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Local Perception of the Carbon Emission Reduction Program in Oil Palm Plantations

Andi Fahri Faisal[1]

[1]*Faculty of Social and Political Sciences, Universitas Hasanuddin*

**Corresponding Author: Andi Fahri Faisal*
E-mail: andifahrifaisal@gmail.com

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Abstract

This study aims to examine local community perceptions of carbon emission reduction programs in oil palm plantation areas, focusing on awareness, perceived benefits, and participation. A qualitative case study approach was employed, involving semi-structured interviews with 25 participants, including smallholder farmers, plantation workers, community leaders, and local government representatives. Data were analyzed using thematic analysis to identify key patterns in community responses. The findings reveal varying levels of awareness, with some participants demonstrating a clear understanding of environmental objectives while others showed limited comprehension. Economic considerations were found to dominate perceptions, with most participants prioritizing tangible benefits such as income and employment. In addition, limited participation in decision-making processes contributed to skepticism and reduced trust in the program. The study concludes that the effectiveness of carbon emission reduction programs depends not only on technical design but also on community engagement, equitable benefit distribution, and context-sensitive communication strategies.

INTRODUCTION

Oil palm has been identified as a significant source of economic development in most of the tropical nations especially in the southeast of Africa. Nevertheless, its rapid growth has been inextricably linked with serious environmental issues, such as deforestation, biodiversity, and greenhouse gases emissions (Murphy et al., 2021; Singh & Kumar, 2023). Palm oil which is one of the most consumed vegetable oils in the world is very important in food, cosmetics and biofuel production. However, its manufacture has been in growing apprehension of environmental sustainability, making the industry a subject of crucial attention in global climate change mitigation practices (Palmer et al., 2023; Ezeasor & Ozougwu, 2022; Dwivedi et al., 2023).

To counter these challenges, different carbon emission reduction plans have been unveiled in the oil palm industry. The initiatives seek to balance the economic development with environmental sustainability by the practice of improved land management, including reforestation, zero-burning, and the capture of methane in palm oil mill effluent (POME) (Uning et al., 2020; Firdaus, 2025). Also, certification programs like Roundtable on Sustainable Palm Oil (RSPO) have also taken center

stage as the major governance mechanism towards ensuring production that is environmentally friendly. These schemes are not intended solely to decrease emissions but they are also aimed at incorporating the other aspects of sustainability such as social equity and local economic development (Günther et al., 2020; Hariram et al., 2023; Kumar et al., 2024).

National regulatory frameworks also support the efforts to reduce carbon emissions in the plantation sector in the Indonesian context. An example is the Undang-Undang Nomor 32 Tahun 2009, which highlights the need to conserve the environment and to involve communities in the governance of the environment. In the same way, the Undang-Undang Nomor 39 Tahun 2014 specifies the needs of implementing the environmentally friendly practices of the plantation business as well as having community welfare. Most recently, Peraturan Presiden Nomor 98 Tahun 2021 offers a policy framework of carbon pricing and emission reduction mechanisms, including those of land based industries like oil palm plantations. These regulatory tools show that reduction of carbon emissions is not only a global agenda but national priority which is entrenched in the Indonesian legal framework.

Even though these policies and initiatives are in place, the success of carbon emission reduction programs is greatly determined by their perception and acceptance by the local communities. The role of community participation in environmental governance has become the focus of more and more attention in the past decades. The local perceptions, awareness, and attitudes have become the most important determinants of success or failure of sustainability programmes (Thompson et al., 2020). Social groups that perceive that they are not involved in decision-making or do not receive sufficient information are more prone to oppose such efforts, therefore, sabotaging them (Taylor & Asmundson, 2021). On the other hand, active involvement and inclusionary communication practices can create a sense of ownership and improve the effectiveness of the program (Wamsler, 2020; Larson et al., 2022; Lubis, 2024).

Local communities in oil palm plantations are not just passive recipients but major stakeholders with their livelihoods, land rights, and socio-cultural systems directly impacted by carbon reduction efforts. Their views are influenced by many factors, such as economic factors, social relations, and environmental consciousness (Peetz et al., 2021). In most instances, economic demands in the short term are more likely to prevail over the environment, especially in areas where oil palm farming is a major income generator (Golub et al., 2021). This brings a complicated interaction process as sustainability programs might be seen with suspicions when they are considered to pose a threat to current livelihoods.

