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Integrating Waqf-Based Forests and Carbon Trading: Opportunities, Challenges, and Strategies in Indonesia

Khalifah Muhamad Ali[1,*], Hendri Tanjung[2], Raditya Sukmana[3], Miftahul Jannah[4,5], Mu'minah Mustaqimah[5]

[1] Department of Islamic Economics, Faculty of Economics and Management, IPB University, Bogor, Indonesia
[2] Department of Islamic Economics, Faculty of Islamic Studies, Ibnu Khaldun University, Bogor, Indonesia
[3] Department of Islamic Economics, Faculty of Economics and Business, Airlangga University, Surabaya, Indonesia
[4] Kuliyyah of Architecture and Environmental Design, Inetrnational Islamic University of Malaysia, Gombak, Malaysia
[5] Bogor Waqf Forest Foundation, Bogor, Indonesia
[*] Corresponding Author. E-mail address: khalifahma@apps.ipb.ac.id

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ABSTRACT

Carbon trading is pivotal in mitigating greenhouse gas emissions. However, the contribution of waqf-based forests—forests established on endowed land—remains underexplored. This research addresses this gap by investigating the potential, schemes, stakeholders, opportunities, challenges, and strategies for waqf-based forests in carbon trading. Through a literature review, in-depth interviews, and field observations, the study found that waqf-based forests can contribute to carbon trading and raise Islamic awareness. The findings identify two potential schemes for selling carbon credits from waqf-based forests: the Ministry of Environment and Forestry's carbon exchange and direct business-to-business (B2B) transactions. Due to the sustainability of waqf land and its added ecological, economic, social, and Islamic values, waqf-based forests can produce high-quality carbon credits and provide an inclusive and sustainable green economy. However, challenges such as suboptimal land area, lack of technical knowledge, and the absence of a carbon trading fatwa need to be addressed. Proposed strategies to overcome these challenges include document bundling, collaborations with Corporate Social Responsibility (CSR) programs, direct B2B sales, and selecting plants that enhance carbon economic value. This research offers in-depth insights into the potential of waqf-based forests as significant players in carbon trading, emphasizing their inherent sustainability values.

1. Introduction

Environmental issues are one of the top problems faced by humanity today, with global warming being the leading cause of world climate change. Climate change is caused by the accumulation of greenhouse gases (GHG) in the earth's atmosphere, leading to global warming and shifts in climate patterns like temperature and rainfall (Lipczynska-Kochany 2018). Historically, natural climate change occurred due to natural events such as forest fires, earthquakes, and volcanic eruptions, but nowadays, human activities such as energy production, industrial operations, and land clearing are significant contributors to climate change (Edenhofer

2015; Hussain et al. 2020). Deforestation also contributes to global greenhouse gas emissions, and Indonesia has a high rate of forest loss (Santika et al. 2017).

To overcome this climate change, the Paris Agreement 2015 was signed by 195 countries worldwide. According to the United States Environmental Protection Agency (EPA), 81% of GHG emissions are carbon dioxide (CO_2) (Sharif et al. 2020; UNFCC 2015). The World Bank suggests several incentives to reduce carbon emissions, such as eliminating fossil fuel subsidies, enhancing energy efficiency standards, conducting auctions for renewable energy at the lowest cost, and introducing carbon trading (Tsai 2020). Carbon trading is a promising solution to address climate change. The units traded in carbon markets are called carbon credits, each representing a reduction of 1 ton of carbon dioxide (CO_2) emissions. The three primary methods under this mechanism are emissions trading, joint implementation, and the clean development mechanism, collectively resulting in a carbon market (MJ et al. 2023)

The carbon market is divided into two types: regulatory and voluntary. The regulatory carbon market involves the state government, where emission limits are established, and entities must buy or sell carbon credits to comply with these limits (Bayer and Aklin 2020). In contrast, the voluntary carbon market operates without government mandates, allowing organizations and individuals to buy or sell carbon credits voluntarily. This market fosters innovation and flexibility, serving as an essential platform for contributions and education on carbon offsetting (Bayon et al. 2007; Kreibich and Hermwille 2021).

Green projects, such as reforestation and sustainable forest management, can voluntarily reduce emissions through the carbon market (Djaenudin et al. 2016). Waqf-based forests are one example of green projects. It is established on waqf land, which is eternal, irrevocable, and cannot be transferred, sold, given, or inherited due to its protection by Islamic and state law (Ali and Kassim 2020, 2021). The concept of waqf-based forests ensures the preservation and sustainability of forests (Restiyani and Hasanah 2023). Ecologically, waqf-based forests maintain biodiversity and water cycles, reduce soil erosion, and prevent natural disasters. Waqf-based forests, managed by a nazhir (waqf manager), also provide income, educational, and development benefits to surrounding communities (Jannah et al. 2024b).

