

Environmental Communication in Local Wisdom: The Role of Panglima Laot in Marine Ecosystem Preservation and Food Security

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Abstract

The global ecological crisis in the early 21st century, especially in marine ecosystems, poses a serious threat to food security and community welfare. This article explores the role of Panglima Laot in Aceh in managing marine resources and mitigating the global ecological crisis that impacts food security and the welfare of coastal communities. Aiming to analyze the implementation of Panglima Laot's local wisdom and its impact on environmental preservation and community economy, this research uses a qualitative approach with a literature study on the practice of local wisdom and customary marine law. The findings show that Panglima Laot successfully implemented effective customary regulations in regulating fishing, protecting coastal areas, and safeguarding habitats, thus contributing to ecosystem balance and sustainability of marine resources. In conclusion, Panglima Laot's local wisdom contributes significantly to the preservation of the marine environment and the economy of coastal communities, suggesting that community-based environmental policies can be adapted to address global ecological challenges.

Keywords: Ecological Crisis, Environmental Communication, Local Wisdom, Marine Resources, Panglima Laot

INTRODUCTION

The ecological crisis has become a global challenge in the early 21st century that has been widely discussed. It is caused by human activities in the modern era and threatens the existence of human life, nature, and various other creatures. One of the impacts of the ecological crisis is the food crisis, especially those sourced from the oceans. By the Indonesian state, especially in the marine ecosystem in Indonesia. The ecological crisis in Indonesia's marine ecosystem is a threat that has resulted in a decline in the fisheries sector (Hendra, 2023). This happens because of fishing activities that use compressors and trawlers that can damage the marine ecosystem (Zulkarnaini, 2024).

The ecological crisis that occurs as a result of the anthropocentrism paradigm that is egoistic and prioritizes human interests in viewing nature and other creatures (Gule & Surbakti, 2021). Especially the view of the sea and its resources is still seen from the aspect of economic resources, so that the pattern of utilization tends to be more exploitative (Pusaran1, 2023). The ocean is strategically important, especially as a provider of food products. With its high biodiversity, the ocean is the main resource for food needs amidst the threat of the global food crisis. The decline in the ocean health index is a concern for the decline in ocean productivity and is feared to be a threat to food availability (Pusaran1, 2023). In addition, Indonesian

fisheries are classified as the most at risk of decline due to the double crisis of marine ecosystem degradation and overfishing (Yusran & Asnelly, 2017).

Aceh Province is one of the provinces in Indonesia that has considerable natural resources, especially in the fisheries sector. Geographically, Aceh Province is located at the tip of the island of Sumatra and is crushed by two marine ecosystem areas, namely the Strait of Malacca and the Indian Ocean. A total of eight districts/cities directly border the Malacca Strait and ten districts/cities border the Indian Ocean. Aceh Province, which is surrounded by the ocean, has a coastline length of 2,666.27 km and a water area of 295,270 km². This makes Aceh have diverse and abundant marine resources (Muslihin *et al.*, 2022). Marine natural resources, especially fisheries, have become one of the mainstay sectors for the community, especially for fishermen in Aceh province. More than half of Aceh's population depends on marine resources either directly or indirectly (Furqan *et al.*, 2021).

Aceh is known for its rich culture based on strong religious values. This certainly affects the behavior of people's lives and also affects the implementation of applicable legislation, so that indirectly the culture based on religious values has become a characteristic in the Aceh region (Pranitas, 2021). Economic development in the Aceh region that utilizes marine resources remains based on the foundation of sustainable values and sustainable ecosystem control. This is realized through the application of local wisdom values by marine and coastal communities in Aceh. The local wisdom of a region is built on social values found in the social structure of the community, which functions as a controller, instructor, and signpost for behavior in various aspects of life, especially in interactions between humans and also human interactions with the environment (Muslihin *et al.*, 2022).

As an autonomous region, Aceh has local wisdom values written in Aceh Qanun Number 10 of 2008 which states that customary institutions are customary community organizations, formed by customary law communities with their own territory, wealth, given the rights and authority to regulate and resolve matters relating to customary issues in Aceh (Munawwarah & Abdi, 2019). The manifestation of customary law in marine and coastal communities in Aceh is manifested in the existence of laot customary law which is managed and run jointly by a customary institution called Panglima Laot.