The fact that carbon emission reduction programs are perceived as externally pressed and lack inclusivity among the local stakeholders is one of the most prominent challenges in realizing them (Shah et al., 2021). The absence of effective involvement in program planning and execution usually creates a sense of mistrust and opposition among the community members (Roll et al., 2022). Moreover, issues of social justice in the allocation of benefits, particularly in initiatives with an economic component like payment of ecosystem services (PES), can increase social tensions and diminish community support (Blanchard et al., 2020; Shi et al., 2022).

With these complexities, it is necessary to learn more about the local perceptions in order to enhance the effectiveness and sustainability of carbon emission reduction programs in the oil palm plantations. This paper will discuss the perception of such initiatives by the local population, especially in terms of economic, social, and environmental aspects. This study aims to fill the gaps in the literature that, to a large extent, overlook the perspectives of the grassroots in favor of the technical and policy-oriented viewpoint (Weldegiorgis et al., 2021). Finally, the paper can help to

create more inclusive and context-sensitive environmental governance policies that would help to adjust the ecological goals to the socio-economic reality.

METHODS

Research Design

This study employed a qualitative research approach using a case study design to explore local community perceptions of carbon emission reduction programs in oil palm plantation areas. A qualitative approach was selected as it allows for an in-depth understanding of how individuals interpret and respond to socio-environmental initiatives within their lived contexts. The case study design enabled the researcher to examine these perceptions within a specific setting where carbon reduction programs are actively implemented.

Study Site and Participants

The study was conducted in communities located near oil palm plantations where carbon emission reduction initiatives have been introduced. A purposive sampling technique was used to select participants who have direct or indirect exposure to the program.

A total of 25 participants were involved in this study, consisting of 10 smallholder farmers, 6 plantation workers, 5 community leaders, and 4 local government representatives. These groups were selected to capture diverse perspectives across key stakeholders affected by or involved in the program.

Participants were selected based on the following criteria: 1) Residing in the plantation area for at least five years; 2) Having awareness of or involvement in the carbon emission reduction program, and 3) Willingness to share their experiences and perspectives.

The sample size was considered sufficient as data saturation was achieved, indicated by the repetition of similar responses and the absence of new emerging themes in later interviews.

Data Collection

Data were primarily collected through semi-structured interviews, which provided flexibility for participants to express their views while ensuring consistency across key discussion topics. The interview guide covered three main areas: 1) Community awareness and understanding of the program 2) Perceived environmental and economic benefits, and 3) Levels of participation and involvement in program implementation.

Each interview lasted approximately 45–60 minutes and was conducted in the participants' local language to ensure clarity and comfort. All interviews were audio-recorded with participants' consent and transcribed verbatim for analysis.

To complement the interview data, non-participant observations were also conducted to capture contextual insights into community interactions, program implementation practices, and local engagement dynamics. Observations included attendance at community meetings, informal discussions, and daily plantation-related activities. Field notes were recorded systematically to support data interpretation.

Data Analysis

Data were analyzed using thematic analysis following a systematic process. First, all interview transcripts were read multiple times to achieve data familiarization. Second, initial codes were generated through open coding to identify recurring ideas and patterns related to community perceptions.

These codes were then organized into broader themes that reflect key findings of the study, particularly: 1) Community awareness and understanding; 2) Perceived benefits, and 3) Concerns and skepticism regarding the program.

The themes were continuously refined to ensure coherence and strong alignment with the research objectives.

Trustworthiness of Data

To ensure the rigor and credibility of the study, several strategies were applied. Member checking was conducted by sharing summaries of findings with selected participants to verify the accuracy of interpretations.

In addition, data triangulation was employed by comparing information obtained from interviews, observations, and field notes to ensure consistency across data sources.

The researcher also maintained a reflexive journal throughout the research process to document assumptions, analytical decisions, and potential biases. This approach enhanced transparency and strengthened the overall validity of the findings.