Waqf-based forests are a solution to achieve inclusive and sustainable growth because they provide access to finance for local communities and Micro, Small, and Medium Enterprises (MSMEs) by promoting a green economy and sustainability. Under current regulations in Indonesia, waqf-based forests are included as community forests, where their management is fully returned to the surrounding community (Ali and Kassim 2020; Ardiansyah 2017; Rochmah et al. 2020). Following the principles of waqf, most of the income from a waqf will be distributed to *mauquf 'alaih* or people in need, which aligns with Islamic principles to reduce poverty (Razak 2020). By being owned and managed in its society, the waqf-based forest can provide benefits, both ecologically, economically, socially, and educationally, for the community. Waqf-based forests, particularly if integrated with carbon trading activities, would give more comprehensive and inclusive benefits to all societies. Carbon trading positively incentivizes forest management through voluntary carbon markets (Djaenudin et al. 2016).

Several studies have been carried out to discuss carbon trading done by various green projects in Indonesia. Even though there are several ongoing carbon credit projects, the information about listed companies that have purchased carbon credits is currently limited (Abidin and Kartikasari 2023). Some of the projects mentioned are the Katingan Mentaya project; carbon trading scheme through the Verified Carbon Standard (VCS) in Katimpun Village Forest of

Kapuas Regency; Payment for Ecosystem Services (PES) scheme with the Plan Vivo certification framework in Aik Bual Community Forest, Kopang District, Central Lombok, West Nusa Tenggara; and Public-Private-Community Partnership (PPCP) approach to achieving zero carbon emissions in North Sumatra (Alviya et al. 2018; Septyanun et al. 2023; Sukadi et al. 2020). Previous studies on waqf-based forests have also been conducted regarding their positive impact on forest sustainability and reducing carbon emissions, application of agroforestry, and waqf principle in forests for sustainable carbon storage (Ali and Kassim 2020; Jannah et al. 2024a).

However, no further studies exist on how the waqf-based forests participate in carbon trading. This research was conducted to fill the gap regarding the potential of waqf-based forests to contribute to carbon trading. This paper aims to prove and discover waqf-based forests' potential schemes, opportunities, and challenges in generating carbon credits and formulating strategies to contribute to carbon trading. This study will not discuss more technical aspects such as carbon stock measurement.

This paper consisted of 4 sections. Section 1 introduces the background and aim of the research. Section 2 explains the methodology, Section 3 discusses the results and analysis, and Section 4 gives a conclusion. This research may be followed by some potential studies in the future, such as the carbon absorption measurement in waqf-based forests, carbon trading for small-scale forestry, carbon supply and demand in waqf-based forests, and action research for carbon trading implementation in waqf-based forests.

2. Materials and Methods

This research was conducted from January to May 2024. The data was collected through a literature review, in-depth interviews, and field observations. The literature review involved identifying, categorizing, and classifying relevant literature on forest functions, waqf-based forests, climate change and mitigation, and carbon credits to address the research questions. From the information in the literature review, the stakeholders that were involved in the carbon trading process were selected to be the experts in the in-depth interviews process to explore further their insights and views on waqf-based forest in participating in carbon trading, such as IDW from Indonesian Stock Exchange that launched IDX Carbon, and HAW from the Ministry of Environment and Forestry as the Indonesia's official carbon validator, verifier, and certifier. The literature review results were also deepened with in-depth interviews with experts from the waqf-based forest and forest practitioners who have already contributed to the voluntary carbon market, as well as the academics' point of view. **Table 1** provides a list of the experts interviewed. The in-depth interview results were analyzed using NVivo 12+ to gain the experts' discussions and main points.

Field observations were conducted in April 2024 at the YPM Waqf-based Forest in Mojokerto, Jawa Timur, Indonesia, and the Gunung Walat University Forest in Sukabumi, Jawa Barat, Indonesia. These locations were selected due to their successful track records in preserving and managing the waqf-based forest and contributing to carbon trading using a business-to-business scheme. Following data collection, triangulation was used to justify the information collected from the various methods (Carter et al. 2014). Triangulation draws different viewpoints and multiple data sources to obtain a fuller picture of the situation being investigated, resulting in enhanced study validity (Natow 2020). After the triangulation was completed, the data were analyzed descriptively.