The presence of Panglima Laot in Aceh dates back to 1607 until 1636 during the reign of Sultan Iskandar Muda. At first the laot commander was only tasked with mobilizing warfare to support the Acehnese people against invaders, collecting sea tax from commercial ships that stayed at the port and had a hand in exporting and importing in the Aceh region at that time (Pranitas, 2021). Based on historical records, the establishment of Panglima Laot in Aceh as a

driver of economic growth in the port area in broad economic activities and also the interest in maintaining the sovereignty of war in the Aceh region, is not related at all to fishing activities or marine resource management. Marine resource management aims to improve the welfare and economy of communities that depend on marine products. Especially in the ecological aspect, marine resource management aims to maintain marine ecosystems and preserve sustainable marine resources. So as not to cause an ecological crisis that can pose a crisis threat to the availability of food sourced from the ocean.

The application of laot customary law in Aceh aims to maintain order in the utilization and management of coastal areas and marine resources by taking into account environmental sustainability. The application of local wisdom so far can be an alternative to various environmental problems, especially the marine environment from various threats, especially the threat of ecological crisis and food availability crisis. The existence of Panglima Laot to this day shows that the people of Aceh highly value local wisdom, especially in marine matters. The presence of Panglima Laot has an important influence on the lives of the people of Aceh in carrying out activities at sea and especially in preserving marine resources from the activities of searching and catching marine resources in Aceh through applicable customary law (Muslihin *et al.*, 2022).

Customary law is a manifestation of cultural ideas that include the beliefs about traditional legal values and norms. Customary law regulates human behavior both individually and in groups based on values and norms inherited from ancestors passed down from generation to generation. Customary law must be respected by every individual or group as proof of respect and upholding the values and norms that have been passed down (Sy *et al.*, 2023).

In the context of mitigating ecological crises, especially in the management of marine resources for sustainability, participation is needed, which can be fostered through environmental communication (Herutomo & Istiyanto, 2021). Cox in the article (Herutomo & Istiyanto, 2021) explains environmental communication as a pragmatic and constitutive medium to provide understanding to the public about the environment, such as the relationship between humans and nature and related to how to manage and preserve it. Environmental communication is an implementation of communication approaches, principles, strategies and procedures for managing and preserving the environment. In environmental communication, policies and rules are needed to regulate the continuity of implementation in accordance with the ecological paradigm. Environmental communication is carried out to maintain and preserve

all environmental components both forests and oceans to achieve sustainable development and development (Sy *et al.*, 2023).

In this case, the local wisdom applied by Panglima Laot in protecting ecosystems and marine resources not only functions as an environmental management tool, but also as a means of environmental communication that disseminates conservation and mitigation values in the face of the threat of ecological crisis. Through a participatory approach, Panglima Laot is able to mobilize coastal communities, especially local communities, to play an active role in maintaining the balance of ecosystems and marine resources.

This research aims to analyze the position of Panglima Laot in the local government structure, as well as explore how local wisdom is implemented by Panglima Laot in the management of marine resources in Aceh. By taking a case study in Aceh, this research reveals the various communication strategies used, the challenges faced, and the resulting impacts in the context of marine resource management and contribution to ecological crisis mitigation.

It is hoped that the results of this research can provide new insights into the role of local wisdom in marine resource management and become a reference for the development of community-based environmental policies. In addition, this research is also expected to strengthen awareness of the importance of involving local wisdom in marine resource management efforts, especially in overcoming the ecological crisis.

DISCUSSION

In the perspective of customary law in Aceh, the environment is seen as a gift from Allah SWT that has important and strategic value for human life and other living things. The environment is not only a natural element, but also an inseparable part of the survival of all creatures, including humans. Therefore, preserving the environment is a non-negotiable necessity.

Since ancient times, the people of Aceh have practiced wise environmental management. This practice has been going on for generations, showing how important the role of the environment is in daily life. Particularly in the management of the marine environment, a customary institution known as Panglima Laot plays an important role. This institution implements the values and concepts of local wisdom in every aspect of marine management.

