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Asia Sustainability and ESG Summit

CHALLENGES, OPPORTUNITIES AND STRATEGIES TO REDUCE CARBON EMISSIONS: A CASE STUDY OF THE INDONESIA SOCIAL FORESTRY.

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Keywords:
Carbon reduction, Social forestry, Climate change, Carbon trading, Net zero emission, Indonesia

Abstract

This study examines the challenges, opportunities, and strategies for reducing carbon emissions through social forestry initiatives in Indonesia. As one of the world's largest tropical forest holders, Indonesia has committed to achieving net zero carbon emissions by 2060, supported by policies on renewable energy, carbon trading, and community-based forestry. Using an interpretive qualitative approach, this research applies a case study design with data collected from semi-structured interviews involving company practitioners, social forestry committee members, and academics. The findings highlight five key strategies: (1) the critical role of forests in biodiversity conservation and carbon sequestration; (2) the economic empowerment of communities through tree planting and cash crops; (3) the importance of leadership and governance in social forestry organizations; (4) meaningful corporate participation via partnerships, reforestation, and renewable energy investment; and (5) the necessity of clear regulatory frameworks and fair carbon pricing mechanisms. The study concludes that achieving Indonesia's net zero target requires strong collaboration among government, corporations, and communities, supported by effective governance systems and integration of cultural values in forest management..

INTRODUCTION

This study aims to investigate strategies for carbon reduction in the Indonesian social forestry context, a bold presidential program that grants society the right to utilize state forests. Forests play a significant role in reducing carbon emissions and mitigating climate change. Over the last decade, issues of carbon and climate change have been widely discussed by scholars (Busch et al., 2022; Li et al., 2021; Nunes et al., 2020; Pan et al., 2022; Shrestha et al., 2022; Wibowo & Diaz, 2024). Previous research has emphasized several important aspects, such as improved forest management for carbon reduction (Haya et al., 2023), barriers to carbon trading (Pan et al., 2022; Wibowo & Diaz, 2024), the role of forests in offsetting carbon (Shrestha et al., 2022) and in carbon storage (Nunes et al., 2020), as well as the impact of carbon reduction on company performance (Busch et al., 2022; Li et al., 2021).

Despite this growing body of literature, limited studies have examined the specific challenges and opportunities of carbon exchange schemes between companies and forests in developing countries, particularly within the framework of social forestry. Social forestry itself represents a bold government policy that provides formal utilization permits of state forests to local communities for more than 35 years. This program emerged as a response to widespread deforestation and forest conversion, which had severely damaged state forests. Within the program, forest farmers are responsible for planting, growing, and maintaining trees and crops, activities that not only improve the farmers' economic conditions but also contribute to biodiversity conservation, water preservation, and soil protection. Forests thus hold a crucial role in global climate action because of their capacity to store carbon (Nunes et al., 2020; Pan et al., 2022; Shrestha et al., 2022). Beyond carbon sequestration, forests also provide valuable natural resources and essential ecosystem services, including water regulation, soil fertility, and biodiversity conservation (Jenkins & Schaap, 2018). Indonesia, being one of the countries with abundant tropical forests, has a significant advantage in this regard. As the second-largest forested nation after Brazil, Indonesia holds vast potential to reduce carbon emissions through social forestry initiatives and carbon trading schemes, thereby positioning itself more strongly in the global carbon market.

LITERATURE

Leadership plays a crucial role in contributing to the governance of organizations, including society-based organizations. Social forestry represents one such organization, built upon collective action by forest farmers. The nature of leadership in social forestry is based on voluntary will, where leaders emerge without coercion or personal gain. Voluntary and unselfish leadership can foster group consensus, stimulate social movements, and strengthen self-governance within the organization (Andersson et al., 2020).

