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Unlocking the Private Sector Role in Supporting the Sustainable Multipurpose Forest Management in Riau, Indonesia

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Abstract

This study aims to discover the private sector's perspective on the sustainable transition of degraded forestlands, including the transformation of oil palm plantations in forest areas into multipurpose forests, identify current barriers in adopting sustainable multipurpose forest management practices on financing and policy aspects, and explore how the private sector can step up its role in forestland restoration. This study was based on field observations, key informant interviews, focus group discussions (*FGDs*), *and literature reviews. This study aims to navigate a path for policy implementation toward decarbonization, as tenurial conflicts, particularly between oil palm plantations and forest areas, are critical for sustainable forest management in Riau. The private sector's interest in sustainable multipurpose forest management is higher when additional benefits from non-timber forest products* (*NTFPs) are high. This study also found that the private sector's desire to support sustainable multipurpose forest management stems from the potential benefits of carbon trading. Regarding the carbon market, most respondents are willing to join when carbon prices are USD4–6 ton^{-1} of CO_2e. It indicates that the private sector is willing to support the domestic carbon market as regulated under the Minister of Environment and Forestry Regulation 21/2022. While the private sector has complied with most transformative policies and mechanisms, respondents expect further incentives and support, particularly to resolve the forestland conflict.*

Keywords: *multipurpose forests, oil palm*, *Riau*, *sustainable forest management*, *tenurial conflict*

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Introduction

As an ecosystem, forestlands can provide more than just carbon-regulating services, including benefits for human welfare and water storage (Nurida & Wihardjaka, 2014; Osaki et al., 2016; Rahajoe et al., 2016). From this perspective, focusing merely on one type of ecosystem service could diminish the multifunctionality of the forest ecosystem (Cord et al., 2017). In a more comprehensive approach, it is equally essential to ensure the cohesion of multiple ecosystem services, rather than focusing on the trade-off condition. The decoupling of carbon emissions and natural resources benefits means a large-scale restoration and adoption of sustainable commodities (Rossita et al., 2021; Nurrochmat et al., 2022; 2023).

In 2021, Indonesia officially joined the other 30 leading countries, submitting its Long-Term Strategy and declaring to reach Net Zero Emission (NZE) in 2060 or sooner (Republic of Indonesia, 2021). Indonesia's NZE pathway assumes the Forestry and Land Use (FOLU) sector will act as a net sink by 2030, offsetting emissions from forests and other sectors (Nurrochmat et al., 2022; 2023). With an emphasis on suppressing emissions from peat fire and peat oxidation by restoring four million ha of peatland by 2050, the ambitious pledge was mainly intended to avoid locking in emissions from irreversible drying that turns peat soil into hydrophobic (Noor et al., 2014).

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Conversely, to date, forest restoration has been carried out on a small scale and in sporadic locations (Budiman et al., 2020; Puspitaloka et al., 2020), doubting the upscaling process to a large extent with varying ecosystem conditions. Apart from a technical challenge, financing and market support were also identified as the main barriers to the restoration upscaling (Giesen & Sari, 2018; Budiman et al., 2020). At the national level, the central government has announced an alarming budget gap from state funding for the implementation of unconditional climate commitment, which amounts to USD900 million annually (Ministry of Environment and Forestry, 2019; 2021). While this has signaled an urgent need for the private sector to step in through voluntary compliance, as of today, there is no accessible financing scheme that could offset the profit loss from discontinuing the business-as-usual practice. Despite significant progress in releasing Presidential Regulation 98/2021 on carbon economic value, several issues remain unresolved, including policies and technical aspects related to the utilization of carbon benefits for investment and the market development of forestry multi-business commodities.

While many studies have assessed the academic and government perspectives on forest restoration in Indonesia (Puspitaloka et al., 2020; Ward et al., 2020; Januar et al., 2021), the private sector's perspective remained absent. In this study, we aim to explore the private sector's perspective on sustainable forest management, identify current barriers to the sustainable transition of oil palm-based agroforestry practices in financing and policy, and investigate how to enhance its role in forest restoration. This study was based on reflection from the interview process, several focus group discussions (FGDs), and literature studies. This study aims to provide a navigation path for transitioning degraded forestlands into sustainable, multipurpose forest management and other land-use practices that promote decarbonization.

Methods

This study employed key informant interviews (KIIs). It means a specialized interview conducted with individuals or key informants recognized for their insider knowledge or unique perspectives on a specific topic. This method is distinct in its focus on depth rather than breadth, targeting information-rich sources (Kibuacha, 2024). We conducted key informant interviews with representatives of various forest concession types in Indonesia, including timber plantations, logging concessions, and ecosystem restoration projects (Table 1).

The interviews were conducted in accordance with the rules and took place from November 2021 to January 2022. In addition to the interviews, we conducted field observations and gathered secondary data from literature and online resources to enrich the analysis while ensuring compliance with current regulations. The selection process of the respondents with a range of levels of social conflict and the extent of the concession area was assisted by the Indonesian forest concession association (APHI).

Referring to Government Regulation 3/2008 on Forest Management and Utilization, there are three main types of concessions, i.e., timber plantations (hereinafter referred to as IUPHHK-HT), logging concessions in natural forests (IUPHHK-HA), and ecosystem restorations (IUPHHK-RE). However, this regulation was replaced by the Government Regulation 23/2021 on Forest Administration and then regulated further by the Ministry of Environment and Forestry (MoEF) Regulation 8/2021 on Forest Management and Utilization in Protected and Production Forests, the multipurpose forest management scheme offered concessions the flexibility to adjust the type of resource extraction and use based on landscape diversity and ecosystem function through a single business license named *Perizinan Berusaha Pemanfaatan Hutan* (PBPH) or Forest Business License.

