Available online at https://journal.rescollacomm.com/index.php/ijeer/index

International Journal of Ethno-Sciences and Education Research

e-ISSN 2776-7590

Vol. 5, No. 1, pp. 1-7, 2025

Tanjung Jaya Village and the Potential for Developing Ethno-Sciences for Climate Change Mitigation in Panimbang District, Banten

Astrid Sulistya[1*], Riza Ibrahim[2]

[1,2]*Research Collaboration Community, Bandung, Indonesia*

**Corresponding author email: astrid.sulistya16@gmail.com*

Abstract

Climate change is a major challenge for global society, especially in coastal areas that are vulnerable to the impacts of environmental change. Tanjung Jaya Village in Panimbang District, Banten, is an example of a coastal area that faces major threats due to climate change, such as coastal abrasion, tidal flooding, and changes in weather patterns. The people of Tanjung Jaya Village have rich local knowledge, which has been passed down from generation to generation and has proven effective in managing natural resources and mitigating disasters. This study aims to explore the potential of ethno-sciences or ethnology in addressing the impacts of climate change in this village, with a focus on mangrove management, sustainable agriculture, and coastal ecosystem protection. The results of the study indicate that the integration of traditional knowledge with modern science, such as satellite-based monitoring technology, can increase the effectiveness of climate change mitigation. Therefore, the development of policies that support the strengthening of the role of local wisdom in mitigating climate change is very much needed to increase community resilience to natural disasters.

Keywords: Climate change, local wisdom, ethno-sciences, disaster mitigation, Tanjung Jaya Village

1. Introduction

Climate change is one of the biggest challenges facing humanity in the 21st century. The impact of this phenomenon is not only felt in developed countries, but also in remote areas, especially in developing countries such as Indonesia. One area that is very vulnerable to the impacts of climate change is the coast, where the level of vulnerability to climate change is very high, whether in the form of rising sea levels, increased frequency of extreme weather, or damage to coastal ecosystems (Trew & Maclean, 2021). Tanjung Jaya Village, located in Panimbang District, Banten, is a real example of the impact of climate change that can threaten the lives of coastal communities.

Coastal communities, such as those in Tanjung Jaya Village, often have very deep local knowledge about managing natural resources around them. This knowledge, which has been passed down from generation to generation, contains local wisdom values that can play an important role in climate change mitigation efforts. Ethno-sciences, as a branch of science that studies traditional knowledge and its application in an environmental context, is important to study in order to understand its potential contribution to ecosystem sustainability and community resilience to climate change (Ratnasari et al., 2023).

Ethno-sciences explore and utilize local wisdom that has developed in traditional communities, including in the management of nature and biodiversity. In many areas, this local knowledge has been proven to be able to maintain the balance of ecosystems for centuries. However, with the pressures of modernization and increasingly rapid climate change, this local wisdom faces major challenges (Lianingsih & Prabowo, 2024). Therefore, it is important to understand how ethno-sciences can be developed and applied in the context of climate change mitigation in Tanjung Jaya Village, which has great potential to become an example of a model for environmental management based on local knowledge.

On the other hand, Panimbang District, where Tanjung Jaya Village is located, also faces major challenges due to climate change. This coastal area is affected by natural phenomena such as tidal flooding, coastal abrasion, and declining quality of marine ecosystems that threaten the livelihoods of communities that depend on agriculture and fisheries. Local communities have long used traditional methods to manage their natural resources, but the increasing intensity of natural disasters requires more innovative and science-based solutions (Smith et al., 2021; Irawan, 2022).

It is important to integrate traditional knowledge with modern science in efforts to mitigate climate change. Many studies have shown that a holistic approach that combines local knowledge and new technologies can accelerate

ecosystem recovery and increase community resilience to natural disasters (Cooper, 2022). Therefore, this study aims to explore the potential for developing ethno-sciences in Tanjung Jaya Village as part of sustainable climate change mitigation efforts.