The local wisdom values implemented by Panglima Laot include various rules and practices that aim to maintain the balance of the marine ecosystem. For example, there are rules about when is the right time to fish and the type of fishing gear that can be used. All of this is done to ensure that marine resources remain sustainable and can be enjoyed by generations to come.

The existence of customary institutions such as Panglima Laot is evidence that Acehnese society has a structured environmental management system based on local wisdom. This system not only aims to preserve the environment, but also to support the welfare of people who depend on natural resources. Thus, customary law in Aceh does not only regulate the relationship between humans, but also the relationship between humans and the surrounding environment.

Panglima Laot Institution

In terms of name, the title Panglima for the head of the laot customary institution suggests a special distinction, reflecting a position of power. The title clearly signifies a position of power and responsibility, as is evident from his assertive role in day-to-day decision-making, which sometimes requires a strong stance. There is no definitive record of when the institution of Panglima Laot began to exist in the Acehnese customary system. However, some sources indicate that it has long existed, developing in tandem with the Aceh sultanate era, where customary institutions were an important part of the governmental apparatus. During the time of Sultan Iskandar Muda (1607-1636 AD), Panglima Laot was officially appointed by the Sultan, with duties that included empowering the region's economy and maintaining laot defense and security. In order to carry out these duties, Panglima Laot was given the power to administer justice and execute any verdicts he rendered (Djuned, 1995). In the book *De Atjehers*, Snouck Hurgronje only mentions that the handlers who coordinate fishing activities in the laot are led by a Panglima Laot and his staff who are elected by the handlers in their respective teupin areas. The jurisdiction (adat) of a Panglima is called Lhok, separated from one Lhok to another by a natural boundary marker (Puspita, 2017).

The Role of Panglima Laot in Marine Environment Management

The Panglima Laot institution, which operates in the marine area, has the main task of managing natural resources in the coastal and ocean areas. In addition, this institution also plays a role in supporting local governments to advance the fisheries sector, as well as preserving the customs and habits of fishing communities. In practice, Panglima Laot is responsible for maintaining and overseeing the regulation of customary law and sea customs, coordinating and supervising fishing activities at sea, resolving disputes between fishermen or their groups, organizing and carrying out sea custom ceremonies, protecting trees on the beach from being cut down, serving as a liaison between fishermen and the government, and working to improve the welfare of coastal fishermen.

In managing the coastal and marine environment, Panglima Laot consistently follow marine customary law, which is a set of traditional rules applied and maintained by fishing

communities to ensure order in fishing practices as well as in the daily lives of coastal communities. This customary law of the sea serves to maintain balance and order in fishing activities and plays an important role in preserving the customs and traditions of fishermen. In the absence of national legal regulations covering certain aspects of marine management, customary law of the sea can serve to fill the void in positive law. In addition, customary law of the sea covers various important aspects, such as knowledge of fishing gear, techniques for managing marine biological resources, and the ability to preserve natural resources. As such, customary marine law not only helps in regulating and supervising fisheries activities, but also contributes to the preservation of the environment and the sustainability of natural resources available in the wild.

Panglima Laot's authority extends from the coast to the high seas. The physical areas of the coast that fall under the authority of Panglima Laot include the *binéh pasie* (beachfront), *leun pukat* (zone for the use of inshore trawls), *kuala* and *teupien* (boat landing areas in bays and *kuala*), and *laot luah* (high seas). According to Djuned (1995), the boundaries of Panglima Laot's authority on the high seas follow legal principles that consider the extent to which indigenous communities can economically manage marine resources. In addition, areas related to coastal ecosystems include *uteun bangka* (mangrove forest), *uteun pasie*, *uteun aron* (cypress forest), *neuheun* (pond), and *lancang sira* (salt field).

Binéh pasie (beachfront) is the area along the coast that extends from the breaking point of the waves to a location where annual crops cannot grow, only horse treads. *Binéh pasie* is a land area under the supervision of marine customs, so the use or change of function of this area for other purposes must obtain approval from the local fishing community. *Binéh pasie* is the domain of Panglima Laot in regulating and monitoring its use, especially for the welfare of the fishing community. The *binéh pasie* area is highly affected by natural factors such as abrasion. Abrasion is often accelerated by the cutting down of coastal protection trees, which were previously maintained for generations for industrial timber, building materials, and pond clearing. This decline leads to a narrowing of the *binéh pasie* area.

