

Naturalizing Culture: An Analysis of Human and Nature Communication in Peatland Management in Pelalawan Regency

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ABSTRACT

Peatlands are ecologically sensitive and highly flammable ecosystems. This study analyzes human-nature communication in forest and peatland management in Teluk Meranti District, Pelalawan Regency, Riau Province, Indonesia, within the framework of a sustainable economy. The region is characterized by extensive peatlands with significant potential for agriculture and plantation development. However, unsustainable land clearing practices, particularly burning, pose serious environmental risks. Using a qualitative approach and a case study method, this research investigates how local communities interpret natural signs and apply traditional ecological knowledge in managing forests and peatlands. The study is guided by Donal Carbaugh's concept of Naturalizing Culture, which emphasizes the integration of cultural practices with environmental stewardship. Findings reveal that land burning remains a traditional method of land preparation, but it is governed by local norms such as staged burning, the construction of firebreaks, and crop diversification to preserve ecological balance. The use of intercrops such as pineapples, areca nuts, and vegetables emerges as a strategic approach to sustainable economic development. This study underscores the development of a human-nature communication model that harmonizes local wisdom with environmental stewardship, providing a strategic approach for sustainable peatland management

Keywords: Human-nature Communication; Naturalizing Culture; Environmental Communication; Peatland Management; Local Wisdom

INTRODUCTION

Indonesia is in a tropical climate that has a very rich diversity of natural resources, including large peatlands in several regions (Mulyani et al., 2020). The area of peatland in Indonesia is estimated to reach 14.91 million hectares, reaching 7% of the total national land area (Yunus, 2024; Palamba et al., 2018), making it the second largest peatland area in the world

(dataindonesia.id, 2022). Indonesia's peatlands are distributed across several islands, with Sumatra hosting the largest peatland area in the country, reaching 5.85 million ha, followed by Kalimantan with the area of 4.54 million ha, Papua covering an area of 3.01 million ha, and Sulawesi with an area of 24,783 ha. With the vast peatland in Indonesia, there are advantages and disadvantages in agriculture, because peatland needs special attention due to its flammable characteristics (dataindonesia.id, 2022).

One of the provinces with the largest peatland area is Riau, with an area of 5.09 million hectares or around 56.42% of the total peatland in Sumatra. Pelalawan Regency, especially Teluk Meranti District, is one of the areas with large peatlands and has potential for development in the economic and agricultural sectors (Dinas Lingkungan Hidup dan Kehutanan Provinsi Riau, 2021). Peatlands offer significant ecological and economic advantages, serving both as vital carbon sinks and as fertile land rich in organic matter, suitable for agriculture and plantations. In Riau Province, this potential is reflected in the cultivation of key commodities such as oil palm, rubber, coffee, and cocoa, which support the livelihoods of local communities (Allen et al., 2015; Tanaka et al., 2009).

Peatlands, when managed properly, serve as a vital source of livelihood for local communities and contribute significantly to the regional economy. However, its improper utilisation, such as uncontrolled burning and unsustainable land conservation, can lead to severe consequences, including forest fires, environmental degradation, and declining soil fertility. Therefore, to ensure long term benefits and ecological resilience, a sustainable land management system is essential through the integration of ecological consideration, economic viability, and local wisdom in enabling the responsible use of natural resources for the community welfare (Subiksa et al., 2011).

The use of peatland for agriculture must start with careful planning that aligns with the characteristics of peat soil and the type of commodities to be cultivated. This land preparation activities include designing appropriate drainage systems, leveling the land, doing stump cleaning, and making intensive shallow drainage. Land clearing through burning has been a common practice where it poses significant risks when fires occur not only during the land preparation but also after planting due to prolonged dry seasons or by accidental ignition (Subiksa et al., 2011).

The National Disaster Management Agency (2019) stated that 99% of forest and land fires in Indonesia were caused by humans and only 1% were caused by natural factors. Forest and land fires that occur in Riau Province are often driven by agricultural land clearing activities. As highlighted in previous research, the clearing of peatland for conversion into oil palm plantation that involved burning would cause forest fires, both intentional and accidental (Anhar et al., 2022).