Table 1. In-depth interview experts list

No	Code	Role	Institution and Position
1	KAS	Academics	Lecturer at Resources and Environmental Economics, Faculty of Economics and Management, IPB University
2	MUR	Practitioner	Executive Director of PT Cedar Karyatama Lestarindo
3	SUS	Practitioner	Head of APHI's Public Relations and Cooperation Division
4	FMM	Academics	Dean of the Faculty of Biology and Agriculture, National University
5	AGS	Practitioner	Nazhir of YPM Waqf-based Forest, Mojokerto
6	IDW	Regulator	Head of Information Management and Issuer Development Division, Indonesian Stock Exchange (BEI)
7	LUR	Practitioner	Executive Director of Gunung Walat University Forest, Faculty of Forestry and Environment, IPB University
8	HAW	Regulator	Director of Greenhouse Gas Inventory, Monitoring and Verification Reporting, Ministry of Environment and Forestry (KLHK)

3. Results and Discussion

3.1. The Significance of Waqf-Based Forest Carbon Trading

Based on the results of in-depth interviews, all experts agreed that waqf-based forests need to be involved in carbon trading. Carbon and climate issues receive enormous attention in the world. Various parties are jointly putting forth their best efforts to overcome the issues of carbon and climate change. Waqf-based forests need to contribute to the carbon trading. However, considering that the current area of waqf-based forests is not yet significant, only 12.5 ha across Indonesia, experts predict that the carbon incentives that will be obtained will not be notable. MUR estimates that the value of CO_2 captured by 1 hectare of 20-year-old forest is about 150 tonnes of CO_2, and the forest areas below 5000 hectares are not economically profitable to join the carbon trading. Thus, the focus of the contribution of waqf-based forests in carbon trading is not to obtain incentives, but to increase awareness and spread Islam (*da'wah*).

Even though the incentives are small, the involvement of waqf-based forests in carbon trading has a message value: Islam also pays attention to environmental problems and contributes to a solution. Environmental preservation is a religious obligation that is required by Allah SWT according to Sharia Law, as mentioned in Surah Al-Qasas verse 77, "*Do good as Allah has done good to you, and do not do mischief on this earth*", and Surah Al-A'raf verse 56, "*And do not do mischief on the earth, after Allah has repaired it...*" (Irfany et al. 2023). It is also in line with several discussions of ecology that are explained in classical fiqh literature, such as ethical and moral guidelines for the preservation of the environment mentioned in existing books, Ri'āyah al Bī'ah fi al-Sharī'ah al-Islām created by Yusuf al-Qarḍāwi, al-Naḥj alIslāmī fī Ḥimāyat al-Bī'ah karya Muhammad 'Īd Mahmud al-Sāhib, al-Bī'ah wa al-Bu'd al-Islāmī created by Fuād Abd al-Latīf al-Sartāwi, and Man and Nature created by Sayyed Hossein Nasr (Mahsun et al. 2022). Thus, implementing Islamic finance applications, such as carbon trading in waqf-based forests, is also essential to environmental preservation.

3.2. Waqf-Based Forest Carbon Trading Schemes

Based on the research results, two carbon trading schemes can be implemented by the waqf-based forest nazhir. Some differences between the two schemes are the methods, platforms, government involvement as a stakeholder, and the costs required.

3.2.1. Scheme A (carbon exchange)

The research results show that two schemes can be considered in waqf-based forest carbon trading. In scheme A, waqf-based forests carry carbon trading under the mechanism regulated by the Ministry of Environment and Forestry and the Indonesian Stock Exchange (**Fig.1**).