The multipurpose forest management scheme is a transformative policy aimed at optimizing the sustainable use of the natural resources inside the concession area, emphasizing the profit beyond timber, for instance, the carbon benefit from restoring the degraded ecosystem and protecting the natural forest, or the economic benefit from non-timber forest products (Nurrochmat et al., 2021a). Considering this, the inclusion of all types of concessions became necessary. For the interview process, we selected

Table 1 List of respondents

Company	Concession type	Overlapped with the peatland area	Area (ha)
Company A	Logging concession	No	97,500
Company B	Logging concession	No	298,710
Company C	Logging concession	No	315,475
Company D	Logging concession	Yes	89,155
Company E	Logging concession	Yes	138,210
Company F	Plantation forest	No	185,840
Company G	Plantation forest	No	287,333
Company H	Plantation forest	No	60,433
Company I	Plantation forest	Yes	97,300
Company J	Plantation forest	Yes	287,166
Company K	Plantation forest	Yes	97,891
Company L	Plantation forest	Yes	40,750
Company M	Plantation forest	Yes	183,000
Company N	Plantation forest	Yes	296,373
Company O	Ecosystem restoration	No	20,265
Company P	Ecosystem restoration	Yes	157,845

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five representatives from logging concessions, nine from plantation forests, and two from ecosystem restorations. Based on the types of land, two of the five logging concessions, six of the nine plantation forests, and one of the two ecosystem restorations were claimed to overlap with the peatland area.

The questionnaire was developed with the APHI to ensure the consistency of the term used between academia and the private sector. We prepared a subset of questions for the interviews regarding the private sector's perspective on national climate commitment and their past involvement in mitigation activity. We also employed a more technical question regarding the enabling condition for peatland mitigation activities and the domestic carbon market as one of the solutions to economically feasible peatland decarbonization. For each subtopic, we design questions that progress from general to specific, using both closed-ended and open-ended formats. These aim to capture the informant's views on regulations and existing conditions related to technical matters, as well as their inputs on enhancing the private sector's engagement in mitigation activities.

To enable an in-depth analysis of the potential role of the private sector in land-based mitigation activity, we use the meeting notes from FGDs, available government reports, and recent literature depicting a similar study scope. Additionally, we refer to online resources for updated information on government political decisions and shifting interests during the development of the domestic carbon market.

All information collected from the interviews was compiled into a database to enable the assessment of the closed-ended questions. In contrast, notes from open-ended questions were gathered and used for further discussion. We synthesize and interpret the information using available literature and online resources. As one of the first studies to examine the private sector's perspective, we recognize that further assessment is crucial to gaining a deeper understanding of the private sector's engagement with climate and peatland issues. It has been proven by the willingness of the private sector to participate and engage voluntarily during the interview process.

Results

Private sector's perspective on sustainable peatland management While studies have been conducted to explore the state and non-state actors' outlook on mitigation intervention (Ward et al., 2020; Januar et al*.,* 2021), the private sector's view was still largely absent. Therefore, in the first part of the interview, we asked our respondents from the forest concession questions regarding their opinions on the national climate commitment. The results showed that 15 of the 16 respondents (94%) support the pledge made by the country. However, when asked about the rationality of the commitment, only 11 of the 16 respondents (69%) considered that the commitment was rational. While 2 of the 16 respondents (13%) chose the irrational, the remaining 3 of the 16 respondents (19%) chose not to answer. Despite the variety of answers, all respondents (100%) understood their vital role in helping the country achieve its climate commitments.

The respondents raised two main points when responding to their essential role in the country's vision of net-zero emissions. Firstly, most respondents used the words "executor", "control", and "main actor" to highlight their responsibility in managing the concession area at the site level and being the only sector that could sequester carbon in the terrestrial ecosystem. Secondly, the respondents mentioned having resources (e.g., capital, technology, openness to collaborating with multiple actors, and a social management program) to demonstrate their bargaining position for Indonesia's low-carbon development plan. One of the respondents also boldly states that the government cannot make the mitigation effort financially alone.

Historically, 14 of the 16 respondents (87%) claimed to have contributed to mitigation activity; however, only one-third of these contributions were directed to peatland. These activities were dominated by collaboration with the community and local NGOs and less on local government and cooperation between the private sectors. The findings confirmed studies that stated local communities are mainly perceived as the key actors in the success of peat restoration projects (Ward et al*.,* 2020) and emphasized livelihood revitalization for sustainable peatland use (Evers et al., 2017). Engaging the community is also perceived as a way to reduce the uncertainty of peatland restoration projects, highlighting the social dimension of ecosystem restoration (Puspitaloka et al., 2020).

The MoEF has authority over the forest concession area, which highly determines the direction of the private sector's interest in peatland (Astuti, 2020). A compatible vision of spatial planning among actors is essential to ensure the consistency of land use management with regional spatial planning (Nurrochmat et al*.,* 2020). Lack of collaboration potentially leads to a distinctive interpretation of ecosystem restoration among stakeholders (Rahmani et al*.,* 2022) that will affect the perception of the peat restoration responsibility and the burdened cost, which lately has been raised in many studies (Ward et al., 2020; Puspitaloka et al*.,* 2021).

This study aims to further explain the private sector's involvement in land-based mitigation. We found that 80% (11–12 of the 16 respondents) of the reasoning concerned aligning with the company's vision and complying with regulations and certification requirements. A lower percentage, 50–60% (of 7–9 of the 16 respondents), was found for the other motives on intangible benefits (e.g., corporate image) and part of the company's corporate social responsibility (CSR) (Figure 1).

Studies have also confirmed that stronger external motivation (e.g., policy, sanction) is more effective than internal motivation (e.g., value alignment) when conducting mitigation interventions on peatlands (Januar et al. 2021). While external motivation is effective for achieving short-term targets, we argue that it will be insufficient for the long-term sustainability of the restoration work. These external and internal motivations were related to policy implementations rather than valuing ecosystem services (Arias-Arévalo et al*.*, 2017; Himes & Muraca, 2018). However, we believe further studies assessing diverse environmental motivations among actors can complement our study.