One of the provinces with the largest peatland area is Riau Province, with an area of 5.09 million hectares or around 56.42% of the total peatland in Sumatra. Pelalawan Regency, especially Teluk Meranti District, is one of the areas with large peatlands and has potential for development in the economic and agricultural sectors (Dinas Lingkungan Hidup dan Kehutanan Provinsi Riau, 2021). While peatlands have great economic potential, forest and land management in Riau, particularly Teluk Meranti District, still faces various challenges. The practice of clearing and preparing land through intentional burning has become hereditary habit among the local community (Republika.co.id, 2023). It has been reported that Pelalawan Regency alone was affected by forest and land fires with the burnt area reached almost 700,000

hectares. The main factor contributing to these fires is the uncontrolled clearing of peatlands, carries out by both local communities and plantation companies (BPS Kabupaten Pelalawan, 2016).

Despite its high environmental risks, land clearing through burning is widely practised because it is perceived as fast and cost-effective method for the agricultural land preparation. Among its severe environmental impacts include: such activities may increase greenhouse gas emissions through the releases of carbon stored in the soil, thus contributing to global warming (Agus & Subiksa, 2008); the damage to the environmental ecosystem when forest fires destroy flora and fauna habitats, and disrupt the local ecosystem (Ratnaningsih & Prastyaningsih, 2017); it causes health impacts when the haze from forest fires leads to health problems for the community, such as respiratory diseases (CNN-Indonesia, 2019). All these environmental and health impacts ultimately result in economic losses, as forest fires can damage agricultural land and disrupt economic activities of local communities (Anhar et al., 2022).

In addition to this, another challenge faced by farmers in Teluk Meranti District is the lack of public awareness and understanding of environmentally friendly and sustainable land management practices. Reckless land management practices that disregard environmental conditions can lead to a decline in land productivity over the long term. Therefore, a more effective approach to land management is needed, one that includes communication between humans and nature by reading and understanding natural signs before carrying out agricultural and plantation activities (Mulyani et al., 2020). Despite the widespread practice of land clearing through burning and environmental destruction, traditional communities already possess valuable local wisdom in forest and land management. Farmers in certain areas continue to use natural signs to carry out their land management activities, including determining planting and harvesting times as well as preventing disasters such as forest fires (Febri, 2022). In fact, local communities have their own ways of reading natural signs, such as changes in wind patterns and soil moisture before the dry season (Silviana et al., 2020), animals behavior as a sign of predicting forest fires (Nurhayati et al., 2021), and the plant growth cycle as an indicator of soil fertility and seasonal changes (Derik, 2019). Hence, the approach based on local knowledge and human communication with nature can be the solution for a more sustainable and nature-aligned in land management system. However, with the advancement of technology in modern agricultural systems, many local wisdoms have begun to be abandoned. This study aims to investigate how the local communities at Teluk Meranti District understand the local wisdom and natural signs in the activities of forest and land management for a sustainable economy.

For this purpose, this study refers to the "Naturalizing Culture" Theory by Donal Carbaugh. This theory explains that, in the context of the environment and culture, communication between humans and nature is not just an observation, but includes human interpretation and response to natural signs. Carbaugh (2007) offers five main elements in understanding human communication with nature which is summarized in the concept of **EARTH**. First, **Environment**: Understanding how natural conditions affect humans and vice versa. Second, **Active**: Humans must play an active role in responding to natural signs with sustainable actions. Third, **Responsibility**: Awareness of the impact of every action on the ecosystem. Fourth, **Time**: Understanding the cycles of nature and how time affects the environment. And finally, **Heuristic**: Developing new strategies in understanding and adapting to nature.

Using this approach, this study formulates the problem as follows: How can communication between humans and nature shape a culture of forest and land management that

leads to a sustainable economy in Teluk Meranti Regency? Based on the issues outlined, this study aims to analyze how the people of Teluk Meranti District manage forests and land by interpreting natural signs, and how this humans and nature communication contributes to sustainable economic practices. Through this research, it is hoped that a human-nature communication model can be developed and can be applied in environmental policies and land management strategies based on local wisdom, so as to reduce negative impacts and foster a sustainable economy.

