area. Thus,

the panglima laot must be an individual who really understands the ins and outs of the sea.

The role of Panglima laot cannot be separated from maintaining family strength, solidarity relations between fishermen, forming customary rules or customary law, supervising and checking the types and methods of fishing as well as socializing various technological developments, as well as human and natural relations. Panglima laot also pays attention to the relationship between fishermen and the government. One example is overseeing government programs related to marine and fishing activities. Panglima laot always appealed to fishermen not to catch fish species protected by the government such as dolphins and turtles.

In the implementation of the khanduri laot, panglima laot always gives instructions regarding taboos at sea. This abstinence from going to sea is accepted by the fishing community as a customary law that regulates behavior at sea. The taboo is like being prohibited from going down for a full day on the day of the feast. Fishermen are also not allowed to go to sea for three days after the sea feast. It is also forbidden to go to sea on Fridays from sunrise to the end of Friday prayers. Fishing is also forbidden on Eid al-Fitr for one full day, on Eid al-Adha for three days starting from the first day to the third day, and likewise for fishermen who are experiencing misfortune or a tragedy of death until their deceased relatives have been buried. Sanctions for fishermen who violate the day of abstinence are subject to legal sanctions in the form of all catches being confiscated and prohibited from returning to sea. This is for a minimum of 3 days and a maximum of 7 days.

Erosion of Local Knowledge of Fishermen Against the Khanduri Laot

Khanduri laot has religious, social, cultural aspects to environmental conservation. Based on observations, aspects of religion that include prayers and expressions of gratitude to God; social aspects that are manifested in khsnduri activities which are filled with an atmosphere of community camaraderie and cooperation; and the cultural aspects that are manifested in the routine implementation of the khanduri laot ritual, tend to be more prominent than the environmental conservation aspect.

Table 2 Values in the Ritual of Khanduri Laot

No.	Values	Embodiment
1	Religion	Expression of gratitude to God: prayer, donation for orphans
2	Social	Uniting fishermen to marine security guards
3	Culture	Local traditions and culture related to the sea must be preserved
4	Conservation	Ensure fishermen catch fish in a way that does not damage the environment, jointly determine which days going to sea is not allowed, maintain and supervise the trees along the coast so that they are not cut down

In the implementation of *khanduri laot*, it is not disclosed specifically about the purpose and objectives of holding a *khanduri laot* related to the conservation of coastal areas. In addition, the scope of environmental conservation as intended in the sea feast was also not conveyed by the leader of the *khanduri laot* activity. So far, sea feasts tend to contain the implied agreement of the fishing community about the rules for catching at sea. As a result, each participant in the *khanduri laot* activity has a hidden understanding. Each individual has a different understanding of the intent and purpose of implementing *khanduri laot*. The regulations regarding the conservation of mangrove areas were never mentioned at all. The scope of conservation in *khanduri laot* activities is unclear, whether it is limited to marine conservation or includes coastal areas which include mangrove forest areas.

This causes the inheritance of indigenous knowledge related to environmental conservation that is not intact. Indigenous knowledge that is practiced does not reflect the true meaning because many values are reduced. Although the *khanduri laot* tradition continues every year, the damage to the mangrove ecosystem continues. Damage to the mangrove ecosystem has an impact on abrasion, reduced yields of biodiversity, and high tides have started to rise to the village (Aceh, 2021).

The essence of *khanduri laot* is environmental preservation in the *laot* area. Currently, what is included in the concern for environmental conservation in marine *khanduri* is the marine area. Meanwhile, the mangrove area, which is actually an integral part of the marine ecosystem, has not received attention. Therefore, the practice of *khanduri laot* needs to be returned to its essence, namely preserving the environment in marine coastal areas, which can be done by giving meaning and values to mangrove protection in a series of *khanduri laot* rituals.

Discussion

Coastal areas are very important for the survival of marine creatures such as fish, sea tuna to mangrove forests. They are also very important for fishing communities to take natural resources to meet economic needs. In the development of sustainable coastal areas, it is important to prioritize the principle of balance between economic development, socio-culture and conservation. Indigenous knowledge fishing community is an instrument of local communities in the development of sustainable coastal areas.

In essence, the *khanduri laot* tradition is one form of the principle of balance in utilizing nature. It is one form of Indigenous knowledge that is preserved by the Sungai Kuruk III community. Ontologically, *khanduri laot* plays an important role in maintaining the relationship between humans and God, the relationship between humans and the relationship with the environment. The fishing community closely maintains the tradition as a reciprocal sense of what they have obtained by performing the sea feast ritual. *Khanduri laot* in Sungai Kuruk III Village is a practice of sustainable development of coastal areas based on indigenous knowledge.

Local knowledge has elements of environmental education that can help repair the damage done by modern human exploitation. The environmental education scheme can be seen in the following scheme:

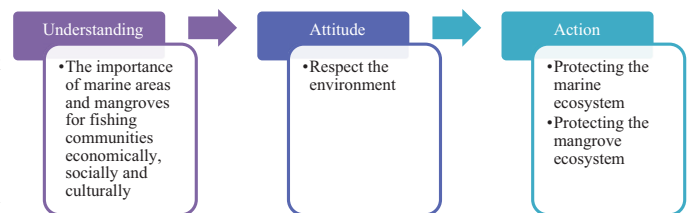


Figure 4 The environmental education scheme

Khanduri Laut has divine, social, cultural, and environmental conservation values in one unit. In the implementation of sea *khanduri*, it is necessary to disclose the importance of marine areas and mangrove areas, both economically, socially, and culturally. This understanding will lead to the emergence of an attitude of respect for the environment. The final stage of environmental education using local knowledge is the actions of fishing communities in maintaining marine ecosystems and mangrove ecosystems. This is a form of local knowledge-based sustainable development. All of these values are practiced every year by the fishing community of Sungai Kuruk III as a form of inheritance to the next generation.