RESULTS AND DISCUSSION

The purpose of this study was therefore to investigate the ways in which carbon emission reduction programs are understood and received in the oil palm plantations through the experiences and beliefs of people living in the plantations communities. More specifically, analysing economic, environmental and social perspectives of the study, it aimed at revealing nuanced factors which determine either acceptance or rejection of such measures by the communities. The findings of the study highlighted broad qualitative understanding of the different viewpoints involved which were useful in explaining the prospects and difficulties in the enhancement of the carbon emission reduction efforts in these areas. The findings offer insight into how local people understand such programs in relation to their existence and differences in appreciation of the impacts that such livelihoods breeding programs have on the environment and sustainability measures within their communities.

Community Awareness and Understanding of the Program

The study showed that the level of community awareness and comprehension of the carbon emission reduction program differs among participant. Some of the members of the local communities have fairly good understanding of the program, what it seeks to achieve and its environmental benefits, on the other hand, there are some members, who had little or wrong impression of the program. These included; education level, access to information, or direct involvement with plantations as they sampled the differences in awareness between the two.

The findings for those who were more knowledgeable of the program, there was recognition of the environmental impact by having to minimize greenhouse gases emission and the part played in combating climate change. Such participants were mostly likely to have a positive perception towards the program indicating that society needed to put measures in place that factor a reduction in carbon footprints in agricultural practices. One participant, a local community leader, expressed optimism, stating:

> *"We know that the carbon emission reduction program is important not just for our plantations but for the world. It helps reduce the harmful gases that cause climate change."*

This understanding was more prevalent among individuals who had attended informational sessions or had direct interactions with the program's implementers.

However, the study also uncovered a considerable portion of the community who lacked a comprehensive understanding of the program. Many participants reported that while they were aware of its existence, they did not fully grasp the program's objectives or how it affected their daily lives. Some believed the program was solely an external initiative with little relevance to their immediate concerns, such as economic livelihood. For instance, a plantation worker remarked:

> *"I have heard about it, but I don't really understand what it means for us. They say it's about the environment, but I am more concerned with my income."*

This quote highlights the disconnection between the program's broader environmental goals and the community's immediate priorities, such as job security and income generation.

The lack of clear communication from program implementers also contributed to this limited understanding. Several participants expressed frustration that there had not been enough effort to educate or involve the community in discussions about the program's purpose and benefits. Some community members felt that information was often presented in technical terms, making it difficult for them to comprehend fully. One farmer explained:

> *"They talk about carbon and emissions, but many of us don't understand these words. We need them to explain it in simpler ways that make sense to us."*

This sentiment underscores the need for better communication strategies that are tailored to the local context, using language and examples that resonate with the community. Moreover, the study revealed that there was a general perception among some participants that the carbon emission reduction program was primarily designed to benefit external stakeholders, such as the government and plantation companies, rather than the local communities themselves. This perception was particularly strong among individuals who felt excluded from decision-making processes. A farmer commented:

> *"It seems like this program is for the government and the companies. They are the ones who make the decisions, and we just follow what they say."*

This lack of perceived ownership and involvement in the program further contributed to the limited understanding and, in some cases, skepticism about its effectiveness and relevance.

Despite these challenges, there were indications that when properly informed and engaged, community members were more likely to support and participate in the program. Participants who had attended community meetings or had regular contact with plantation management expressed a greater sense of responsibility toward reducing carbon emissions. They saw the program as a collaborative effort that required their involvement. One community leader emphasized:

> *"We have to work together to make this program work. It's not just for the plantation but for our future, too."*

The awareness and understanding of the carbon emission reduction program within local communities were shaped by several factors, including access to information, the relevance of the program to their daily lives, and the level of community engagement. The findings suggest that improving communication and involving the community more actively in decision-making processes could enhance their understanding and support for the program.

Perceived Benefits

The findings indicate that community perceptions of the benefits of the carbon emission reduction program are divided between environmental and economic

considerations. Some participants recognized the environmental importance of the program, particularly its role in reducing greenhouse gas emissions and addressing climate change. These individuals viewed the program as contributing to broader environmental sustainability and expressed a sense of pride in being part of such efforts. A community leader stated:

> *"We understand that reducing carbon emissions is a way to help fight climate change. If our plantations can help in some way, that's something we can be proud of."*

This reflects a level of environmental awareness among certain participants, particularly those with greater exposure to program information.