Tanjung Jaya Village has a long history of natural resource management based on local wisdom. As a coastal village, the Tanjung Jaya community has long relied on coastal ecosystems for survival, especially in terms of agriculture and fisheries. In an effort to protect these natural resources, they have developed traditional practices such as planting mangroves to prevent coastal abrasion and using environmentally friendly methods in farming. This local wisdom not only focuses on sustainability, but also includes fair and equitable social management, which is very relevant to climate change mitigation efforts (Suhaeb et al., 2024; O'Donoghue et al., 2021).

In facing climate change, this village is faced with two main challenges: first, dependence on coastal ecosystems that are increasingly threatened; and second, the need for a more modern approach to dealing with the problem (Mozumder et al., 2023). Therefore, this study will also discuss how collaboration between ethno-sciences and modern science can bring more effective solutions to reduce the impacts of climate change in coastal areas such as Tanjung Jaya Village.

Local wisdom in Tanjung Jaya Village, if developed with the right approach, can make a significant contribution to climate change mitigation efforts. Practices such as planting drought-resistant crops or environmentally friendly farming patterns can be optimized by utilizing modern technology, such as satellite mapping to monitor land and water conditions. This can create a balance between nature conservation and improving the quality of life of the community (Sarma et al., 2024).

Through this research, it is expected to find a more appropriate solution to develop ethno-sciences as part of a climate change mitigation strategy in Tanjung Jaya Village, which can be applied not only in this village, but also in other coastal areas in Indonesia that face similar challenges. This research also aims to provide policy recommendations that support the development of traditional knowledge and its integration with science-based approaches in order to create sustainable social and environmental resilience.

2. Methods

This study uses a qualitative approach with a case study method. This study aims to explore how local wisdom possessed by the Tanjung Jaya Village community can contribute to reducing the impact of climate change, as well as to see the potential for integrating traditional knowledge with modern science. This approach was chosen because of its flexible nature in obtaining in-depth and contextual data on the traditional and social practices of the local community (Moisey et al., 2022). The stages of this research can be seen in the following flow diagram:

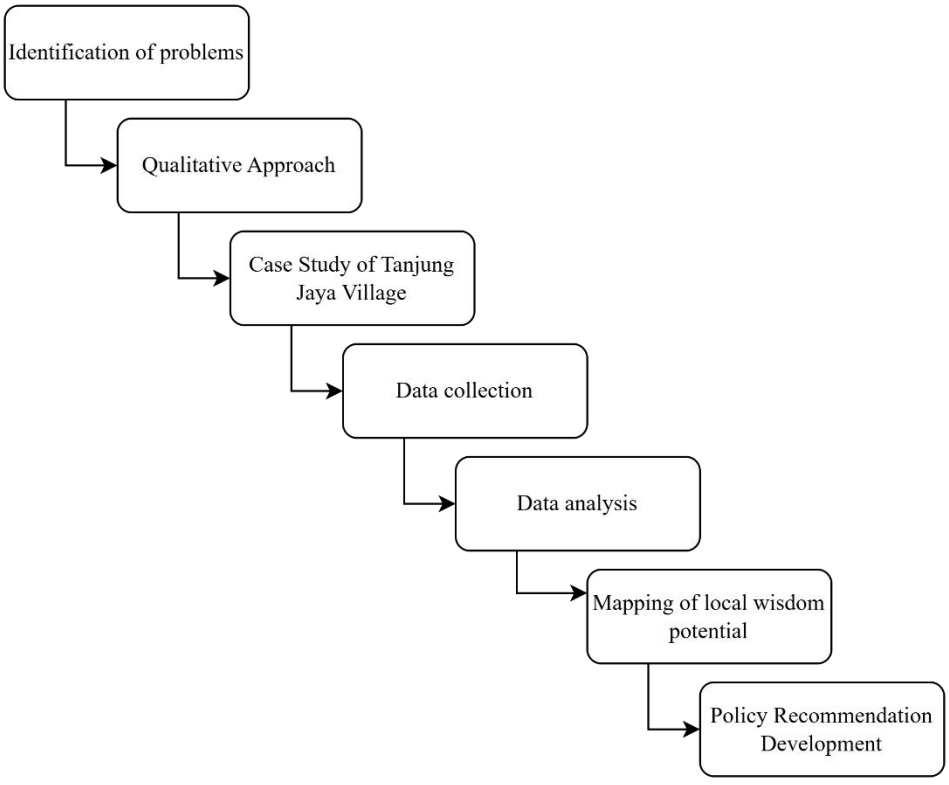

Figure 1: flow diagram

2.1. Qualitative approach

This study uses a qualitative approach because this type of research allows researchers to gain a deeper understanding of the phenomenon being studied. This approach is very appropriate for ethno-science studies that involve understanding and interpreting local knowledge and community culture (Putra, 2021). Through a qualitative approach, researchers can explore how the Tanjung Jaya Village community interacts with their environment, how they traditionally manage natural resources, and how this knowledge can be used to mitigate climate change. This approach also allows researchers to identify cultural nuances related to adaptation to climate change and the ecological challenges faced by the community.

2.2. Case study

This study uses a case study design that focuses on Tanjung Jaya Village in Panimbang District, Banten. The case study was chosen because this village has characteristics that are very relevant to the research topic, namely coastal communities that are highly dependent on natural ecosystems for survival. Traditional knowledge and practices in Tanjung Jaya Village are important subjects to study, considering that this village faces major challenges due to climate change. Through this case study, researchers can dig deeper into how local wisdom in the village can help overcome environmental challenges such as coastal abrasion, tidal flooding, and coastal ecosystem damage, and how this knowledge can be integrated with science-based solutions to increase community resilience to climate change.

2.3. Data collection

The data used in this study consists of two main types: primary data and secondary data. Primary data collection is carried out through in-depth interviews, Focus Group Discussions (FGDs), and participant observation. In-depth interviews will be conducted with local community leaders, traditional leaders, and farmers and fishermen who have knowledge of traditional practices in natural resource management.

Focus Group Discussions (FGDs) will be conducted by involving community groups to explore their views on the impacts of climate change that they have felt and the potential for applying traditional knowledge in climate change mitigation. Participatory observation will be conducted by researchers by directly participating in the daily activities of the community, such as agricultural or fishery activities, to observe how traditional practices are applied in their lives. Meanwhile, secondary data is obtained through a literature review that includes previous research reports, scientific articles, and policy documents related to climate change, traditional-based natural resource management, and the implementation of ethno-sciences in Indonesia and the world. This secondary data will be used to provide a theoretical framework in analyzing primary data collected in the field.

2.4. Data analysis

After data collection, the next stage is data analysis. The analysis technique used is thematic analysis, where the data obtained will be analyzed by identifying the main themes that emerge in interviews, FGDs, and observations. Thematic analysis will help researchers understand the patterns in the data regarding traditional knowledge and practices that are relevant to climate change mitigation. Furthermore, the data will be analyzed inductively, starting from more specific findings in the field to then be concluded into more general concepts regarding the potential for developing ethno-sciences in efforts to mitigate climate change. This analysis will also consider the social, cultural and environmental context of Tanjung Jaya Village, as well as the impacts of climate change faced by the community.

2.5. Mapping of local wisdom potential

One of the main objectives of this research is to map various traditional practices in Tanjung Jaya Village and identify how these practices can contribute to climate change mitigation. This mapping will cover aspects such as coastal natural resource management, such as mangrove and fisheries management, as well as adaptation to natural disasters and extreme weather. Researchers will dig deeper into the use of local knowledge related to agriculture, such as environmentally friendly farming methods, and soil and water maintenance techniques used by the community. After the mapping is done, an analysis will be conducted to assess how these practices can be strengthened or adapted with modern technology, such as the use of satellite-based monitoring systems or other technological devices, to strengthen climate change mitigation efforts.

2.6. Development of policy recommendations

Based on the results of the analysis and mapping of local wisdom potential, this research will provide policy recommendations that support the development of ethno-sciences in Tanjung Jaya Village. These recommendations will include policies that can strengthen the role of traditional knowledge in environmental management and climate change mitigation, both at the village level and at the local government policy level. The recommendations will also

suggest how the government can help communities access relevant technology to support their traditional practices. In addition, this research will propose educational and training programs for communities to improve their capacity to adapt local knowledge and integrate it with science-based solutions. Thus, this research aims to contribute to strengthening community resilience to climate change and creating a sustainable natural resource management model.