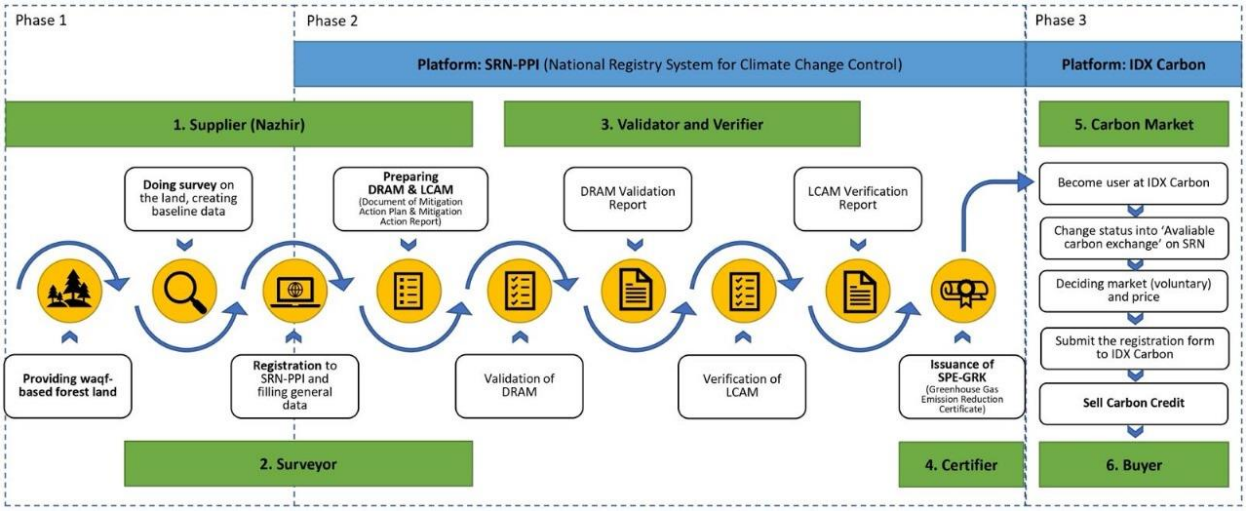

Fig. 1. Waqf-based forest carbon trading (scheme A).

Fig. 1 shows the process of selling carbon credits from waqf-based forests, which is structured in three phases using two leading platforms: SRN-PPI (National Registry System for Climate Change Control) and IDX Carbon. Phase 1 is the data provision and collection phase. Nazhir provides carbon units generated from the estimated carbon absorbed in the forest. Nazhir can ask surveyors to find the estimated carbon units produced by the forest and prepare the DRAM (Action and Mitigation Plan Document) and LCAM (Mitigation Action Achievement Report). In conducting surveys, as mentioned by KAS, there are three method choices: Tier 1 (using satellite imagery), Tier 2 (using comparative values), and Tier 3 (direct observation and measurement in the field). Based on the (BSN 2011), five carbon pools in the forest need to be calculated: aboveground biomass (trees, shrubs, grasses, sedges), belowground biomass (roots of living vegetations), necromass (dead trees and dead woods), forest floor litter (leaves, needles, twigs), and mineral soils. Besides calculating carbon units, surveyors might also identify other potential in waqf-based forests to improve the economic value of the carbon produced. Once the two documents are completed, they are uploaded to the SRN-PPI page.

After all documents are uploaded to SRN-PPI, the second phase is validation and verification. In SRN-PPI, validation and verification can only be carried out by parties appointed by the Ministry of Environment and Forestry (SRN-PPI 2022). A validation results report will be prepared and submitted to the Ministry of Environment and Forestry as a certifier to issue the SPE-GRK (Greenhouse Gas Emission Reduction Certificate). The next phase of scheme A is the carbon exchange. This step was carried out on the IDX Carbon platform. The supplier will submit a registration form to sell carbon credits to IDX Carbon. Upon receiving the application, the nazhir can sell the carbon credits to potential buyers.

3.2.2. Scheme B (business-to-business)

In contrast to scheme A, which goes through SRN-PPI and IDX Carbon, in scheme B, the waqf-based forest nazhir sells carbon directly to buyers (Business to Business) (**Fig. 2**). In simple terms, scheme B has been implemented by the management of the YPM Waqf-based forest in Mojokerto and by the management of the Gunung Walat University Forest in Sukabumi. AGS explained that he had experience selling carbon from community gardens that he managed together with the YPM Waqf-based forest.