Leun pukat is an area of *binéh pasie* used for towing land trawlers (*banting trawlers* or *Aceh trawlers*). *Leun pukat* stretches from the shore to the sea and is sized according to the needs of landing fish for inland trawlers. *Leun pukat* is an area protected by *adat* and cannot be used for other purposes without permission from the fishing community.

Teupien is the location used by fishermen to land their boats, and this landing can occur either at the *kuala* or at the *binéh pasie*. The *kuala*, which is included in the customary authority of the sea, is the part that traditionally serves as a place to land the boat, as well as a path that

connects the sea with the edge of the landing. As one of the important activity centers for fishermen when returning from fishing, teupien has a very significant role in the daily life of coastal communities. Therefore, the use of teupien is strictly regulated and protected by customary law to ensure that this area remains in line with the interests of fishermen. This customary protection and regulation aims to maintain the sustainability and accessibility of the teupien area, so that the rights and needs of fishermen over the area are maintained and guaranteed in the long term.

Uteun bangka (mangrove forest) serves as an important buffer for life on the coast. These plants have many benefits, such as providing breeding grounds for various types of fish and shrimp, preventing seawater from seeping inland, and resisting abrasion. In some areas, such as Aceh Besar and West Aceh districts, there is a custom stating that anyone who plants mangrove trees in a body of water is entitled to the plants. However, due to uncontrolled management, mangrove planting continues to expand and ownership becomes unclear. Large mangrove trees are often cut down by their owners to make way for neheun (ponds). This situation has resulted in a shrinking area of mangrove forests owned by indigenous communities, making mangrove conservation efforts to protect coastal ecosystems increasingly difficult, due to changes in ownership of mangrove forests in the region.

Uteun Aroen (cypress forest) is a buffer area on the shore consisting of cypress trees. Based on the experience of local fishermen, the nearshore waters that are heavily vegetated with cypress trees are believed to be very attractive to a variety of fish species, including molluscs such as clams, snappers and groupers. These fish tend to favor the climatic temperature around coastal areas surrounded by cypress trees, making it an ideal habitat for them.

Meanwhile, Uteun Pasie (coastal forest) refers to the canopy area of trees that grow on the beach. This forest functions as a protected area to maintain environmental balance in coastal areas. The protection of Uteun Pasie is important to ensure the sustainability of the coastal ecosystem and prevent environmental damage that could affect the overall balance of the ecosystem.

Coastal communities in Aceh have local wisdom in managing coastal areas, one of which is through the protection of green strips, now known as green belts. In the past, the green belt in the form of bak aron (cypress trees) was protected by custom, and anyone who cut down bak aron in bineh pasie (beachfront) would be subject to customary sanctions. Nowadays, however, awareness of the custom of protecting bak aron is declining, so many bak aron are being cut down. In fact, according to the experience of the handlers, bak aron has an important ecological

role in maintaining the balance of the coastal environment. Its ability to adapt well to the coastal climate and seawater, such as during high tide, allows bak aron to survive even though its land is often inundated with seawater.

From an economic point of view, the green belt in the form of aron basins attracts certain types of fish to approach the coastal area, which is very beneficial for fishermen because they can catch fish in closer waters. In addition, bak aron serves to strengthen the cliffs or soil bonds along the coast where it grows. Post-tsunami experience has shown that bak aron can survive tsunami inundation, as seen around Lhoknga-Lampuuk Beach, Lhoknga Sub-district, Aceh Besar District.