3. Results and Discussion

Based on the research methods that have been explained, the results of this study will be presented in two main parts: the main findings from data analysis and mapping of local wisdom potential, and a discussion on the relevance and contribution of ethno-sciences to climate change mitigation.

3.1. Research results

3.1.1. Identification of climate change impacts in Tanjung Jaya village

From interviews and FGDs conducted with the Tanjung Jaya Village community, it was revealed that this village is facing serious impacts from climate change, especially related to coastal erosion, tidal flooding, and disruption to weather patterns that affect agricultural and fishery yields. Local communities identified sea level rise as the main problem that threatens their survival, considering that this village is located in a coastal area. In addition, more frequent extreme weather, such as heavy rain that causes flooding, also has a negative impact on agriculture and the sustainability of natural resources. Based on these findings, Table 1 shows the results of interviews and observations related to the impacts of climate change that occurred in Tanjung Jaya Village.

Table 1: interviews and observations: impact of climate change in Tanjung Jaya village

No	Tested Aspects	Interview/Observation Findings	Identified Impacts	Relevance for Climate Change Mitigation
1	Coastal Erosion	Interviews with fishermen and community leaders indicate worsening coastal erosion	Loss of agricultural land and settlements	Mangrove management to prevent abrasion
2	Tidal Flooding	Observations indicate tidal flooding is occurring more frequently, inundating agricultural fields and settlements	Damage to agricultural crops and infrastructure	Implementation of better water management systems
3	Extreme Weather Patterns	Interviews with farmers reveal changes in rainfall patterns affecting planting times	Hindered agricultural production	Agricultural techniques that are more adaptive to weather changes
4	Sea Level Rise	Group discussions reveal community concerns about rising sea levels	Threats to coastal ecosystems and natural resources	Protection of coastal ecosystems such as mangroves

3.1.2. Traditional practices relevant to climate change mitigation

In terms of traditional practices, it was found that the people of Tanjung Jaya Village still adhere to several methods that can be adapted to mitigate climate change. One of them is the management of the mangrove ecosystem. Mangroves on the coast of Tanjung Jaya Village have an important role in preventing coastal abrasion and protecting settlements from high waves. In addition, traditional tree planting and rainwater management are also carried out in environmentally friendly ways. The community also utilizes agricultural patterns that use organic farming techniques that can maintain the balance of the local ecosystem and increase resilience to natural disasters. Table 2 illustrates traditional practices that are relevant to climate change mitigation in Tanjung Jaya Village.

Table 2: Traditional practices relevant to climate change mitigation

No	Traditional Practices	Practice Description	Positive Impacts for Climate Change Mitigation
1	Mangrove Management	Mangrove planting and maintenance locally by communities to prevent coastal abrasion	Stabilize coastlines, prevent erosion, protect settlements from high waves
2	Organic Farming	Use of organic farming methods without chemicals to maintain soil fertility	Reduce soil and water pollution, maintain the sustainability of natural resources
3	Tree Planting Around Settlements	Planting trees in groups to protect settlements from wind and rain	Increase rainwater absorption and prevent flooding

4	Rainwater Management	Implementation of rainwater collection systems for irrigation	Reduce dependence on primary water sources, reduce crop damage due to drought

3.1.3. Mapping of potential local wisdom

From the mapping carried out, a number of potential local wisdoms were found that can be used to mitigate climate change. Among them are mangrove maintenance techniques that have been carried out by the community for years. In addition, sustainable agricultural systems and wise use of natural resources can be used as a basis for further development. Mapping also shows the existence of local knowledge related to coastal natural resource management that can be combined with modern technology to strengthen mitigation efforts. For example, planting mangroves with an agroforestry system involving local communities can be a model for other coastal villages. The presentation of the mapping of local wisdom potential found during the research in Tanjung Jaya Village can be seen in Table 3.