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Existing and transformative policies associated with peatland Peatland management is regulated by the Ministry of Agriculture Regulation (MoA Reg.) 14/2009. Following the establishment of the Peat Restoration Agency (also known as the Peat and Mangrove Restoration Agency or BRGM), as stipulated in Presidential Regulation 1/2016, peatland policies have been progressively developed. Being mandated to restore 2 million ha of peatland in the country, BRGM, assisted by the MoEF, has formulated the Peat Ecosystem Protection and Management Plan (RPPEG), which includes a peatland management plan for several Peat Hydrological Areas or *Kawasan Hidrologis Gambut* (KHGs). MoEF, through the Directorate of Peat Damage Control, has the authority to control the peat and peat dome peak in the concession areas. Each forest company should revise its work plan and environmental permits based on the peat's ecological function and classification into peat dome peak areas to ensure the sustainability of peat forest management.

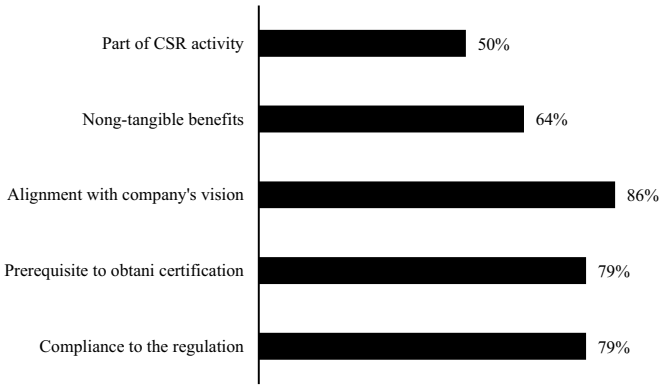

Figure 1 The rationale for the private sector's involvement in land-based mitigation.

We have constructed an illustration of the implementation of the MoEF Reg. 10/2019 based on spatial conditions (Figure 2). It shows that the rule for restoring peatland completely applies only to an area within the peat dome peak. Around 67% of the respondents confirmed the presence of peat dome peaks in their concession area and stated that a peatland restoration plan had been prepared in these areas. Business activity is allowed for an area outside the peat dome peak until the permit expires. In this case, plantation activity is permitted across all types of land cover, which may lead to

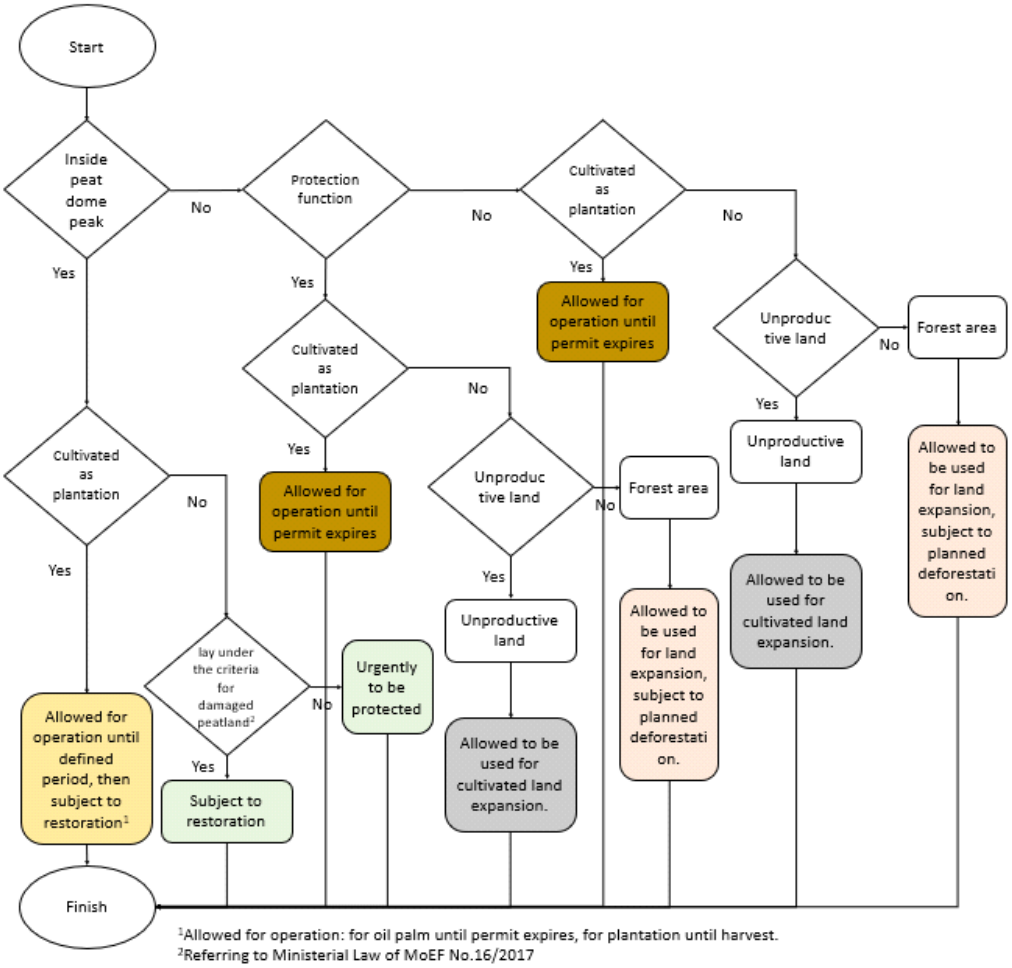

Figure 2 Illustration for the Ministerial Regulation of MoEF Number 10/2019 regarding peatland restoration.

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deforestation and peatland drainage to facilitate the expansion of commercial plantations (Figure 2).

While peatland protection has been promoted for areas under the peat dome peak, the law has not offered optional interventions that could provide a better solution for the coherence of ecosystem services (ES), particularly for areas prone to planned deforestation and further drainage. Accordingly, the Indonesian government has developed a social forestry scheme for the concession to partner with the community, as well as a multipurpose forest management scheme that allows multiple forestry businesses within a concession area (Nurrochmat et al., 2021a; Rahmani et al., 2022). These two regulations were perceived as part of transformative forestry regulation, which we argue can be applied to the peatland case.