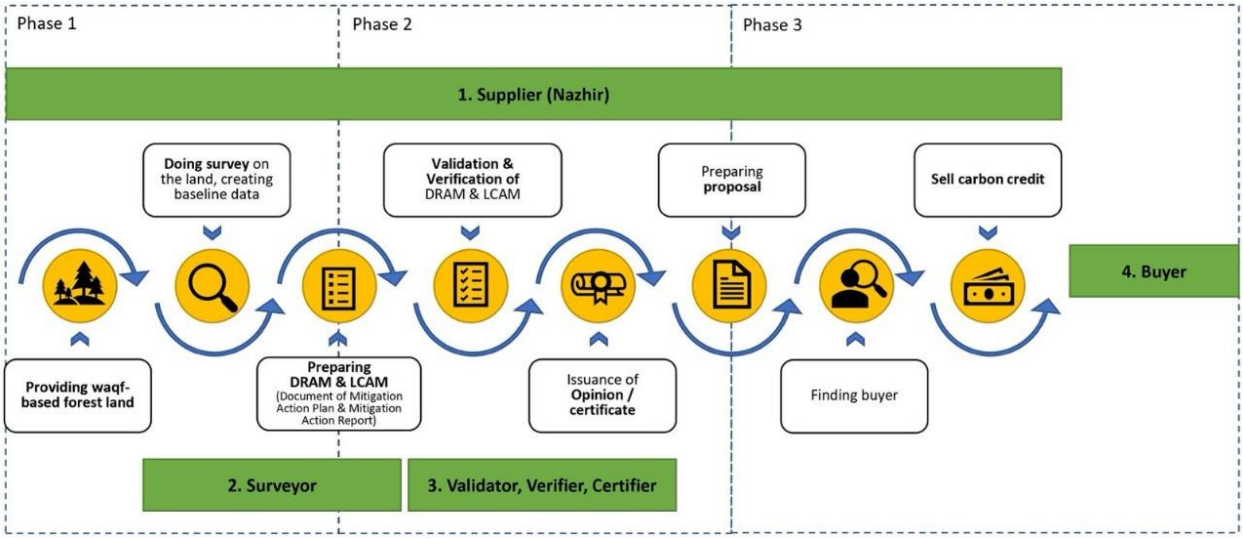

Fig. 2. Waqf-based forest carbon trading (scheme B).

Similar to scheme A, there are also 3 phases in scheme B. Phase 1 is data provision and collection. Nazhir will provide waqf-based forest land planted with trees and ready to have its carbon calculated. Then, the nazhir can ask for help from the surveyor to calculate carbon absorption from waqf-based forest land and prepare the required documents.

After the required documents are completed, the next phase is validation and verification. In contrast to scheme A, where the validation-verification process is carried out by parties appointed by the Ministry of Environment and Forestry through the SRN-PPI system, in scheme B, nazhir may self-determine the parties who will be requested as validators and verifiers. After these documents have been validated and verified, nazhir can appoint another party as a certifier. The task of the certifier is to issue an opinion/certificate stating that the waqf-based forest green project is eligible and proven to produce carbon units. Even if the sales are made directly to the buyers, a certificate is one of the things that must still be made, as stated by MUR.

The third phase of scheme B is sales. In this phase, sales are carried out directly to the company (Business to Business). Before selling the carbon unit, the supplier must look for potential buyers and prepare a proposal that suits the prospective buyer's profile. Carbon trading can be done after finding a suitable buyer and negotiating the price.

In Scheme A, the resulting emission reduction certificate will be recorded with the state and, if used, can be claimed as proof of carbon reduction efforts by the state, contributing to the Nationally Determined Contributions (NDC) target. In contrast, scheme B offers a more straightforward carbon trading process. However, in scheme B, the nazhir's role is more significant because the nazhir determines the other parties involved, starting from the surveyor, validator-verifier, certifier, and the targeted buyer. Therefore, Nazhir needs to understand and be ready to

complete the process. Apart from that, the selection of the parties will also impact the cost and quality of the carbon certificate produced. If professional and internationally recognized parties are used, the costs required will be more significant, but the results might be utilized more widely. On the other hand, using internal auditors/verifiers will cut costs, but the results might be more limited.

For carbon trading, a Greenhouse Gas Emission Reduction Certificate is issued after conducting a baseline survey/existing conditions in the field, compiling the necessary documents, and obtaining validation and verification of those documents. The supplier, surveyor, validator, verifier, and certifier are involved in this process. Based on the results of in-depth interviews, it is known that the costs for the professional survey are relatively high and not commensurate with the area of the existing waqf-based forest. Therefore, collaborating with a university as a surveyor could be a solution, especially for scheme B. For example, in the Gunung Walat University Forest, survey activities were carried out by IPB University (in collaboration with lecturers and students from the Faculty of Forestry and Environment). They might also be validators and verifiers, ensuring the waqf-based forest carbon project is appropriate and meets the requirements. **Table 2** briefly discusses the differences between the two schemes.

Table 2. Differences between the two waqf-based forest carbon trading schemes

Differences	**Scheme A**	**Scheme B**
Method	Indirect (carbon exchange)	Direct (Business to Business / B2B)
Platform	1. SRN-PPI from the Ministry of Environment and Forestry 2. IDXCarbon from the Indonesian Stock Exchange	Not specified
Requirements	1. Baseline data 2. Action and mitigation plan, and reports documents (DRAM and LCAM) 3. Greenhouse Gas Emission Reduction Certificate (SPE-GRK) all requirements according to the Ministry of Environment and Forestry regulation	1. Baseline data 2. Action and mitigation plan and report documents (DRAM and LCAM) 3. Opinion/certificate as proof of greenhouse gas emission reduction all according to the other parties appointed by nazhir
Stakeholders	1. Supplier: waqf-based forest nazhir 2. Surveyor: third party with a carbon accounting certificate, appointed by nazhir 3. Validator and verifier: from the SRN-PPI platform, appointed by the Ministry of Environment and Forestry 4. Certifier: The Ministry of Environment and Forestry 5. Carbon exchange (IDXCarbon) 6. Buyer: from the carbon exchange	1. Supplier: waqf-based forest nazhir 2. Surveyor: third party, might be professional/internal/campus, appointed by nazhir 3. Validator, verifier, certifier: the third party appointed by nazhir might be local/internal parties or international 4. Buyer: appointed by nazhir
Cost	High	It might be high or low, based on other stakeholders appointed by nazhir