Carbon trading is another central mechanism in global climate action. Recognized under the Kyoto Protocol and the Paris Agreement, carbon trading provides countries with the ability to buy and sell carbon credits as a way to regulate emissions. In this system, carbon trading refers to the activities of purchasing and selling carbon credits, where buyers are typically entities that produce emissions beyond their permitted limits. There are two primary types of carbon markets: mandatory and voluntary. Mandatory markets are strictly regulated by governments at national, regional, or international levels, where companies are issued annual carbon credits they must fulfill, often under a cap-and-trade scheme. In contrast, voluntary carbon markets are more flexible, allowing companies or individuals to purchase or sell credits outside formal regulation. These markets provide opportunities for profit-making and can accelerate emission reduction, particularly through carbon offsets. Previous studies have examined the functions and challenges of voluntary markets (Bellassen & Leguet, 2007; Corbera

et al., 2009), their legitimacy (Blum & Lövbrand, 2019), and their potential to contribute meaningfully to global climate change mitigation (Streck, 2021).

A carbon credit represents the right of an entity to emit a specific amount of carbon during its industrial processes, and it can be commercialized. One unit of carbon credit is equivalent to the reduction of one metric ton of carbon dioxide, which can then be sold to companies whose emissions exceed regulated limits. The concept of Net Zero Emission, which has gained momentum since 2018, emphasizes balancing ongoing emissions with equivalent carbon absorption, so that total emissions equal zero (Fankhauser et al., 2022). Indonesia has adopted this framework and set a national target to achieve net zero emissions by 2060.

Achieving net zero requires a combination of rapid decarbonization, renewable energy adoption, and making industries less carbon-intensive, supported by aligned political, social, and technological efforts. Simultaneously, the global community must maximize carbon capture efforts through strategies such as forest planting and the application of carbon-capturing technologies. Within this context, social forestry and corporate actors play a vital role in reducing emissions through sustainable practices, reforestation initiatives, and the integration of carbon reduction into their long-term strategies.

METHOD

This study employs an interpretive qualitative approach and applies a case study of Indonesian Social Forestry to identify strategies for carbon reduction, with particular emphasis on the inclusion of forests in carbon reduction schemes. The primary method of data collection was semi-structured interviews, which were recorded and subsequently transcribed for analysis.

The interviews were conducted either in person or online, with each session lasting between 45 and 120 minutes. The questions posed were open-ended to allow participants to share rich, detailed perspectives. The research involved three key groups of participants. The first group consisted of company practitioners, including managers and staff, who explained their organizations' efforts in combating climate change. The second group was made up of social forestry committee members, who provided insights into the operational and business processes of social forestry. The third group comprised academics, who contributed critical perspectives on carbon reduction and carbon trading from a scholarly standpoint.

Table 1. List of Interviewee

Code	Roles
Interviewee 1	CEO of Indonesian company
Interviewee 2	Academic
Interviewee 3	Head of Carbon Reduction Implementation of Indonesian company
Interviewee 4	ESG Lecturer and Consultant
Interviewee 5	Advisor of GEMA Social Forestry Organization
Interviewee 6	Advisor of GEMA Social Forestry
Interviewee 7	Committee of GEMA Social Forestry
Interviewee 8	Academic
Interviewee 9	Academic
Interviewee 10	Head of RD of Indonesian company
Interviewee 11	RD team of Indonesian company
Interviewee 12	RD team of Indonesian company
Interviewee 13	RD team of Indonesian company
Interviewee 14	RD team of Indonesian company

Interviewee 15	RD team of Indonesian company
Interviewee 16	RD team of Indonesian company
Interviewee 17	Program Director of Indonesian Company Foundation Environmental Action
Interviewee 18	Head of Forest Agriculture Project Implementation of Indonesian company

Once collected, the interview data were transcribed into written form. These transcripts were then systematically coded to identify emerging patterns, which were subsequently grouped into thematic categories to generate meaningful findings. The interview process was guided by the study's objectives; however, flexibility was maintained to allow for adjustments during the interviews, ensuring that new and relevant information could be incorporated into the analysis.

The interview protocol included the following guiding questions: (1) How do you decrease carbon emissions? (2) What are the challenges and opportunities of carbon reduction? (3) How do you calculate the amount of carbon emission reduction within your organization? (4) What strategies are in place to sustain carbon emission reduction? and (5) How effective are these strategies in practice?