Apart from bak aron, there are several other plants suitable for coastal buffer zones, such as bak siron, bak bunot, bak seukee, and mangrove or *bangka* (mangrove). These plants can be planted both in dry coastal soil and in tidal areas. In dry coastal areas, bak siron, bak bunot, and bak seukee can be planted on the beach, while in wet or brackish areas, mangroves are more suitable. The planting of all these plants can be done in various patterns, either uniformly or mixed. If a uniform pattern is used, the arrangement is as follows: bak aron in the inner layer, bak bunot and bak siron in the middle layer, and bak seukee in the outermost part which is directly facing the sea. With this pattern, in the event of *tanoh jeut* (new land formed on river banks or beaches due to natural processes), the growth of the bak seukee will expand naturally, making the *tanoh jeut* stronger and eventually allowing the planting of old crops (Puspita, 2017).

In terms of growth pattern, bak aron grows vertically upwards with a sturdy trunk, while bak siron forms a dense crown and sometimes the trunk bends towards the sea. The roots of bak siron have the ability to bind the soil horizontally along the cliff, thereby strengthening the cliff or shore. The economic benefits of bak siron remain largely untapped. Among the plants suitable for establishing green strips on the beachfront as buffer zones, bak bunot is considered to have strategic potential in the future. This plant contributes greatly to the shipping industry in the future as its wood is one of the best materials for making boats or fishing vessels. Today, boat builders rely on bak bunot to make *geunandeng* (boat frames), replacing bak manee (*laban tree*) which is becoming increasingly difficult to find. Unlike bak manee, bak bunot can grow in coastal areas, even on the shores exposed to seawater. Its enlarged trunk provides added value when used as a protective plant or natural fortification in buffer zones.

So far, there is no customary prohibition that restricts fishers from fishing in a *lhok*; rather, there is a regulation of fishing exploration that includes the timing, methods and use of fishing gear in accordance with local marine customs. Fishers outside the *lhok* must abide by

and follow the customary provisions of the marine customary area where they conduct fishing activities. The provisions stipulated in the customary law of the sea are as follows:

1) Traditional Kenduri Laut and Sea Abstinence Day

The traditional sea kenduri is held at least once every 3 (three) years or according to the agreement and ability of local fishermen. During the kenduri event, there is a ban on fishing for 3 (three) days, which is counted from sunrise on the kenduri day until sunset on the third day. The following are other customary provisions:

- a. On Friday, fishing is prohibited for 1 (one) day starting from sunset on Thursday until sunset on Friday.
- b. On Eid al-Fitr, fishing is prohibited for 2 (two) days counted from sunset on the day of Meugang until sunset on the second day of the Feast.
- c. On Eid al-Adha, fishing is prohibited for 3 (three) days from sunset on the day of Meugang until sunset on the third day of the Feast.
- d. On August 17 Independence Day, fishing is prohibited for 1 (one) day calculated from sunset on August 16 until sunset on August 17.
- e. Every December 26, fishing is prohibited for 1 (one) day from sunset on December 25 until sunset on December 26. This prohibition is to commemorate the tsunami that occurred on December 26, 2004.
- f. Legal sanctions. Fishermen who violate the abstinence day are subject to legal sanctions in the form of all catches being confiscated and prohibited from going to sea for as low as 3 (three) days and as long as 7 (seven) days.
- g. Laot Environmental Maintenance Customs as follows: (1) bombing, poisoning, drugging, electrifying, taking coral reefs and other materials that can damage the living environment of fish and other biota are prohibited; (2) it is prohibited to cut down/destroy wooden trees on the sea coast such as arun/cemara trees, pandanus, ketapang, mangroves and other trees that live on the beach; (3) prohibited from catching fish/other protected marine life (dolphins, turtles, etc.); (4) prohibited from using nets in coral reef areas (spawning areas); (5) tagging fishing regulations. These prohibitions are still effective in fishing communities.

2) Marine Environment Management System by the Panglima Laot Institution

The management of the marine environment based on customary marine law is entrusted to the Laot Customary Institute, which is led by Panglima Laot, an expert in marine management. Panglima Laot carried out his duties with the help of Pukat Handlers and Aneuk Pukat, who worked in an organized organizational structure. The Laot Customary Institution functions as a maritime customary law alliance, has the power to regulate the exploitation and

protection of the environment and marine biological resources in its territory. The power of this institution is autonomous and does not depend on other powers.