METHOD

This research was conducted in Teluk Meranti District, Pelalawan Regency, Riau Province, which is a large peatland area and often experiences forest and land fires. The research approach used is qualitative with a case study method. The focus of the research is how the people of Teluk Meranti District in reading natural signs in forest and land management as a form of sustainable economy, using the *Naturalizing Culture* theory from Donal Carbaugh with the concept of EARTH (Environment, Active, Responsibility, Time, Heuristic). The case study was chosen because it can explore the phenomenon of forest fires carried out by the community to clear land more deeply. In qualitative research that considers or explains human social life, it is considered suitable for the problem because qualitative research begins with its assumption and usefulness to inform or interpret a problem faced by an individual or group that is considered a social problem or a problem between people (Creswell, 2013).

The data sources in this study consist of primary data and secondary data. Primary data was obtained through direct interviews with communities involved in forest and land management, while secondary data was sourced from books, journals, and the internet as supporting materials. The data collection technique was carried out by semi-structured interviews using the *in-depth interview* method with farmers in Meranti Bay. These interviews can be conducted in person or through online communication media to obtain more in-depth information related to forest and land management culture.

In the selection of research subjects, the research subjects were selected using the *purposive sampling* technique, with the main criteria being farming communities who cleared land by burning and those who understood the culture of forest management. The total informants interviewed were nine people with backgrounds as farmers. The validity of the data is tested by the source triangulation technique, which is comparing various data sources to obtain more valid and reliable results. As for data analysis, it was carried out with the *Miles and Huberman model* which involved three stages: First, data reduction: Simplification of raw data into relevant main parts. Second, data presentation: Displaying data in the form of narratives, tables, or diagrams to facilitate analysis. Third, drawing conclusions: looking for patterns, relationships, and drawing meanings from the data that has been collected (Miles and Huberman, 2014).

RESULTS AND DISCUSSION

Peatland Management in Teluk Meranti District

Peatlands, which are organic soils with a high carbon content, have the potential to be managed sustainably for a variety of purposes, including agriculture and the forestry industry, by

minimizing negative impacts on the environment (Chadiri et al., 2016). Peatlands have a high diversity of plants, which contributes to ecosystem stability (Yenihayati, 2018). However, changes in land use, such as the conversion of peatlands to oil palm plantations, can reduce biodiversity and disrupt the balance of ecosystems (Suwondo et al., 2018; Hutabarat, 2019). Therefore, it is important to apply the principles of sustainable management and conservation to maintain the functioning of peat ecosystems (Tanur & Mutakim, 2023). Teluk Meranti District, Pelalawan Regency, Riau Province, which is a peatland area, has an important role as a natural carbon store. However, when it is disrupted, such as through combustion, it can release large amounts of carbon emissions that impact climate change. The strategies listed involve risk mitigation measures, therefore the local community of Teluk Meranti District, carries out the forest and land management process in three stages, namely as follows:

a. Vegetation Clearing

The process of land clearing in forest and land management has stages that must be passed, one of which is vegetation clearing. In Teluk Meranti District, Pelalawan Regency, Riau Province, there are several stages in the process of clearing land vegetation, including:

1. Cutting down trees

Tree felling in the context of the removal of forest vegetation in the process of forest management and land to be used as plantation land, with the aim of increasing food production or other agricultural commodities (Gibbs et al., 2010). In land cultivation, tree felling is often carried out to change land functions, for example from forests to agricultural land, the process of converting forests into monoculture crops, such as corn, has occurred significantly in a certain period (Mamangkay, 2023).

In the process of forest and community land management in Teluk Meranti District, the method of clearing forest land by cutting down trees first to facilitate the land clearing process, before proceeding to the next stage by burning. With the understanding of the people of Teluk Meranti District that peatland has flammable characteristics, so the process carried out before burning the land is vegetation clearing. The process of clearing vegetation is for the reason that the next work will be easier and avoid land fires, when carrying out the burning process.