MoEF Number 9/2021, on social forestry, recommends adopting agroforestry techniques to meet the requirements for cultivating forest areas. The social forestry scheme includes forest communities for conserving forest areas, or joint forest management (Sahide et al., 2020; Hasannudin et al., 2022). Under the social forestry scheme, the private sector is encouraged to partner with the community near the concession, particularly in an area with high conflict potential, as part of the conflict resolution policy. Of the 16 respondents, one respondent has a favorable relationship with the community, and 13 preferred not to answer. The remaining two respondents confirmed that the land conflict issue has become a bottleneck for community collaboration. One respondent provided a rough estimation of IDR33.5 million or USD2,200 ha^{-1},[1] spent on addressing the tenure issue.

Indonesia's government has set a social forestry target of 12.7 million ha (in peat and mineral lands), and, as of March 2025, has released 8.3 million ha of social forestry permits.[2] Boosting the implementation rate of social forestry is necessary to transform the FOLU sector's emission trajectory. The Indonesian government has included social forestry in the national economic recovery program. In this case, the social forestry program will receive funding from the state budget for the access-granting process and business improvement facility. Increased community welfare is expected to indirectly benefit the national effort to reduce illegal deforestation.

The social forestry law mentions optional profit-sharing mechanisms (e.g., a profit-sharing percentage based on investment expenditure) to resolve conflicts in the community's concession area. However, the conflict resolution process can also be based on the agreement of rights and obligations (e.g., mandatory selling of products to the company). In this case, the private sector could explore its role in the market and the development of multipurpose forestry, focusing on community forests, rather than operating in labor-intensive and high-input agriculture.

Social forestry is essential to support the implementation of sustainable multipurpose forest management. However, when we asked the 16 respondents about the possibility of creating social forestry, which is a prerequisite for sustainable forest management certification, only two agreed, one chose not to answer, four disagreed, and the remaining nine expressed conditional agreement. More than 50% of the nine respondents said they need support from the Ministry of Forestry for law enforcement and engagement from the regional government to enable fair mediation with the community, collaboration with the forest management unit (FMU), and government incentives. Capacity building is another support required in assessing the oil palm age (as part of the *Strategi Jangka Benah* program) and loosening the administrative process to obtain forest certification (Figure 3).

Beyond the financing issue, merging forest restoration with multiple actors requires a unified paradigm for sustainable forest management, particularly for peatlands,

Figure 3 Willingness of support provided by the private sector to the peatland community.

[1]USD1 = IDR14,853 average exchange rate in 2022 https://www.exchange-rates.org/id/riwayat-nilai-tukar/usd-idr-2022
[2]Siaran Pers Kementerian Kehutanan. Menhut tinjau pengelolaan perhutanan sosial di Majalengka (March 12, 2025). https://www.kehutanan.go.id/pers/article-7

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since many parts of the forests in Riau lie on peatlands. Of the nine respondents who confirmed the existence of peatlands in their concession area, only 78% (seven respondents) claimed sufficient knowledge of managing peatlands. When asked about indicators of the success rate of peatland restoration, respondents rated increased vegetation cover and decreased peat fire events (67%) higher than increased water levels (56%). Our result contradicts a study conducted by Ward et al. (2020). The non-private sector found that increased water levels were the main consensus, indicating a successful restoration intervention. We found that all respondents expressed uncertainty regarding the receipt of carbon economic benefits, low carbon prices, complex administrative processes, and the avoidance of fire-risk activities. However, when we mentioned the additional benefits the private sector could obtain from non-timber forest products of the agroforestry system, only four of the five respondents (plantation forest holders), or 80%, were interested in joining the carbon market mechanism while adopting the agroforestry system.

We aim to broaden the question to include all concession types (plantation forests, logging concessions, and restoration ecosystem license holders) regarding their willingness to implement sustainable agroforestry and to act as off-takers for non-timber forest products. As many as eight of the nine respondents (89%) indicated their willingness, with two respondents (22%) requesting conditional terms, including government incentives and training to develop a product of export quality. These findings first confirmed the private sector's willingness to participate in the development of markets for agroforestry commodities.

Large areas of forest in Riau are laid on peatlands. Under Government Regulation 57/2016, peatlands must be managed within their ecosystem boundary or peat hydrological unit (KHG), which includes water-sharing management and peat fire protection. When asked about their willingness to participate, only seven of the nine respondents (78%) expressed interest in collaborating with multiple actors on water-sharing mechanisms and fire protection (Figure 4). The remaining respondents stated that it is not mandatory because no incentive is provided to the company.

Interviews with the private sector capture their perspectives and visions for the domestic carbon market. When asked about their interest in joining as the implementer for the carbon tax scheme, 14 of the 16 respondents (88%) expressed interest, 1 respondent (6%) was not interested, and the remaining 1 respondent (6%) chose not to answer. The 14 interested respondents expressed the expectation that the carbon tax would serve as a starting point for developing the currently absent domestic carbon market and provide an additional incentive for the private sector. When asked about the requirements needed to enable the private sector's involvement in the carbon market, 14 interested respondents (88%) requested information or an explanation from the central government, and increased capacity to use the National Registry System (NRS) is necessary (Figure 5). The information includes clarifying the regulations, carbon accounting, and administrative procedures. In the future, technical guidance will be required to access and manage the company account in the NRS, as the system will be used for administrative processes and the issuance of certified emission reductions.

One of the respondents asked the government to support the private sectors that want to be involved in the voluntary carbon market. In this case, increased private sector capacity to understand and fulfill the international certification is necessary (chosen by 11 of the 14 respondents), including improving the methodology used for carbon accounting. Interviews on enabler identification also revealed that approximately 6 of the 14 interested respondents (43%) require incentives for legal and business certainty, loosening permit and administrative processes, fair carbon value, and tax reduction. Additionally, several respondents emphasized the need for regulatory certainty to ensure stable business activity and carbon pricing.