Panglima Laot has authority in three main areas: maritime security, social citizenship, and the maintenance of the marine environment. The marine environment management system by the Panglima Laot Institution is carried out in ways that have been determined in accordance with the provisions of marine customary law. The marine environment management system by the Panglima Laot Institution is carried out as follows:

a. Determination of legal rules for marine environmental management

The customary rules that apply among the fishing community have existed for a long time, and there are also new rules adjusted to current legal needs. Some old rules that are still upheld include the prohibition of cutting down trees on the coast and the restriction on going out to sea on certain days. Generally, everyone is free to go to the sea and seek livelihoods, but there are specific days when fishing is prohibited, such as Fridays, August 17th, Islamic holidays, and during accidents at sea. On Fridays, the ban on fishing is implemented to allow fishermen to perform Friday prayers and for safety reasons at sea.

Other old rules include fishing procedures. When a boat or boat wants to catch a school of fish, the handler of the boat must give a sign or signal to the other boat. This gesture is usually in the form of a handshake or head hood upwards, which gives the vessel the exclusive right to catch the fish, while other vessels are prohibited from fishing on the same fish.

Several new rules have been established to protect the environment and regulate fishing methods. The ban includes the use of fishing gear such as trawls, explosives, electrical devices, and poisons. In addition, there is a ban on dumping waste such as used oil into the sea. These rules aim to maintain the sustainability of marine resources and prevent environmental pollution.

b. Leaders who practice Laot Customary Law

Law without power cannot be considered an effective law because without power, law cannot be applied or enforced in society. In the context of marine environmental management, Panglima Laot plays a crucial role as the main leader. The marine environmental management system is regulated through a vertically structured organizational structure, which includes Aneuk Pukat, Pawang Pukat, and Panglima Laot. Panglima Laot, as the supreme leader, is fully responsible for the implementation of marine environmental management. Its duties include ensuring that the principles of environmental sustainability are well maintained, as well as ensuring that all relevant laws and government

regulations are followed consistently. This organizational structure is designed to ensure that every aspect of marine environmental management is effectively controlled and monitored, facilitating success in maintaining the balance of marine ecosystems.

In practice, the involvement of all fishermen, both those who play the role of Aneuk Pukat, Pawang Pukat, and Panglima Laot, is very important for the supervision and implementation of marine environmental management. Each individual in this structure has its own responsibilities and roles in ensuring that management is carried out in accordance with the provisions of the Laot Customary Law. The active involvement of all fishing communities helps to ensure that marine environmental management policies and practices are not only effectively implemented, but also in accordance with customary principles that have been accepted and adhered to by local communities. With close collaboration between all parties, marine environmental management can be carried out in a sustainable manner and provide long-term benefits for the marine ecosystem and the welfare of fishing communities.

c. Courts to Enforce Maritime Customary Law

Any violation of the provisions of the Laot Customary Law is adjudicated by the Panglima Laot Court, which is tasked with enforcing the rules and ensuring compliance in the fishing community. In this law enforcement process, the sanctions imposed are not in the form of physical punishment or acts of violence, but rather focus on economic and administrative measures. The main sanctions applied include the confiscation of catches obtained in violation of the rules, as well as a ban on carrying out fishing activities for a certain period of time. These measures aim to provide a deterrent effect and ensure that violations of Laot Customary Law are not repeated, while maintaining the balance and sustainability of marine resources and justice within the fishing community.

CONCLUSION

The marine environment management system in Aceh based on customary law shows a holistic and sustainable approach to the conservation of natural resources. The environment is considered a very valuable and integral gift for the welfare of living beings, including humans. The Panglima Laot institution plays an important role in applying local wisdom through management that involves strict customary rules to maintain the balance of the marine ecosystem and support the welfare of coastal communities. Panglima Laot and his agencies are responsible for regulating the exploitation and protection of the marine environment, as well as the enforcement of customary laws that emphasize non-physical sanctions to prevent violations.

Through this structured system, the people of Aceh are able to preserve the marine environment while ensuring that customary rules and social needs can be met in a balanced manner.