Khanduri laot ritual is a form of local tradition that protects natural resources because there are ethics that must be met. Abstinence from fishing serves to regulate fishing by fishermen so that natural resources are not exploited. The days of abstinence from sea give the marine ecosystem time to recover. *Khanduri laot* is an important tool in creating human resources who have awareness and sensitivity to the environment.

Khanduri laot organized by the fishing community of Sungai Kuruk III has succeeded in carrying out religious, social, and cultural values. These values are well implemented in the implementation of the khanduri laot tradition and the daily life of the fishing community who are religious, egalitarian, and help each other. This will have a good impact on the divine values of the fishing community, harmonious social relations and the preservation of cultural values.

In the aspect of environmental conservation, khanduri laot succeeded in building awareness of the fishing community to protect the marine area by complying with the customary rules of the sea under the auspices of the panglima laot, especially to prevent the sea from being used without rest. Without the presence of fishermen taking marine natural resources over a certain timeframe, it means that the sea will be free to return to production and return to produce new generations of natural resources. Abstinence from the sea is a traditional teaching to respect and appreciate nature in order to maintain sustainability.

In the aspect of the preservation of mangrove forests on the coast of Aceh Tamiang, khanduri laot did not significantly succeed in preserving the existence of mangrove forest areas. Although khanduri laot is always held annually by fishing communities, research findings in the coastal area of Aceh Tamiang show that there remains the problem of the cutting of mangrove wood for charcoal kitchen raw materials, and conversion of mangrove forests into rice fields and ponds over the last five years. This has an impact on the consistent reduction of the mangrove forest area every year. This shows that the values of environmental conservation in mangrove forests are not conveyed properly in every implementation of khanduri laot. The author has seen the erosion of local knowledge of fishing communities in khanduri laot. In the implementation of the khanduri tradition, the fishing community does not get complete information about the nature of the implementation of the khanduri laot tradition.

The long-term effect of knowledge erosion is that knowledge about environmental conservation through the khanduri laot tradition will continue to be reduced. The fishing community and the younger generation will lose information about the nature of khanduri laot and understand it incompletely. Furthermore, the damage to the coastal environment will continue consistently every year. The development of sustainable coastal areas will not be achieved because one of the important elements in the sustainable development of coastal areas is the preservation of mangrove forests.

Overcoming the erosion of knowledge can be done in two ways. First, clarifying aspects of the scope of tradition in protecting the environment. Panglima laot as a traditional leader has the ability to mobilize fishing communities and create dialogues by raising issues that affect the community, including the importance of conserving mangrove areas. Traditional leaders contribute to increasing the commitment and enthusiasm of the fishing community in building consensus (Godfrey & Siraje, 2019). Second, issuing written regulations that have legal force, at least at the village level. These rules serve as guidelines for fishing communities, and problems related to the environment, can be solved using these rules (Jarernpanit, 2022). This is to anticipate unwritten rules that have been practiced so far, such as abstinence from fishing, which are less effective in action. Thus, elements that already exist in the fishing community such as local leaders, customary communities to the rule of law at the village level will become an instrument of sustainable development.

Conclusion and Recommendation

Humans live in a big environment. Human life is very dependent on the environment because in it there is survival and human welfare. The coastal area plays an important role for the fishing community in Sungai Kuruk III village because it has economic, social, and ecological values. Khanduri laot is an instrument for the coastal communities of Aceh Tamiang for the sustainable development of coastal areas. The tradition of khanduri laot is a bridge of harmonization between humans and God, fellow humans, and nature. The harmonization of all existing elements has a positive correlation with the development of sustainable coastal areas.

This study found that the indigenous knowledge of the Sungai Kuruk III community plays an important role in the sustainable development of the Aceh Tamiang coastal area. The indigenous knowledge of the Sungai Kuruk III community, which consists of the khanduri laot and panglima laot traditions, has succeeded in encouraging economic, social and cultural development of the fishing community. For environmental conservation, indigenous knowledge is not fully successful in preserving the environment, especially the preservation of mangrove forest areas on the coast of Aceh Tamiang Regency. This is due to the erosion of the fishing community's knowledge of the nature of khanduri laot, which results in the loss of information about the importance of conserving mangrove debt areas.

Therefore, this study provides several suggestions. First, it is necessary to revitalize the khanduri laot ritual by expanding the scope of conservation. Panglima laot, as the traditional leader of the fishing community, needs to convey the intent and purpose of the khanduri laot explicitly to the community so that each individual participant of the khanduri laot tradition has the same perception. Traditional leaders have a strong influence in fishing communities and become a trigger in expanding the scope of environmental conservation in the khanduri laot tradition. Thus, the khanduri laot, which is held every year, can provide a complete inheritance of values regarding divine, social, cultural, and conservation values. Second, it should be encouraged to issue village regulations and apply sanctions on those who violate them. This is important because administratively, most of the mangrove forest area is included in the village environment. Thus, mangrove conservation is also carried out by village communities through village regulations.

To be more accurate, it is necessary to conduct further research in other coastal areas in order to obtain more accurate findings. Sustainable coastal environmental management requires participatory institutions that involve various parties by making the community the main subject.

Conflict of Interest

The authors declare that there is no conflict of interest.

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