We explored the private sector's interest in the carbon price range, finding that 10 of the 16 respondents (63%) prefer a carbon price of USD4–6 ton^{-1} CO_2e, while 4 of the 16 respondents (25%) demand a higher price of USD10–25 ton^{-1} CO_2e. The international carbon market on the IDX turned out to be less than expected. Shortly after its launch on the exchange in early 2025, the carbon price dropped to IDR55,000 or about USD3–4 ton^{-1} of CO_2e.[3] It has been confirmed that the proposed USD2 ton^{-1} CO_2e carbon tax needs to be increased and made viable for land-based mitigation activities, including peatland, which will require

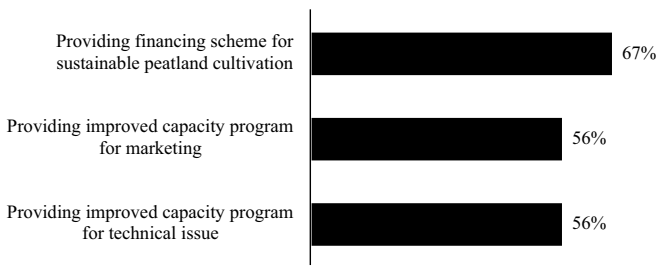

Figure 4 Willingness of support provided by the private sector to the peatland community.

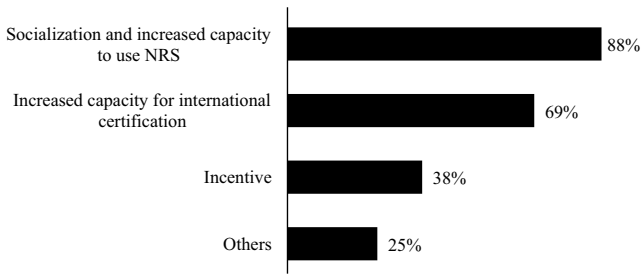

Figure 5 Enablers needs for private sectors to develop the domestic carbon market; others include assured supply and demand, price stability, regulation certainty.

[3]ESG Sustainability Forum 2025. Pasar karbon RI ternyata sepi peminat, cuma laku segini. https://www.cnbcindonesia.com/market/20250131151310-17-607030/pasar-karbon-ri-ternyata-sepi-peminat-cuma-laku-segini

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higher mitigation costs. Land-based mitigation activities required costs ranging from USD18–37 ton^{-1} CO_2e (Fuss et al., 2018; Tan et al., 2022).

When asked whether the respondents agree to contribute to the carbon market if the transaction is prioritized for the domestic market, 4 of the 16 respondents (25%) agreed, 10 of the 16 respondents (63%) conditionally agreed, and 2 of the 16 respondents (13%) did not agree (Figure 6). Respondents who conditionally agreed stated that the government needs to ensure the stability of the domestic carbon supply and demand before making it mandatory. One of the respondents proposed that the government estimate the percentage of the national emission reduction that needs to be covered by the domestic carbon market.

For the market options, we explore the private sector's options for REDD+, the domestic and international carbon markets, and other markets that deliver the highest carbon benefits. Our interview results revealed that 8 of the 16 respondents (50%) prefer the international carbon market, while the other 8 (50%) prefer the market offering the highest carbon price. None of the respondents expressed interest in REDD+ or the domestic carbon market. Respondents who chose the international carbon market said it is more price-competitive because it reaches a broader pool of potential buyers than the domestic market.

Discussion

Forest license holders could explore potential commodities and establish a multi-business forestry operation. As market availability has become the main obstacle for upscaling forest restoration, the funding support for business improvement under the social forestry scheme (Rahmani et al., 2021; Hasannudin et al., 2022) can support the initial phase of market creation for multiple commodities. Furthermore, social forestry should also facilitate the development of local commodities, thereby fostering a distinct local product identity.

Currently, the official government loan scheme, administered by the Ministry of Agriculture (MoA), applies only to a specific agricultural cluster (e.g., paddy, corn, oil palm).[4] Hence, this limits the opportunity for smallholders to adopt the forestry multi-business or agroforestry scheme. In this situation, we are developing a new classification of potential agroforestry commodities within the official loan scheme.

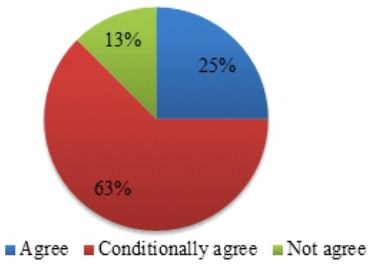

Figure 6 The willingness of the private sector to participate in carbon transactions is prioritized for the domestic carbon market.

From a food security perspective, facilitating the loan scheme for growing various food commodities will assist the national vision toward food diversification. Additionally, numerous other potential financing sources exist to support investments in land-based mitigation activi-ties involving smallholders, including banks, crowdfunding, peer-to-peer lending, and intermediaries (Republic of Indonesia, 2021; Sheriffdeen et al., 2020; 2023).

The Government of Indonesia has developed a multi-purpose forest management scheme for forest concessions, emphasizing a landscape-based approach, as outlined in Government Regulation 23/2021 regarding Forest Governance. A multipurpose forest management scheme is an incentive mechanism that offers leniency to the private sector, allowing multiple forestry businesses to operate within a single concession area, based on the landscape conditions (Silalahi et al., 2025). In this regard, the land can be used to its full potential to reduce emissions and increase the carbon sink. The private sector, willing to implement multipurpose forest management schemes, must revise its business work plan without submitting a new permit. However, coordination among ministries remains challenging. Since the Ministry of Forestry and the Ministry of Environment were separated, the Environmental Impact Analysis (AMDAL) for the forestry multi-business was a concern.

Under the multipurpose forest management scheme, forest plantation holders can protect the remaining natural forest in the concession area, particularly areas prone to deforestation (Figure 2). To protect and restore an essential ecosystem with high carbon stock, the private sector can sell the environmental services benefits under a payment for ecosystem services (PES) scheme or other mechanisms. In this regard, the private sector should gradually improve its monitoring system to support the transition to carbon trading. In addition, due to the difficulties of commuting and doing technical work, the cost of transport and goods distribution is high, making the mitigation activities in peatland pricer than those in mineral lands (Ministry of Environment and Forestry, 2019). However, if spending is converted into tons of C units, peatland mitigation activity is one of the most cost-effective mitigation options (Hasegawa et al., 2016; Tan et al., 2022).