However, for most participants, the perceived benefits were primarily linked to economic outcomes. Smallholder farmers and plantation workers emphasized the importance of direct impacts on their livelihoods, such as improved farming practices, increased productivity, or financial incentives. One farmer explained:

> *"If this program helps us to farm better or gives us incentives for reducing emissions, that would be a good thing for our families. We want to see direct benefits, not just talk about the environment."*

Similarly, expectations regarding job opportunities and improved working conditions were also highlighted. A plantation worker noted:

> *"If this program means more jobs or better work conditions, then it's something we would support. We need more jobs, especially for young people."*

Despite these expectations, several participants expressed concerns about the unequal distribution of benefits. Some believed that the economic advantages of the program were more likely to be captured by plantation companies and government institutions rather than local communities. As one participant stated:

> *"We hear about the benefits, but it seems like the companies and the government are the ones making money from this. We don't see much coming our way."*

In terms of environmental impact, participants showed varying levels of confidence. While some acknowledged positive changes such as improved plantation management and environmental protection, others were uncertain about how the program directly affected their local conditions. One participant remarked:

> *"I'm not sure how reducing carbon will change things for us here. We have other issues that seem more immediate."*

This work provides useful informations to the local appreciation of the carbon emission reduction program in oil palm plantations, thereby filling the existing research deficits. Unfortunately, the concentration on the technological and policy element has left the native communities out of the models of carbon emission reduction unrepresented (Weldegiorgis et al., 2021; Redvers et al., 2025). Specifically, by primarily considering a community's perceptions of such initiatives, this study contributes to the literature by providing insights into grassroots experiences with environmental programmes, thus addressing an existing research limitation.

Skepticism and Limited Community Participation

The findings reveal a notable degree of skepticism among community members regarding the carbon emission reduction program, particularly in relation to their level of involvement in its implementation. Many participants perceived that the program was primarily designed and controlled by external actors, with limited space for local input. This perception contributed to a sense of exclusion and reduced trust toward the program. As one farmer explained:

> *"It seems like this program is mostly from the government and the companies. We are usually only told about it after everything is decided. Sometimes we are invited to meetings, but we don't really have a chance to speak. In the end, we just follow what they say."*

This statement reflects a broader concern that community members are positioned more as passive recipients than active participants. Such conditions weaken the sense of ownership, which is essential for the sustainability of environmental initiatives.

Field observations also supported these findings, showing that community engagement in program-related activities was relatively limited and often dominated by external stakeholders. As a result, the program was frequently perceived as externally driven rather than locally grounded. As one plantation worker noted:

> *"They talk about carbon and emissions, but it is difficult for us to understand. We know it is important, but we don't clearly see how it affects us. What matters more to us is whether it can help our income. If we don't understand it, it is hard to support it fully."*

Field observations also supported these findings, showing that community engagement in program-related activities was relatively limited and often dominated by external stakeholders. As a result, the program was frequently perceived as externally driven rather than locally grounded.

The findings of this study highlight the central role of community perceptions in shaping the effectiveness of carbon emission reduction programs in oil palm plantation areas. The results demonstrate that awareness, perceived benefits, and participation are closely interconnected factors that influence how local communities respond to sustainability initiatives. These dimensions do not operate independently; rather, they interact in ways that determine whether such programs are accepted, resisted, or only partially implemented at the community level.

The variation in community awareness reflects broader challenges in environmental communication and knowledge dissemination. While some participants demonstrated a relatively strong understanding of the environmental objectives of the program, others showed limited comprehension, particularly regarding technical concepts such as carbon emissions and climate change mitigation. This finding is consistent with previous research suggesting that environmental awareness is shaped by access to information, education, and direct engagement with program implementers (Thompson et al., 2020). The persistence of misunderstanding among participants indicates that current communication strategies are not sufficiently adapted to local contexts. As noted by Rustam et al. (2020), the effectiveness of environmental communication depends on the ability to translate complex concepts into accessible and locally meaningful terms.

In this study, participants who had direct interaction with program implementers or had attended informational sessions tended to demonstrate a higher level of understanding. This supports the argument that awareness is not only influenced by information availability but also by the quality of interaction between stakeholders. Wamsler (2020) emphasizes that participatory learning and engagement processes are critical in fostering meaningful understanding of sustainability initiatives. Without such interaction, awareness remains superficial and may not translate into behavioral change or active participation. Therefore, improving communication strategies through the use of locally relevant language, participatory approaches, and continuous engagement is essential to enhance community understanding.