3.3. Relevant Stakeholders in Waqf-Based Forest Carbon Trading

Some relevant stakeholders are involved in waqf-based forest carbon trading, such as the supplier, surveyor, validator and verifier, certifier, carbon exchange, and buyer. Suppliers are parties that provide land to estimate the value of carbon that will be traded. In waqf-based forest carbon trading, those who act as suppliers are nazhir (managers) of waqf-based forests. To trade carbon credits in Scheme A, Nazhir must obtain a Greenhouse Gas Emission Reduction Certificate (SPE-GRK) or something similar (in Scheme B).

Surveyors are parties who help nazhirs carry out surveys and collect initial data. They also help suppliers calculate carbon credits and prepare documents to obtain SPE-GRK. To ensure the surveyor's credibility, some experts, such as KAS and MUR, mentioned the importance of a Carbon Accounting certificate. Validators and Verifiers are parties who validate and verify DRAM and LCAM documents. In scheme A, validators and verifiers are limited to four parties determined by the Ministry of Environment and Forestry through the SRN-PPI platform, such as Sucofindo, Mutuagung Lestari, TUV NORD, and TUV Rheinland (SRN-PPI 2022). This information was conveyed by several experts, one of whom is HAW. Meanwhile, in scheme B, nazhir can use international verifiers such as Plan Vivo, Verra (VCS), Gold Standard, Corsa, and many more. Experts state that international verifier fees, like professional surveyor fees, are expensive. Based on the results of interviews with AGS, the YPM Waqf-based Forest has used other third parties as validators and verifiers in their carbon trading project.

A certifier is a party that issues Greenhouse Gas Emission Reduction Certificates (SPE-GRK) for green projects that have been previously validated and verified. In scheme A, on the SRN-PPI page, SPE-GRK will only be issued by the Ministry of Environment and Forestry. Meanwhile, for Scheme B, the international verification party, for example, Verra (VCS), can issue similar documents (Verra 2024).

Carbon Exchange is a platform where carbon credits are sold; this party plays a role in scheme A (via SRN-PPI) (OJK 2023). As a green project actor, waqf-based forest carbon transactions are included in the voluntary carbon market (VCM), namely a market that the government does not supervise, there are no restrictions on the emissions that can be traded, and the buying entities are those who want to eliminate the emissions produced (Abidin and Kartikasari 2023). One of the experts, IDW, stated that although not every day, cumulatively, there have been carbon buying and selling transactions at IDXCarbon, and the total transactions have reached half a million tons.

The buyer is the party who purchases carbon credits as a form of responsibility for the emissions that have been produced. IDW said that when the buyer has purchased a carbon unit in scheme A, he can determine whether to use it to reduce his carbon footprint or resell it. If it has been used, a certificate of proof of carbon offset use will be issued, which can be included in the buyer's sustainability report. Meanwhile, in Scheme B, buyers can sign a cooperation agreement with the supplier and receive a certificate of appreciation for purchasing carbon credits. However, this transaction is not recorded in the SRN-PPI, so the state does not record that the buyer has purchased and used the carbon credit to reduce his carbon footprint.

In scheme A, every process is formal and done by an authorized institution, so the conflict of interest should be minimal. However, for scheme B, to avoid any conflict of interest, the nazhir and buyer should have an agreement beforehand to appoint any third parties involved in the carbon trading process. For example, experts believe universities can act as certifiers who state that the

waqf-based forest GHG project is appropriate and meets the requirements. The Gunung Walat University Forest has done it before. Based on the agreement with the buyer, this GHG project received certification from the Dean of the Faculty of Forestry and Environment, IPB University, as explained by MUR and LUR.

3.4. Opportunities, Challenges, and Strategies in Waqf-Based Forest Carbon Trading

3.4.1. Opportunities

The two main opportunities highlighted are waqf-based forest contributions in carbon trading, high-value carbon credits, and promoting an inclusive and sustainable green economy. The first opportunity is a high-value carbon credit. Preserving forests has a lot of positive impacts on human survival by storing carbon, preventing floods, and providing air, water, food, energy, medicines, and genetic resources (Griscom et al. 2020; IPCC 2019; Seddon et al. 2020). Experts believe that waqf-based forests, which promote forest preservation and sustainability, have the opportunity to produce high-value (premium) carbon credits. High-value carbon credits can be defined as carbon credits that significantly reduce greenhouse gas emissions and have other positive benefits for local communities and biodiversity that are well-designed and managed, accurately monitored, meet standards, and comply with local and international policies (Katingan Mentaya Project 2024). SUS, one of the experts, also explained the same thing. The legal aspect also distinguishes waqf-based forests from the other forest types because they are protected by two legal laws in Indonesia (religious and state law), so their sustainability is more guaranteed (Jannah et al. 2020). All experts emphasize this, including FMM.