2. Grass Slashing (Weed Slashing)

It relates to grass cutting, which is a process that involves cutting or removing grass vegetation and other undergrowth, the purpose of which is varied, including land preparation for agriculture, weed control, or landscape maintenance (DiTomaso, 2000). Weed control with a good grass cutting process can reduce competition between cultivated crops and weeds, thereby increasing crop yields. Good weed control can increase productivity by up to 30% (Hambakodu, 2021). In the process of cutting grass can improve soil health, after grass cutting can help improve soil aeration and reduce soil density (Munadi, 2021). After the cutting process, the use of leftover slashing as mulch can increase the organic matter content in the soil and reduce nutrient loss. This practice also aids in erosion control, especially in the early stages of plantation development (Carvalho et al., 2015).

The people of Teluk Meranti District, in forest and land management activities, there are several stages that must be carried out, one of which is by cutting down grass, shrubs, and small trees. with the aim that the next stage of the process will be easy. The people of Teluk Meranti District carry out this process manually by using a machete as the main tool to prepare

the land before the land burning and planting process. This process is carried out with the aim of preventing land fires during the land burning process, with the characteristic condition of flammable peatlands.

3. Poison the Grass (Poison the Weeds)

Weed poison, or herbicide, is a chemical compound used to control weed growth that can interfere with agricultural yields, given its effectiveness in reducing competition between cultivated crops and weeds, the use of mixed herbicides can increase rice yields by significantly suppressing weed growth (Sumekar & Widayat, 2022). However, the use of herbicides also has its own challenges, especially related to the development of weed resistance to herbicides, more than 43 weed species have shown resistance to ACCase inhibitors, which is one of the commonly used herbicide classes (Heap, 2014). This resistance can be caused by excessive and invariable use of herbicides, which creates selection pressures in weed populations (Chipomho et al., 2023).

The use of grass poison as a method to clear the land has become a common practice among the people of Teluk Meranti District, the use of this method is considered faster and more efficient in controlling weeds and wild vegetation. This process is carried out with the aim of accelerating the killing of weeds or vegetation to make it easier to carry out further work such as the burning process or directly continue with the planting process.

b. Land Burning Process

Land burning is often carried out because it is considered a cheap and fast method to clear land (Nugraha, 2019). Historically, land clearing by burning has long been used as a cheap and fast method of land clearing and traditional farmers believe that ash from burning increases soil fertility (Miettinen et al, 2016). The increase in soil fertility after burning is generally temporary and in the long term, soil tends to experience degradation and decreased productivity (Agus et al., 2014)

The Effect of Burning on Peat Soil Properties can change the physical structure of the soil, increase bulk density, and reduce porosity and can improve soil drainage in the short term, but also increase the risk of erosion (Rein et al, 2008). Peat soil is generally very acidic, with high acidity of peat soil with a pH ranging from 3-4.5, this acidity is caused by the presence of organic acids resulting from the decomposition of organic matter. (Andriesse, 1988). High acidity can reduce the availability of essential nutrients for plants, such as phosphorus, potassium, calcium, and magnesium, some nutrients can also be toxic at low pH, such as aluminum (Al) and iron (Fe). (Segun et al., 2014). With extreme acidic conditions can inhibit the growth and development of plant roots and the lack of essential nutrients and metal toxicity can cause symptoms of chlorosis, necrosis, and decreased plant productivity (Brinkman, 1980).

1. Making Fire Barriers

People in Teluk Meranti District are in the process of clearing land by burning, using the method of making fire barriers (fire barriers) when burning land. With the aim of keeping the fire from spreading to unwanted areas. Clean the boundary area by paying attention to the area around the fire barrier, so that no flammable material remains, especially peat fibers, as it can trigger a wider spread of fire. This method of making fire barriers is maintained and applied by the local community so that unwanted land fires do not occur. This method shows that there is an understanding of the local community related to fire control to maintain safety and respect

land ownership boundaries.

2. Gradual Combustion

The process of managing forests and community land in Teluk Meranti District uses the method of land burning which is carried out gradually and not arbitrarily. They burn land in stages according to their capabilities, ensuring that the burned land is controlled, safe, and can be used optimally. The local community only burns a small part of the land area, for example half a hectare which is managed from the two hectares of existing land. Local communities have rules in carrying out land burning, this gradual burning is carried out to prevent wider environmental damage, avoid the risk of uncontrolled fires, and ensure that land that has been burned and planted can be monitored optimally, as well as consider environmental sustainability. This method is closely held to avoid the occurrence of forest and large land fires out of control. On the other hand, land that has been burned is not immediately abandoned. The community waited until the fire was extinguished before continuing the burning in other areas.