RESULT AND DISCUSSION

Indonesia has committed to achieving net zero carbon emissions by 2060. Since 2017, the government has introduced a series of regulations related to carbon reduction and trading mechanisms. One of the key initiatives is the development of renewable energy, with a target of 23% of the nation's energy coming from renewable sources by 2025. Additionally, tax incentives are being prepared to reward companies that successfully reduce their carbon emissions (Limanseto, 2022). These policies require collective support from regulators, corporations, and society at both national and global levels. In 2023, the Indonesian government further demonstrated its commitment by launching a carbon market within the Indonesia Stock Exchange. As one interviewee emphasized, "In order to adopt carbon trading, we already have a regulation. There is even a body that handles this funding, namely the National Climate Change Council. So, for what purpose is it arranged there? … what was mentioned earlier was issued, namely PP or Government Regulation 46 of 2017. And in the sub-chapter it regulates how it is related to the process of buying and selling carbon plus its derivatives, there is a Ministerial Regulation related to this matter. If I'm not mistaken there are two Ministerial Regulations, 2022 and the newest one is 2023" (Interviewee 8, Academic and Environmentalist).

Indonesia is also home to vast rainforests, covering approximately 125.8 million hectares of land and water (BPS, 2024), which positions the country as a key player in global climate change efforts. However, deforestation has caused significant ecological damage. Social forestry has emerged as a promising solution to these challenges by granting forest farmers the right to cultivate trees, fruit plants, and cash crops for up to 35 years, a right that can be inherited by their children. These communities can responsibly utilize forests for activities such as tree planting, agricultural tourism,

farming, and fisheries. In Java, for instance, millions of trees and cash crops have already been planted under social forestry programs, largely driven by the Gerakan Masyarakat Perhutanan Sosial (GEMA PS) [Social Forestry Society Movement], which has more than 200,000 members. As one CEO explained, "If you plant, your plants will be carbon sequestered. You may want to plant bananas or anything. The only problem is which plants have the highest carbon sequestration. Whatever is planted, it will absorb carbon for sure" (Interviewee 1, CEO of Indonesian Company).

Beyond direct ecological practices, many forest conservation and plantation issues can also be addressed through social, cultural, and even mythological approaches. Cultural beliefs, for instance, have proven influential in biodiversity preservation (Aerts et al., 2016; Huang et al., 2020). As one advisor highlighted, "We seem to have defined the forest problem wrongly. We only see it as ecological, but we don't see that the forest is a social and cultural problem. The approach should be social and cultural. People have permission to enter the forest at certain times, and at certain times they have to leave. That's cultural. In fact, it is actually community management in managing forest areas, but done culturally" (Interviewee 5, Advisor of GEMA Social Forestry).

Myths also play a role in motivating communities to protect forests. For instance, large old trees in Java have historically been revered as cultural symbols and objects of nature worship (Huang et al., 2020). This cultural dimension reflects deep-rooted historical dynamics, as forests in Java were heavily exploited under Dutch colonial rule (1814–1940), which prioritized commercial crops and excluded local communities. Social forestry, therefore, represents not only an ecological strategy but also a restoration of historical land rights and cultural identity. "Java people are guided by a myth that has been internalized for over a hundred years … because this land belonged to your ancestors, it has been returned by the state in the form of social forestry, and you have to maintain it," explained an anthropologist involved in the program (Interviewee 5).

Strong governance is equally essential in social forestry initiatives to ensure accountability and trust among communities. The rise of digital technologies offers new tools for improving forest governance. According to Gabrys (2020), the Internet of Things (IoT) can enhance transparency by tracking tree planting, harvest schedules, and carbon absorption. This view was echoed in the field: "With the help of digital systems, social forestry governance can improve. We can find out the type and number of plants, forest location, when to plant, when to harvest. This also allows us to know the potential for carbon that can be absorbed by the plants we plant" (Interviewee 5). Similarly, another corporate actor highlighted the importance of integrating carbon accounting into company systems: "… the superpower is the accountant who must understand how to calculate it (carbon footprint), and how this calculation can be consolidated into an integrated accounting system" (Interviewee 17, Program Director of Indonesian Company Foundation Environmental Action).

Companies also play a central role in carbon reduction. Unsustainable business

practices generate significant greenhouse gas emissions, but several companies have begun implementing strategies to mitigate their impact. These include calculating carbon footprints, shifting to renewable energy, reducing energy consumption, minimizing waste, and reforestation efforts. One example is the reforestation of degraded savanna areas with sengon trees, which are fast-growing and economically valuable due to high demand for their timber. As explained by a company leader, "Sengon is not only able to rehabilitate deforested land, but also has high economic value due to the high market demand" (Interviewee 3, Head of Carbon Reduction Implementation).