In the field of ecology, waqf-based forests play a role in maintaining biodiversity, as well as land and water management. In the economic and social fields, waqf-based forests carry out community empowerment activities through group business assistance, training, learning, and other activities (Ali and Kassim 2020). Apart from that, from an Islamic perspective, waqf-based forests allow wakifs to gain rewards from waqf and rewards for nazhirs for managing assets owned by Allah SWT (Ali and Permana 2024).

The second opportunity is an inclusive and sustainable green economy. Waqf-based forests are one example of green economy applications combined with Islamic principles. As a waqf asset, the waqf-based forest nazhir should make it productive, providing intangible and tangible benefits for its beneficiaries (Ali and Kassim 2020). Based on the provisions of waqf in Islam and regulated by waqf law in Indonesia, the benefits of waqf assets must be conveyed to the mauquf'alaih. The nazhir's rights are a maximum of 10% and must be used to develop the waqf assets (Republik Indonesia 2004). Thus, waqf-based forests provide inclusive and comprehensive socio-economic access for the community by prioritizing sustainability to achieve a green economy.

3.4.2. Challenges

Although waqf-based forests have great potential, several challenges must be considered. These challenges are insufficient area, technical understanding, and the absence of a carbon trading fatwa. The first one is an insufficient area. Currently, there are only 12.5 ha of waqf-based forest in Indonesia. This area is still insignificant in producing carbon units, whose sales should cover operational costs such as surveys, document preparations, and document validation and verification. One of the experts, KAS, stated that initial capital is needed to enter the carbon

exchange market (SRN-PPI) and carry out the inventory. Currently, the unit price of carbon in Indonesia is low; the range is around 3 dollars (IDXCarbon 2024).

The second challenge is technical understanding. Nazhir should understand the technicalities of carbon trading as a carbon credit unit supplier. It was conveyed by experts, one of whom is HAW, who handles GHG emission monitoring inventories and reports at the Ministry of Environment and Forestry, that either using Scheme A or B, nazhir must be able to get the correct data, develop institutional and governance systems that comply with applicable regulations, prepare appropriate action and mitigation documents, and implement risk management.

The last challenge is Sharia compliance: there is no fatwa regarding carbon trading yet. Fatwa is essential in religious communities to meet the demands relevant to certain times for legal implications following the Qur'an and as-Sunnah (Ansori 2022). For instance, the existing classical fiqh muamalat is no longer fully relevant because of the rapid development of modern business and economy. Thus, the National Sharia Council in the Indonesian Ulema Council (MUI) oversaw and researched the relevant sharia products to comply with Islamic Law and made a fatwa (Zaini and Shuib 2021). Until now, the MUI has issued several fatwas on the environment (Mangunjaya and Praharawati 2019), but they have not issued a fatwa regarding the carbon trading law. This condition creates an opening for rejecting the involvement of waqf-based forests in carbon trading because it is feared that something *haram* may be in the process. One of the experts, FMM, conveyed this challenge.

3.4.3. Strategies

Several strategies can be implemented to optimize opportunities and face challenges in selling waqf-based forest carbon, such as DRAM bundling, third-party survey funding, B2B carbon sales, and plant selection. The first one is document (DRAM) bundling. This "DRAM bundling" is one strategy to overcome the first and second challenges: insufficient area of waqf-based forest land and lack of technical understanding. Several small locations can jointly prepare a mitigation action plan document through this strategy and then submit it to validators and verifiers. Several experts, such as KAS, MUR, and SUS, have mentioned this strategy. HAW, the Ministry of Environment and Forestry expert, verified this strategy. HAW mentioned that the Ministry of Environment and Forestry is compiling a manual for Social Forestry schemes (with smaller land areas) to produce carbon credits. If the Social Forestry scheme is possible, waqf-based forests can use the same scheme.

The following strategy to overcome the first challenge is third-party survey funding. The following strategy is to collaborate with companies using CSR funds to survey the economic value of carbon from waqf-based forests. Nowadays, it has been found that many CSR activities are aimed at financing green projects and have a positive correlation with the development of green innovation performance (Mo et al. 2022). Several experts have mentioned this, one of whom is HAW. Nazhir receives funding to conduct baseline surveys by collaborating with third parties so that they can cover the document, validation, and verification operational costs. Meanwhile, the company will receive appreciation for using its CSR funds to fund green programs.