3. Removing Peat Fiber

The people of Teluk Meranti District have a special method in managing peatland before carrying out the land burning process. The local community in the process of burning land has a process of removing peat fibers, before carrying out the burning process. Peat fibers are described as flammable grass roots. Peat fiber cleaning is carried out when making fire barriers, which means that cleaning fire barriers is one of the components that are cleaned is peat fiber. This cleanup is carried out to ensure that the fire does not spread wildly, potentially causing a large fire. The local community understands that peatlands have unique characteristics, namely they contain flammable fibers and are able to store heat for a long time. Therefore, local communities are carefully managing peatlands to reduce the risk of unwanted fires. And also the local community understands that if the peat fiber is not cleaned, the plants planted on the land will not grow properly. This shows that the fiber cleaning process is not only important for controlling fires, but also for improving soil fertility for plants.

c. Planting Process

The community in Teluk Meranti District has a distinctive forest and land management method to be used as plantation land. With geographical conditions in the form of peatland areas, in land management local communities use two periods, namely the period of land clearing and burning and the second period of planting. The community uses the method of burning land to remove acidic substances in peat soil and increase its fertility. However, the characteristics of peatlands that are flammable and difficult to extinguish make this process challenging. In the process of extinguishing fires, the community relies heavily on the rainy season, because fires on peatlands tend to spread into the ground, making it difficult to extinguish them by manual methods or using the nearest water source. Therefore, the local community waited for the rain to fall to ensure that the fire was completely extinguished before proceeding to the planting stage.

After the period of clearing and burning the land in the dry season, it is completed with the second period, namely the planting process in the rainy season. The people of Teluk Meranti District planting in the rainy season is an ideal time for farmers in peatlands to start planting activities after burning because the rain helps to ensure a thorough fire extinguishment. Burning peatlands require sufficient rainfall for the embers in the ground to be completely extinguished before planting can be carried out safely.

The rainy season has an important role in the agricultural cycle of peatland after burning. Farmers choose to postpone planting activities until the arrival of the rainy season because rain can naturally water plants evenly. The practice of planting in this rainy season is not only to take advantage of the optimal humidity for plant growth, but also to ensure that the land is completely safe from the potential for further fires. This strategy illustrates that land clearing is carried out in a planned and not arbitrary manner, but is based on in-depth knowledge of natural characteristics and attention to environmental safety.

Economy and Peatland Utilization

Nature exploration for forest and land management is an important approach in maintaining the sustainability of the ecosystem and improving the welfare and economy of the community in Teluk Meranti District. In this context, the understanding of the community in Teluk Meranti District about the surrounding environment is urgently needed to develop an effective management strategy. Community involvement in the planning and implementation of forest management not only provides direct benefits for them, but also increases a sense of ownership and responsibility for natural resources. In Teluk Meranti District, in the process of land management, the local community takes advantage of natural conditions and the environment to improve the community's economy. Here are some forest and land management carried out by the community in Teluk Meranti District in improving the economy:

a. Utilizing the condition of the main crops that are still small in peatlands

The community in Teluk Meranti District manages forests and land on peatlands by taking advantage of local geographical conditions. This management includes exploration of nature to optimize the benefits of the main crops that are still small. In addition, the community adjusts the types of plants to be cultivated on peatlands based on local environmental conditions and the ecological impacts caused. Here are some of the explorations carried out by the local community in utilizing the main plants that are still small.

1. No-Burn Plant Management Techniques

In Teluk Meranti District, local people understand nature as an important part of forest and land management. They manage land without burning methods, by developing techniques for exploring plant types that are suitable for the characteristics of peatlands. The plants chosen include pineapples, areca nuts, and vegetables, because they are able to support environmental sustainability. This approach is carried out to reduce the risk of forest fires while maintaining peatland ecosystems. The selection of such plants is based on their ability to retain soil moisture and prevent ecological damage that often occurs due to burning methods.