Enablers for the increasing private sector's contributions to sustainable multipurpose forest management Two critical enabling factors can increase the private sector's contribution to sustainable multipurpose forest management. First, the legal status of the lands must be ensured, not only for social forestry permits but also for oil palm plantations. In Riau Province, forest areas were overlapping with oil palm plantations in many places. The overlap of forest areas and oil palm plantations, particularly smallholders', has arisen since the government launched the smallholder oil palm core plantation (PIR) program in Riau Province more than three decades ago, which involved transmigrants from Java and local farmers. Numerous smallholder oil palm plantations are over 30 years old and need replanting. Replanting was not

[4]IDX Channel, "KUR BNI untuk petani porang, gabung di ekosistem & kredit pun langsung cair", https://www.idxchannel.com/economics/kur-bni-untuk-petani-porang-gabung-di-ekosistem-kredit-pun-langsung-cair, (accessed December 16, 2021).

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carried out due to a lack of funds; instead, it was because these plantations generally collaborate with large oil palm companies, and their land status overlaps with forest areas (Ekayani et al., 2025).

The conflicting areas of forests and oil palm plantations can be divided into two types. First, those plantations already existed through the transmigration program. The community had a certificate of ownership of their oil palm plantation lands. However, a forest area was then determined, including their oil palm plantations within it. This first type of oil palm plantation is easily recognized in drone photos, characterized by neat, orderly plantation boundaries and an age of more than 18 or even, in some other places, 30 years (Figure 7). Second, the plantations were established after the forest area was determined. Some of these plantations are illegal, having been established through encroachment on forest areas. Others do not align with the central government's forest area map, even though they are legally recognized at the local

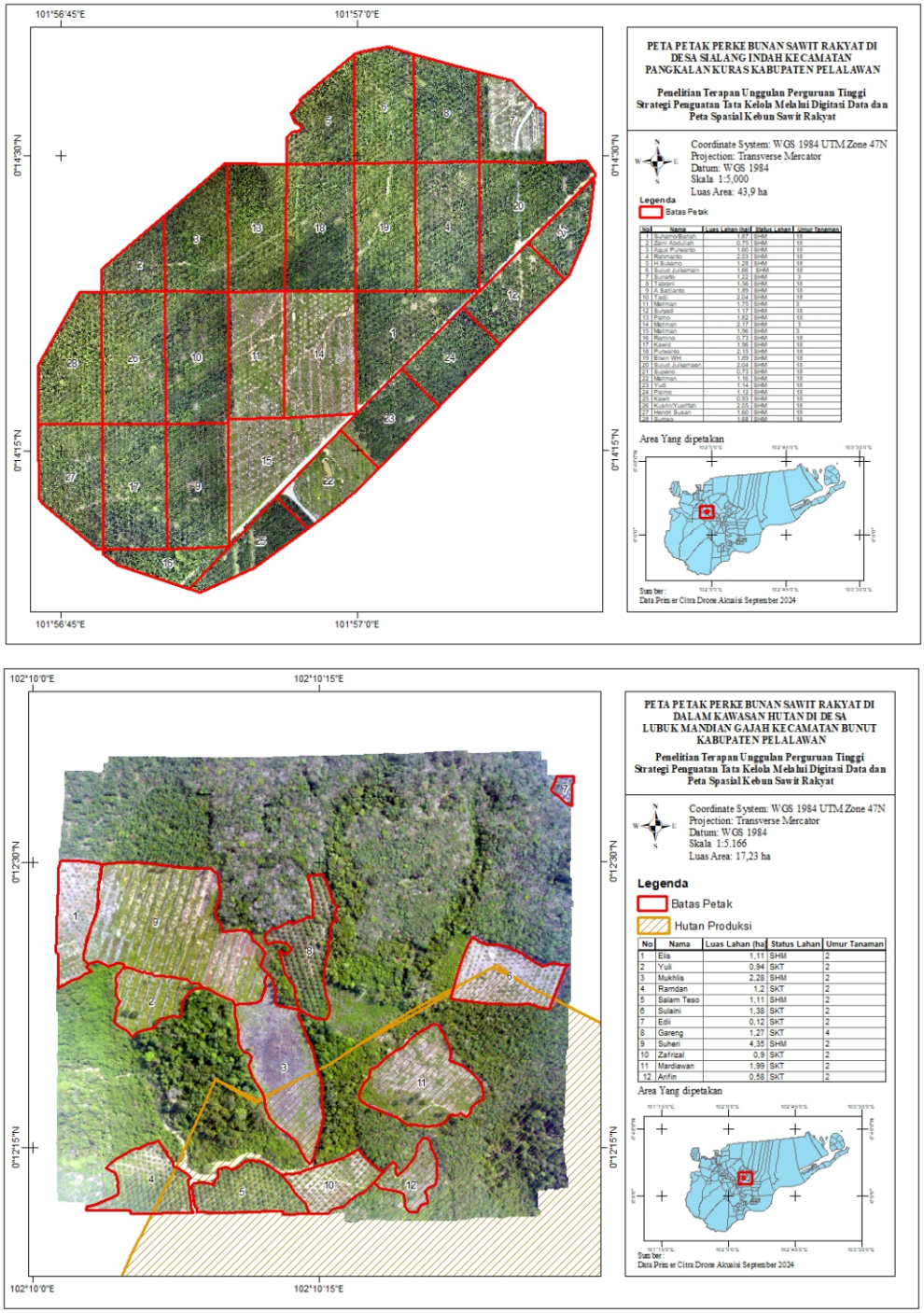

Figure 7 Drone photo view of two types of smallholder oil palm plantations overlapping with forest areas. Source: Nurrochmat et al. (2024).

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level through land certificates issued by the village head or regional authorities. In the second type of oil palm plantation, drone photos reveal that the boundaries are often irregular and the ages of the plantations vary. Figure 4 illustrates the different patterns of the tenurial conflicts between oil palm and forests in Pelalawan Regency (Nurrochmat et al., 2024).