The third strategy is focused on B2B carbon sales. Of the two schemes previously proposed, experts agree that with the current condition of waqf-based forests, Nazhir should focus on scheme B, which carries out business-to-business carbon sales. AGS, as the manager of the YPM Waqf-based forest in Mojokerto, said that even though it was just a simple project, he had already

succeeded in selling carbon through this scheme in the community plantations he managed. It was possible to apply this to other waqf-based forest areas. However, several things must be considered when conducting B2B carbon sales transactions. If international validator and verifier institutions are used, for example, Verra (VCS), the carbon credits produced will still be recorded in their database and recognized internationally (Verra 2024). A significant fee is also required to obtain the carbon credit certificate.

The fourth strategy is plant selection. To optimize the limited land, choosing plant species with many benefits, prioritizing local plants, and avoiding invasive species are some management strategies for productive waqf-based forests (Jannah 2024b). More specifically, MUR, one of the experts, mentioned the benefits of plants that should be developed in waqf-based forests, including soil and water conservation, rare plant conservation, economic and social benefits, education, and absorbing emissions. Other experts agreed with the same thing, one of which was FMM. Regarding carbon absorption, the more plant types, the greater the potential carbon uptake increases (Warner et al. 2023). The ecological aspect also increases if the plant is rare or has other ecological values. Meanwhile, added economic and social value is obtained by selecting plants that produce wood and non-timber forest products beneficial for residents or plants that can be cultivated using agroforestry. MUR mentioned in the in-depth interview that a fast-growing species such as *acacias*, *eucalyptus*, *Gmelina arborea*, and *Aucoumea klaineana* has a high rate of carbon absorption in the first 5–8 years. However, it does not have a strong root system and is insufficient to conserve ground and water. For instance, fruit trees, *Durio kutejensis* and *Durio oxleyanus*, are also recommended because they have a great carbon-capturing ability for more than 15 years compared with the fast-growing species. They also have economic benefits, ground and water conservation ability, and are included as one of Indonesia's endemic plants.

The proposed strategies are the actions that the waqf-based forest nazhir could take. However, there are also some recommendations for external stakeholders, such as for the government to encourage carbon trading mechanism for smaller forest areas, for universities and educational institutions to collaborate with nazhir to research the economic value of carbon in waqf-based forests to produce credible and valid data, and for MUI to issue a fatwa on carbon trading for sharia legitimacy and increase Muslim trust.

4. Conclusions

As an example of a green economy initiative, waqf-based forests have the potential to carry out carbon trading with the main focus on raising Islamic awareness. Two schemes can be followed by a waqf-based forest nazhir as a supplier for carbon trading. Scheme A is a carbon exchange on the SRN-PPI platform. Meanwhile, Scheme B is selling carbon directly to buyers (B2B). The choice of scheme will influence the stakeholders involved and the costs incurred. Both schemes involve suppliers, surveyors, validators, certifiers, and buyers. However, in scheme A, there is government involvement, namely the Ministry of Environment and Forestry, which appoints validators-verifiers in the SRN-PPI platform and at the same time acts as a certifier. The other government parties are the Indonesian Stock Exchange through the IDX Carbon. Meanwhile, in scheme B, nazhir plays a role in determining the other stakeholders. With the sustainable nature as waqf assets, the waqf-based forests have great potential in carbon trading because they can produce high-value (premium) carbon credits from various added values in the ecological, economic, social, and Islamic fields. Waqf-based forest carbon trading also provides inclusive and

comprehensive socio-economic access for the community by prioritizing sustainability to achieve a green economy. Some challenges must be considered in waqf-based forest carbon trading: the insignificant area, technical understanding, and the absence of a carbon trading fatwa. To overcome this, several strategies that can be implemented include pursuing document (DRAM) bundling, collaborating with third parties (CSR) to fund surveys, focusing on B2B carbon sales efforts, and choosing plants to grow in the waqf-based forests area.

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Author Contributions

K.M.A.: Conceptualization, In-Depth Interview, Observation, Funding Acquisition; H.T.: Conceptualization, Supervision, Validation; R.S.: Conceptualization, Investigation, Formal Analysis; M.J.: Project Administration, Visualization, Writing – Original Draft Preparation; M.M.: Resources, Data Curation, Writing – Review and Editing.

Conflict of Interest

The authors declare no conflict of interest.

Declaration of Generative AI and AI-Assisted Technologies in the Manuscript Preparation

Not applicable.

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