Table 3: Mapping of local wisdom potential for climate change mitigation

No	Local Wisdom Potential	Potential Description	Relevance for Climate Change Mitigation
1	Mangrove Management	Communities have managed mangroves to prevent coastal erosion for years	Increase the resilience of coasts and coastal ecosystems to climate change
2	Sustainable Agriculture	Agricultural techniques that maintain soil quality and utilize nature wisely	Maintain food and natural resource security, reduce the impact of natural disasters
3	Coastal Natural Resource Management	Management of fish and coastal natural resources based on local wisdom	Increase the sustainability of natural resources and coastal ecosystems
4	Planting of Shade Trees	Communities plant shade trees around settlements and fields	Reduce the impact of extreme weather, reduce flooding, and prevent ecosystem damage

3.2. Discussion

3.2.1. Relevance of local wisdom in dealing with climate change

Traditional practices still carried out by the people of Tanjung Jaya Village show that local wisdom has great relevance in overcoming environmental problems caused by climate change. Mangrove management, which has been carried out by the community for generations, is not only useful for reducing the impact of coastal abrasion but also functions as an ecosystem support that supports the life of coastal biodiversity. Knowledge about mangrove management, which has so far been local and traditional, can be strengthened with scientific research and more sophisticated technology. With this strengthening, mangrove management can increase the capacity for more effective and sustainable climate change mitigation.

3.2.2. Integration of traditional knowledge with modern science

One of the main findings of this study is that there is great potential to integrate ethno-sciences with modern science in order to mitigate climate change. For example, mangrove management can be optimized through the use of satellite-based monitoring technology or Geographic Information Systems (GIS) to map and monitor mangrove conditions in real-time. Integration of traditional knowledge in organic farming can also be strengthened with agroecological farming techniques, which can increase food security while reducing negative impacts on the environment. Thus, the use of modern technology to support traditional practices can accelerate adaptation to climate change in Tanjung Jaya Village.

3.2.3. The role of government in developing local wisdom

The results of the study also show that the role of government is very important in supporting the development of ethno-sciences for climate change mitigation. Policies that integrate local knowledge in village development planning, as well as providing training and access to supporting technology, will be very beneficial. The local government can introduce community empowerment programs that involve. Policies for the development of Ethno-Sciences in Tanjung Jaya Village can be seen in Table 4.

Table 4: Policy recommendations for the development of ethno-sciences

No	Policy Recommendations	Policy Description	Expected Implementation
1	Strengthening Mangrove Management	Policy to strengthen community-based mangrove management	Coastal protection, erosion prevention, coastal ecosystem preservation
2	Sustainable Agricultural Extension	Training program to introduce organic farming techniques to farmers	Increase food security and environmental friendliness
3	Development of Monitoring System	Use of technology to monitor ecosystem conditions and environmental changes in real-time	Increase efficiency in natural resource management and climate change mitigation
4	Empowerment of Coastal Communities	Encourage community participation in natural resource management and climate change adaptation programs	Increase community capacity in dealing with climate change and natural disasters

4. Conclusion

This study shows that the local wisdom of the Tanjung Jaya Village community has great potential in mitigating climate change, especially in coastal areas that are very vulnerable to the impacts of climate change. Traditional practices implemented by local communities, such as mangrove management, organic farming, and natural resource management based on local wisdom, can contribute significantly to efforts to preserve ecosystems and increase community resilience to climate change.

This study also highlights the importance of integrating traditional knowledge with modern science. By using technologies such as satellite-based monitoring and Geographic Information Systems (GIS), mangrove management and environmentally friendly agricultural systems can be strengthened, thereby accelerating efforts to adapt to climate change.

In addition, the role of the government is very important in supporting the development of ethno-sciences as part of climate change mitigation policies. Policies that integrate local knowledge into village development planning and provide access to relevant training and technology can help increase community capacity in managing their natural resources sustainably and facing the challenges of climate change.

Thus, the development of local wisdom in climate change mitigation in Tanjung Jaya Village can be a useful model not only for this region, but also for other coastal areas in Indonesia that face similar challenges. This research provides policy recommendations that can support strengthening the role of traditional knowledge in natural resource management and disaster mitigation, as well as encouraging the development of sustainable social and environmental resilience.

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