

Forest Management Vulnerability of Dayak Communities in *Lok Lahung* to Climate Change Impacts

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ABSTRACT

Climate change has brought significant impacts to forest land management systems, especially for indigenous communities who rely heavily on natural resources for their livelihoods. Indigenous Dayak communities in Lok Lahung Village, Lokasado District, South Kalimantan, face challenges in maintaining the sustainability of cinnamon cultivation as the main commodity due to shifting seasonal patterns, increasing temperatures, and extreme weather events. This study aims to assess the level of community vulnerability to the impacts of climate change and explore local wisdom-based adaptation strategies in forest management. This research used a descriptive qualitative approach, with data collection methods through in-depth interviews, participatory observation, and documentation. Data analysis was done thematically with source triangulation to increase the validity of the findings. The results showed that the community experienced ecological and economic vulnerability due to declining cinnamon productivity, climate uncertainty, and limited access to information and adaptive technology. However, they have local adaptation strategies that are still practiced, such as agroforestry systems, intercropping, and planting site selection based on traditional knowledge. The findings confirm the importance of strengthening customary institutions, revitalizing local knowledge, and integrating external support to improve community resilience in the face of climate change.

Keywords: Indigenous peoples, Climate change, Cinnamon, Forest management, Adaptation strategies, Dayak Lok Lahung community.

INTRODUCTION

Global climate change has become a major challenge to the sustainability of ecosystems and the livelihoods of communities dependent on natural resources, particularly indigenous peoples. In Indonesia, indigenous peoples have an important role in forest management through local wisdom systems that have been passed down through generations. However, this management system is now facing serious threats due to climate change, such as changes in rainfall patterns, increased temperatures, and increased frequency of extreme events such as forest fires and floods (Usop, 2020; Wulandari et al., 2021). In southern Kalimantan, the indigenous Dayak community in Lok Lahong Village, Loksado

Sub-district, Hulu Sungai Selatan District, is highly dependent on forests as a source of livelihood and cultural identity. Their forest management practices reflect deep local wisdom, but their vulnerability to climate change impacts has not been widely studied. Previous research has focused more on ecological or macro aspects, while social-ecological aspects involving indigenous local wisdom have received less attention. (Wahyu et al., 2020; Wulandari et al., 2021).

In southern Kalimantan, the Dayak indigenous people of Lok Lahong Village, Loksado Sub-district, Hulu Sungai Selatan District are a community that relies heavily on forests as a source of livelihood and cultural identity. Their forest management practices reflect deep local wisdom, but their vulnerability to climate change impacts has not been widely studied. Previous research has focused more on ecological or macro aspects, while social-ecological aspects involving indigenous peoples' local wisdom have received less attention (Wahyu et al., 2020;

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Wulandari et al., 2021). This research aims to fill the research gap by assessing the level of vulnerability of the forest management system of indigenous Dayak communities in Lok Lahung Village to the impacts of climate change. This research offers novelty by integrating local ecological knowledge and vulnerability assessment frameworks, as well as considering social and cultural dimensions in dealing with climate change. In addition, this research also aims to provide policy recommendations that support indigenous community-based adaptation in the context of climate change.

METHODS

This study used a descriptive qualitative approach to explore the level of vulnerability of indigenous Dayak communities in Lok Lahung Village, Central Kalimantan, in managing forest land amidst climate change pressures. Data was collected through in-depth interviews with key informants, including traditional leaders, forest farmers, women involved in land management activities, and representatives of the younger generation. In addition, focus group discussions (FGDs) were conducted to explore collective community perceptions, adaptation strategies, and shared experiences related to climate variability and forest-based livelihoods. Participatory observation was also used to gain a contextual understanding of daily practices in forest management and local responses to environmental change. Supporting data was obtained from village documents, customary archives and other relevant secondary sources. Thematic analysis was applied to identify and interpret emerging patterns related to ecological vulnerability, local knowledge and adaptation practices. Data triangulation was conducted by comparing information from different sources and methods to increase the credibility of findings. To maintain validity, data were confirmed (member check) with informants by presenting initial interpretations for clarification. Ethical aspects were

maintained through providing informed consent, maintaining the anonymity of informants, and respecting the norms and decision-making structures of indigenous communities. This methodological design was designed to capture in depth the linkages between local ecological wisdom and socio-environmental challenges due to climate change.