Other companies emphasize tree planting as a long-term environmental mission. One company started with small-scale planting in Kudus City, later expanding its program as it grew. "At first it was just a logical response: how do you make sure this house doesn't dry out? Plant trees … Starting from Kudus, we developed the planting program as the company grew" (Interviewee 17). This reflects a broader global trend, as companies increasingly calculate the carbon sequestered by their projects to align with sustainability standards.

At the same time, corporate collaborations with social forestry organizations provide mutual benefits. By offering capital assistance, partnerships, and acting as off-takers, companies ensure that farmers' planting aligns with ecological and economic goals. These collaborations also balance economic considerations, as companies must remain financially sustainable. "If it is not embedded like that, we ourselves as a company cannot carry out operations. Our costs are not covered. That's what we combine with the farmers' wishes" (Interviewee 18, Head of Forest Agriculture Project Implementation).

Despite these efforts, challenges remain in Indonesia's carbon market. While the government has introduced regulatory frameworks and launched the market in 2023, unattractive carbon prices (approximately USD 3 per credit) and regulatory uncertainty have hindered participation. As one CEO remarked, "People plant, their stomachs are full, and they are economically helped. So this carbon is a bonus" (Interviewee 1). Similarly, an ESG consultant noted that if carbon taxes are too cheap, companies will simply pay penalties instead of reducing emissions (Interviewee 4).

Nevertheless, there is optimism for the future. Companies are beginning to measure their carbon reductions and explore trading opportunities, while initiatives such as those in East Lampung, Central Kalimantan, and Tulungagung demonstrate the potential for large-scale sequestration (Interviewee 3). However, sustainability reports in Indonesia remain limited, often failing to capture real data on corporate emission reductions. As one academic noted, "Just look at the sustainability report, the title is good, the emissions section reveals the data, but the content is not there" (Interviewee 3).

To strengthen these initiatives, companies require greater incentives, clearer regulations, and higher carbon prices to make carbon markets economically viable. Until then, the success of Indonesia's carbon reduction goals will depend on the synergy between government policy, corporate action, and grassroots social forestry initiatives.

CONCLUSSION AND RECOMMENDATION

This study highlights several effective strategies for reducing carbon emissions in Indonesia. Forests, as vital sources of biodiversity, play a central role in this process. They act as powerful natural tools for climate change mitigation by storing carbon and supporting ecosystem resilience. Among the most notable approaches are social forestry initiatives, which are community-driven and grassroots in nature. These programs not only contribute to carbon reduction but also strengthen environmental sustainability through collective participation.

An important feature of social forestry is the planting of millions of trees, including cash crops, by local farmers. This activity enhances carbon capture while simultaneously improving the economic well-being of rural communities. Economic incentives serve as a critical driver for reforestation, as individuals are more likely to engage in conservation when they see tangible benefits to their livelihoods. This linkage between ecological sustainability and economic security motivates communities to protect and nurture forests, thereby strengthening long-term carbon sequestration.

Leadership and governance within social forestry organizations are equally significant. With membership exceeding 200,000 individuals, these organizations require effective structures to address climate challenges. The integration of technology into governance offers opportunities to calculate both economic and carbon reduction potentials, thus enhancing decision-making processes and optimizing strategies for climate action.

Beyond community-level initiatives, companies must also play a proactive role. It is no longer sufficient for corporations to provide rhetorical commitments to sustainability; they must take meaningful action to reduce emissions. This includes forging partnerships with social forestry programs, investing in environmental services, and transitioning toward renewable energy sources such as solar power.

Finally, regulatory clarity is essential for ensuring the success of carbon reduction strategies. The current carbon trading system in Indonesia remains unclear, particularly for companies wishing to collaborate with social forestry organizations. Moreover, the existing pricing mechanism—approximately USD 3 per metric ton of carbon—offers insufficient incentives for meaningful participation. Without stronger regulation and more equitable pricing, carbon markets will struggle to generate adequate benefits for either companies or local communities.

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