REFERENCES

- Djuned, T. (1995). *Pengelolaan Lingkungan Laut Oleh Panglima Laot (Suatu Studi di Kotamadya Banda Aceh)*.
- Furqan, Khairani, Y., Surya, E., Armi, Ridhwan, M., Noviyanti, A., Hakim, L., & Muchsin. (2021). Studi Kearifan Lokal Masyarakat Nelayan Dalam Upaya Pemanfaatan Berkelanjutan Terhadap Konservasi Laut Di Kawasan Lampulo Kota Banda Aceh. *Jurnal Al-Ijtima'iyah*, 7(2), 287. <https://doi.org/10.22373/al-ijtima'iyah.v7i2.10124>
- Gule, Y., & Surbakti, E. P. (2021). Eco-Teosentris: Studi Eco-Teologi dan Kearifan Lokal dalam Masyarakat Batak Toba. *Jurnal Teologi Berita Hidup*, 4(1), 1–9. <https://doi.org/10.1016/j.solener.2019.02.027><https://www.golder.com/insights/block-caving-a-viable-alternative/>
- Hendra, M. N. (2023, August 10). Ekosistem Laut Rusak, Hasil Tangkapan Nelayan di Sumbar Turun. *Bisnis.Com*. <https://sumatra.bisnis.com/read/20230810/533/1683364/ekosistem-laut-rusak-hasil-tangkapan-nelayan-di-sumbar-turun>
- Herutomo, C., & Istiyanto, S. B. (2021). Komunikasi Lingkungan Dalam Mengembangkan. *WACANA: Jurnal Ilmiah Ilmu Komunikasi*, 20(1), 1–13. <https://doi.org/10.32509/wacana.v20i1.1165>
- Munawwarah, R., & Abdi, A. W. (2019). Eksistensi Lembaga Adat Panglima Laot Dalam Menjaga Kelestarian Lingkungan Laut di Gampong Jeumeurang Kecamatan Kembang Tanjung Kabupaten Pidie. *Jurnal Pendidikan Geosfer*, 4(2).
- Muslihin, Wahyudi, Rahman, A. A., & Zahara, A. (2022). Kearifan Lokal Panglima Laot dalam Pengelolaan Pesisir di Kabupaten Bireuen Sebagai Bahan Kajian Mata Kuliah Oceanografi. *Jurnal Pendidikan Geosfer*, VII(2), 305–315. <https://doi.org/10.24815/jpg.v>
- Pranitas, A. M. (2021). Peran Panglima Laot dalam Upaya Mewujudkan Ecological Security di Aceh. *Journal Education and Development Institut Pendidikan Tapanuli Selatan*, 9(3).
- Pusaran1. (2023, September 13). Laut dan Ancaman Krisis Pangan Global. *Pusast Kajian Dan Pemberdayaan Sumber Daya Kelautan Dan Perikanan*. <https://pusarankp.org/2023/09/13/laut-dan-ancaman-krisis-pangan-global/>
- Puspita, M. (2017). Kearifan Lokal Dalam Pengelolaan Sumber Daya Pesisir Dan Laut Hukum Adat Laot dan Lembaga Panglima Laot di Nanggroe Aceh Darussalam. *Sabda : Jurnal Kajian Kebudayaan*, 3(2). <https://doi.org/10.14710/sabda.v3i2.13253>
- Sy, A. A., Pinta, J., Ambarwati, A., Maharani, R. Y., & Sutowo, I. R. (2023). Strategi komunikasi lingkungan dalam hukum adat rimbo larangan di kenagarian paru kabupaten sijunjung. *Mediakom: Jurnal Ilmu Komunikasi*, 72, 177–187. <https://doi.org/10.35760/mkm.2023.v7i2.9591>

- Yusran, & Asnelly, A. (2017). Kajian Green Politics Theory Dalam Upaya Menangani Krisis Ekologi Laut Indonesia terkait Aktifitas Illegal Fishing. *Jurnal Hubungan Internasional*, 1(2), 35–53.
- Zulkarnaini. (2024, February 6). Penangkapan Ikan yang Merusak Ancam Ekosistem Laut Aceh. *Kompas.Id*. <https://www.kompas.id/baca/nusantara/2024/02/06/destructive-fishing-ancam-ekosistem-laut-aceh>