RESULTS AND DISCUSSION

Ecological Vulnerability in Cinnamon Cultivation



Figure 1. Cinnamon tree products

The results showed that indigenous Dayak communities in Lok Lahung Village utilize customary forest areas to cultivate cinnamon (*Cinnamomum burmannii*) as the main commodity. However, in recent years, the community has experienced increased vulnerability due to climate change characterized by shifting seasonal patterns, increasing temperatures, and extreme weather events such as prolonged rain or sudden drought. These changes have resulted in a decrease in cinnamon bark quality and an increased risk of crop failure. These findings are in line with research (Wardhana et al., 2021) (Wardhana et al., 202; Arisanty et al., 2025; Syarifuddin et al., 2025) which identified the level of vulnerability of indigenous Dayak Meratus people in Lok Lahung Village to the impacts of climate change.

In addition, research by Djumaty and Hayam Dey (2023) on the adaptation of the Sungai Batu indigenous community to climate change showed that the community diversified their businesses and

changed cropping patterns to reduce the negative impacts of climate change on their agricultural production. Similarly, Save Our Borneo (2023) noted that the Dayak Tomun community in Kubung Village implemented agroforestry practices by planting various types of local fruit trees after harvest, as an effort to maintain soil fertility and sustainability of agricultural production.

Adaptation Strategies Based on Local Knowledge



Figure 2. Interview with the village head of Lok Lahung

Despite facing ecological pressures, the Dayak community in Lok Lahung has shown the ability to adapt based on local wisdom. Strategies used include managing simple agroforestry systems, intercropping cinnamon with other crops such as candlenuts, bananas and several other species, and selecting planting locations based on traditional observations of the soil and wind direction. During the discussion, the community mentioned that their ancestors had taught them the principles of "jaga hutan, jaga hasil" which still guide them in managing the land until now. These values form a management system that is in harmony with natural cycles and reflects local ecological ethics.

However, this adaptation strategy is now facing challenges due to the fragmentation of the younger generation's knowledge and the introduction of a

market economy system that encourages the intensification of monoculture cultivation. Some respondents mentioned that they have begun to replace cinnamon plants with other commodities that are considered more profitable, such as rubber, despite the risk of weakening the structure of the forest ecosystem. These findings indicate the existence of social-ecological dynamics that have the potential to increase long-term vulnerability if not balanced with a collective adaptive capacity strengthening approach.

Social Context and External Support

The presence of local mentoring organizations has made a positive contribution, especially in training on environmentally friendly cultivation and involving women in forest farming activities. However, the sustainability of these initiatives depends heavily on the continuity of external support and integration with village development plans. These findings confirm that the level of vulnerability of indigenous peoples' forest land management is not only influenced by ecological factors, but also by interrelated socio-political and economic factors. Therefore, a holistic approach to adaptation should be encouraged, incorporating the strengthening of local institutions, revitalization of indigenous knowledge, and access to climate information and adaptive technologies. By doing so, the Lok Lahung indigenous community can be more resilient in the face of climate change impacts while maintaining the ecological and economic functions of their cinnamon forests.

CONCLUSION

Cinnamon cultivation by indigenous Dayak communities in Lok Lahung Village faces increasing ecological vulnerability due to climate change, such as seasonal shifts, increased temperatures and extreme weather. Impacts include reduced crop quality and increased risk of crop failure. Despite this, the community has demonstrated local knowledge-based adaptation through agroforestry,

intercropping and traditional cropping practices. However, these adaptations are threatened by the weakening of knowledge transfer between generations and the penetration of a market economy that encourages monoculture cultivation. Vulnerability does not only stem from ecological factors, but is also influenced by socio-political dynamics, such as weak customary institutions and lack of support for customary land protection policies. The presence of supporting institutions and ongoing training are important factors in strengthening the adaptive capacity of the community. Therefore, a holistic adaptation approach is needed, which includes strengthening local institutions, revitalizing traditional wisdom, and accessing climate information and adaptive technologies, to ensure the ecological and economic sustainability of cinnamon cultivation in indigenous territories.

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