The findings also reveal that participants tend to interpret the program primarily through an economic lens. Although environmental benefits were acknowledged by some individuals, the majority evaluated the program based on its potential to improve livelihoods, such as increasing income, providing employment opportunities, or enhancing agricultural productivity. This aligns with previous studies indicating that rural communities often prioritize short-term economic benefits over long-term environmental outcomes (Golub et al., 2021). The dominance of economic considerations reflects the socio-economic realities of communities that depend heavily on oil palm plantations as their primary source of income.

This tendency highlights the importance of aligning environmental initiatives with local livelihood needs. As argued by Brown et al. (2021), environmental programs that fail to consider economic motivations may struggle to gain community support. In the context of this study, the perceived relevance of carbon emission reduction programs is closely linked to their ability to deliver tangible and immediate benefits. Participants expressed greater willingness to support the program when it was associated with practical advantages, suggesting that integrating economic incentives and livelihood improvements into environmental strategies is crucial.

At the same time, the findings indicate concerns about the equitable distribution of benefits. Several participants perceived that the economic advantages of the program were more likely to be captured by plantation companies and government institutions rather than local communities. This perception of inequality can undermine trust and reduce participation, as suggested by Blanchard et al. (2020), who argue that perceived unfairness in benefit-sharing mechanisms can weaken support for environmental policies. When communities feel excluded from the benefits of sustainability initiatives, their engagement becomes limited, regardless of the potential environmental gains.

In addition to economic considerations, the study reveals that skepticism toward the program is closely linked to issues of participation and governance. Many participants perceived the program as externally driven, with limited opportunities for local involvement in decision-making processes. This perception contributes to a sense of exclusion and reduces trust in the program. Such findings are consistent with prior research emphasizing that the lack of stakeholder involvement can lead to resistance and hinder the effectiveness of environmental initiatives (Roll et al., 2022). Participation is therefore not merely a procedural aspect but a fundamental component of program legitimacy.

The limited involvement of communities in planning and implementation processes weakens their sense of ownership, which is essential for long-term sustainability. As highlighted by Lee et al. (2021), meaningful stakeholder engagement fosters empowerment and strengthens collective responsibility. In the absence of such engagement, communities are more likely to perceive themselves as passive recipients rather than active contributors, reducing their motivation to support the program. This dynamic was evident in the findings, where participants expressed a lack of influence over decisions that directly affect their livelihoods.

Furthermore, skepticism is reinforced by concerns about transparency and the uncertainty of program outcomes. Participants questioned whether the promised benefits would materialize, particularly in terms of economic improvements. This reflects broader issues of trust in environmental governance, where communities may be hesitant to support initiatives that lack clear and visible results. Sovacool (2021) notes that perceptions of injustice and uncertainty can significantly affect public acceptance of low-carbon transitions, especially in contexts where economic stability is a primary concern.

The findings of this study also suggest that the visibility of program outcomes plays a crucial role in shaping community perceptions. Participants who observed tangible environmental improvements, such as better plantation management or conservation practices, were more likely to express positive attitudes toward the program. This indicates that making environmental benefits more observable at the local level can enhance community support. Conversely, when benefits are perceived as abstract or distant, they are less likely to influence community attitudes and behaviors.

CONCLUSION

This study demonstrates that the effectiveness of carbon emission reduction programs in oil palm plantation areas is strongly influenced by how they are perceived and experienced by local communities, particularly in terms of awareness, perceived benefits, and participation. While some participants showed an understanding of the program's environmental objectives, many exhibited limited comprehension, indicating that communication strategies remain insufficiently adapted to local contexts. At the same time, economic considerations were found to dominate community perceptions, with participants prioritizing tangible benefits such as income stability and employment over long-term environmental outcomes, while concerns about unequal benefit distribution further undermined trust. In addition, limited involvement in decision-making processes contributed to skepticism and reduced community ownership of the program. These findings suggest that carbon emission reduction initiatives cannot rely solely on technical and policy frameworks but must also address social dimensions by improving communication, ensuring fair benefit-sharing, and strengthening participatory governance. Integrating environmental goals with local socio-economic realities is therefore essential to enhance both the acceptance and sustainability of such programs.

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