The legal aspects of smallholder oil palm plantation land must be addressed before implementing the policy to rejuvenate smallholder oil palm and promote beneficial agricultural practices. Spatial mapping of smallholder oil palm plantations (geo-location) must be carried out and supported by the private sector, as it is a prerequisite for trade to the European Union under EUDR provisions. The country's pledge to climate commitment, particularly after the ratification of the Paris Agreement, has altered the forestry business environment. Around 88% of respondents reported that the climate commitment affected their business activity, including market demand for product certification, additional administrative processes to revise the company work plan, additional expenditure for operational activities, and greater attention from the NGO. Unexpectedly, these respondents agree that a positive aspect of the climate commitment is that it changes the private sector's perception of a land-based business. It includes a new opportunity for environmental services-based businesses, potential business for non-timber forest products (NTFPs) and sustainable agriculture, and a certification mechanism to expand markets and increase product acceptance internationally.

We created a scenario to explore plantation forest holders' willingness to terminate plantation activities for commercial commodities, despite the MoEF Reg 10/2019 allowing them to continue their business activities, provided the carbon economic value is fully implemented. In collaboration with the peatland community, all respondents from all concession types expressed interest in participating, although one respondent noted concerns about land tenure in their concession area. We asked about the company's support for the community. It indicates that, compared with training and capacity-building programs, the private sector was more interested in providing financing schemes for community-led sustainable agroforestry. These findings again confirmed the private sector's potential role in the market development of multiple forest commodities.

Multipurpose forests: Valuing ecosystem services Article 6 of the Paris Agreement states that pursuing more ambitious climate commitments requires international funding and cooperation through carbon markets. Emission trading is a key factor in increasing private sector investment in land-based mitigation activities; therefore, it is one of the prioritized issues to be agreed upon at COP 26 in Glasgow in 2021. Companies, including tech companies, carmakers, oil and gas companies, and cement producers, use carbon offsets to meet their sustainable goals.[5] After Glasgow, many businesses started reassessing their carbon footprints, which is predicted to affect the widespread demand for carbon offsets. In addition, the Taskforce on Scaling Voluntary Carbon Markets stated that voluntary carbon markets are expected to expand 15 to 100 times by 2030 and 2050, respectively, to enable the achievement of the Paris Agreement's target.[6]

At the national level, the Government of Indonesia has

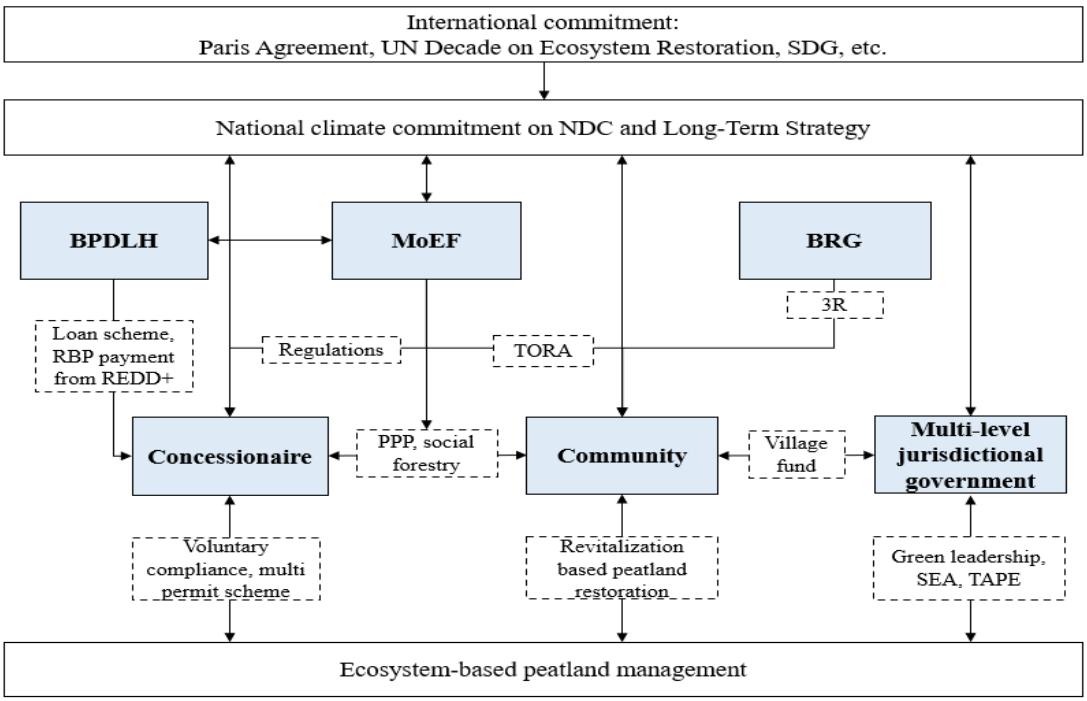

Figure 8 Multi-actors and potential scheme to enable the bottom-up process and national upscale for sustainable peatland restoration.

[5]http://www.perillon.com/blog/12-companies-that-are-buying-carbon-offsets
[6]https://carboncredits.com/how-to-invest-in-carbon-credits-carbon-etfs-and-carbon-stocks/

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endorsed Presidential Regulation 98/2021 on carbon economic value. One of the mechanisms to implement the regulation is developing an 'emission cap and tax' mechanism for coal power plants, with a proposed carbon tax of USD 2 per ton of Co_2e.[7] This carbon tax scheme is expected to be fully implemented in 2025 and may serve as a new financing source for land-based mitigation activities. As Indonesia submits its Long-Term Strategy (LTS) to the UNFCCC, the carbon tax mechanism could help its vision toward the NZE target. Denoting a statement from the LTS document, FOLU is the key to the NZE ambition, the only sector that results in harmful emissions (carbon sequestration). In this case, the land-based business is expected to be the leading player in the domestic carbon market.