The no-burn management techniques applied reflect the innovation of local communities in utilizing peatlands ecologically and economically. Pineapple, for example, is chosen because it has leaves that are resistant to drought thus reducing the risk of fire. In addition, this plant does not deplete the moisture content in peat soil, thus maintaining the stability of the ecosystem. Meanwhile, areca nuts and vegetables are grown as intercropping crops that are used during the oil palm growth period. This strategy not only reflects adaptation to local climate change, but also demonstrates the deep ecological knowledge of the community. By avoiding the burning method, the people of Teluk Meranti have created an environmentally friendly and sustainable land management system. This system supports food security, maintains the balance of the ecosystem, and has a positive impact on the local economy.

2. Utilization of Intercrops for Economic Stability

In the process of forest and land management in Teluk Meranti District, the community explores nature by utilizing intercrops such as pineapples, areca nuts, and vegetables. This strategy aims to maintain economic stability while maintaining the balance of ecosystems in peatlands during the growth period of key crops such as oil palm. The selection of intercropping is based on its characteristics that do not damage land, have good economic potential, and are able to reduce the risk of forest fires.

The use of intercropping by the community reflects an adaptive approach in land management. This approach not only aims to increase economic income, but also focuses on environmental sustainability. For example, pineapple was chosen because of the nature of its leaves that do not dry out easily so that it can reduce the risk of peatland fires. In addition, pineapples have a high economic value, especially in the early days when oil palm has not yet produced. Plants such as vegetables and areca nuts are also chosen because they are able to grow on peatlands without damaging soil quality. Thus, this strategy is a sustainable solution in peatland management that pays attention to economic and ecological aspects in a balanced manner.

b. Utilizing Sustainable Crops

The community in Teluk Meranti District, manages their forests and land with the aim of utilizing natural resources in peatlands. This management is carried out by paying attention to the geographical condition of peatlands and the benefits of the management results. In addition, the local community adjusts the type of plants to be cultivated based on local environmental conditions and the ecological impact of the plant. Here are some types of exploration carried out by local communities to support sustainable agriculture:

1. Plant Diversification

Community Land Optimization Efforts in Teluk Meranti District, practicing forest and peatland management by understanding natural characteristics. They diversify crops as one of the land optimization strategies. This diversification is carried out by planting crops such as pineapples, areca nuts, and vegetables on peatlands. The selection of these plants aims to reduce environmental risks, increase economic yields, and maintain soil fertility. The selected plants have the ability to adapt to peatland conditions. For example, pineapple is chosen because the leaves do not dry out easily so that it can reduce the risk of fire. Areca nuts and vegetables are considered good alternatives because they can be grown without the burning method. Through this strategy, the community seeks to maintain the sustainability of the peatland ecosystem while obtaining economic benefits without damaging the environment.

2. Planting Trees as Animal Protection

The process of forest and land management by the community in Teluk Meranti District reflects high ecological awareness. They tend to blend land exploration with maintaining the presence of fruit crops around the main plantation, although the main focus of the land is on oil palm plantations. This practice aims to maintain ecological balance, provide long-term food sources, and support local animal life. Local communities understand the importance of not only pursuing the produce of commercial crops such as oil palm, but also preserving biodiversity and natural balance. By still making room for traditional food crops such as fruits and vegetables, they show a commitment to environmental conservation. In addition, this practice

is a manifestation of their social responsibility to ensure the welfare of future generations and maintain the sustainability of the ecosystem that includes flora and fauna in the region.

CONCLUSION

Peatland management in Teluk Meranti District, Pelalawan Regency, Riau Province, has great potential for a sustainable economy, if carried out with environmentally friendly methods. Many people in Teluk Meranti District still use the burning method when clearing land, causing forest and land fires. Therefore, it is necessary to implement better land burning and management strategies, including the construction of fire barriers, gradual burning, and peat fiber cleaning before burning. In addition, local communities apply forest and land management methods with a sustainable economy such as no-burn planting and plant diversification, by utilizing intercrops such as pineapples, areca nuts, and vegetables. This strategy not only reduces the risk of fire but also provides long-term economic benefits. Furthermore, this study shows that community understanding of the environment and the application of the "Naturalizing Culture" theory play an important role in shaping a more adaptive and sustainable land management pattern. Policies that support sustainable peatland management are needed, by balancing economic and ecological aspects.

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