Peatlands are among the most valuable ecosystems, with carbon regulation being the primary function they generate (Kimmel & Mander, 2010; Page et al., 2011), among other services (e.g., provisioning services for natural resources and habitat maintenance for biodiversity). The necessity to include multiple ecosystem services beyond carbon, equivalent to the carbon-regulating services, not only has the potential to boost the carbon price but also to help understand how one ecosystem generates a basket of ecosystem services. The funding sources needed to increase ambition toward the Paris Agreement's target will highly rely on generating the value of environmental services, especially in light of the stagnant discussion on global climate financing (Pauw et al., 2022). Attaching a market value to ecosystem services is vital for transitioning to a sustainable phase.

We attempt to raise the issue of distributing carbon transactions in both domestic and international markets with our respondents. Following the release of Presidential Regulation Number 98/2021 on carbon economic value, MoEF Regulation Number 21/2022 has been published, which sets out the implementation procedure for carbon economic value. The regulation stated a buffer mechanism that sets sectoral and sub-sectoral emissions benchmarks to achieve the national NDC. This buffering mechanism will determine eligibility for a sector/sub-sector transaction in the international carbon market when the NDC target for that sector/sub-sector is achieved.

Making the private sector's contributions visible Actors involved in peatland restoration include policy implementers, such as related ministries, government agencies, and jurisdictional government, as well as target groups that comply with policy implementation, mainly companies and communities (Januar et al., 2021). From the perspective of ecosystem services, peatland restoration actors are categorized into two groups: stakeholders, who influence the dynamics of ecosystem services and are affected by them, and ecosystem beneficiaries, who receive the benefits of these services (Suwarno et al., 2016). By collecting available literature and official government documents, we have identified highly influential actors in peatland restoration and implementation schemes and connected them (Figure 8). The involvement of multiple actors indicates the complexity of performing integrated peatland management.

Figure 8 illustrates that the blue box represents the actor, the dashed box indicates a potential scheme for implementing peatland restorations, and the solid box without color indicates the relevance of the peatland issue to national and global environmental agendas.

Since the release of Presidential Regulation 1/2016, which mandates the restoration of two million hectares of peatland in the country, the peat and mangrove restoration agency (BRGM), assisted by the MoEF, has formulated a peat ecosystem protection and management plan (RPPEG), including a peatland management plan for several peat hydrological units (KHGs). As developed by the multi-level, jurisdictional government, a regional spatial plan should serve as the entry point for implementing a KHG-based management plan. Through mandatory SEA, peatland ecosystem services should be included as the foundation for spatial planning. Other schemes, such as green leadership and ecological fiscal transfer (EFT) financing, can also be used to initiate discussions and enhance leaders' support for peatland restoration.

In the non-concession area, funding support is crucial for increasing community participation in peatland restoration. In 2014, significant progress was made in Indonesia's decentralization process (Pribadi et al., 2020; Nurrochmat et al., 2021b). Under Law 6/2014 on the village and Law 23/2014 on Regional Governance, the town receives “village funds” after submitting the village development plan (Naylor et al., 2019). However, these unconditional block grants could risk the village's essential ecosystem without prior environmental assessment. The potential to utilize these funds for peatland restoration needs further exploration.

In the concession area, BRG has no authority to regulate peatland restoration. As regulated by the MoEF Regulation 10/2019, mandatory restoration for concessions applies only to the area within the peat dome peak, while the area outside the peat dome peak is permitted for operation until the permit expires. However, under the transformative policies of social forestry and multipurpose forest management schemes, along with the valuation of ecosystem services, private sector contributions can be pushed further and become the most significant actors. In addition, 17,292 canal-blocking units have been installed, and 4,438 degraded peatlands have been rehabilitated in 194 concession areas (Ministry of Environment and Forestry, 2018). With these enormous contributions, diminishing the private sector's perspective on peatland socioeconomic studies will miss the whole picture of peatland restoration progress. However, the current condition shows that, although regulations were prepared and aligned with the country's NZE vision, the laws still lack enabling mechanisms. While transition requires time, delaying the implementation of transformative policies will cause the country economic loss due to the future loss of carbon benefits. To enhance private-sector participation, the government must create a more favorable environment for businesses that offer environmental services. Other ecosystem services from a carbon-rich ecosystem should be considered, in line with the findings on the preferred range of carbon prices.

Boosting collaboration between the private sector and

[7] https://gatrik.esdm.go.id/assets/uploads/download_index/files/2bb41-bahan-bkf-kemenkeu.pdf

community positively impacts poverty reduction and initiates the private sector's role as an off-taker for agroforestry commodities. In addition, there should be sufficient recognition of the private sector regarding incentives (e.g., tax reduction, simplified administrative procedures) and support from the MoEF law enforcement (*Gakum* KLHK) for the highly conflicted area. The government can also provide carbon benefits based on the level of land conflict. The higher the land conflict risk, the higher the carbon benefit from land-based mitigation activities.

Conclusion

This study indicates that the private sector in Riau was aware of its vital role in financing the net-zero emission target. While almost all respondents supported the country's climate target, we found that the private sector's motivations remained primarily external, which we argue was insufficient to sustain a long cycle of land-based mitigation activity. Despite the private sector's willingness to collaborate with communities, it has stated that it faces tenurial conflicts. In Riau, we found overlaps between oil palm plantations and forest areas, which is a significant issue for the actual implementation of multipurpose forest management. It is essential to acknowledge that encouraging the private sector to undertake more than the mandatory work necessitates a greater return from the government, as the private sector has highlighted the uncertainty of investing in forest restoration, both in terms of technical and financial aspects. However, interest in sustainable multipurpose forest management increased when additional benefits from NTFPs and their potential role as market off-takers were highlighted. It has confirmed the private sector's willingness to take a role in developing markets for multipurpose forest commodities. Regarding the carbon market mechanism, most respondents are willing to join; however, more than half expect the carbon price to be USD4–6 ton^{-1} of CO_2e, which is higher than the average carbon price at IDX. Additionally, this study suggests that the private sector is willing to support the domestic carbon market as regulated under the MoEF Regulation 21/2022. While the private sector generally complied with most transformative policies and mechanisms, this study shows a lack of incentives and support, particularly in resolving the land conflict issue. To enhance participation from the private sector, the government needs to increase the offerings to make environmental services-based businesses, such as those focused on environmental, social, and governance (ESG) schemes, more viable and accessible.

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