

# **Analysis of Carbon Trading Potential in Forest Conservation Areas as A Sustainability Strategy in PT Cheil Jedang Indonesia Pasuruan**

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## **ABSTRACT**

Carbon trading is a strategic mechanism to support sustainability in Indonesia by integrating economic, environmental and social considerations. This research explores the potential of carbon trading in the forest conservation area of PT Cheil Jedang Indonesia (CJI) Pasuruan as a sustainability strategy to maximize economic and ecological benefits. This research used a qualitative approach with data collection through observation and documentation. Primary data was obtained from stakeholders, while secondary data included reports, regulations and literature. Analysis was conducted by combining economic valuation and qualitative descriptive analysis. PT CJI Pasuruan demonstrated significant carbon trading potential through two conservation areas, namely Patuguran Mangrove and Puspo area, with an estimated economic value of carbon reaching IDR 4,147,929,778. In addition, the company is committed to reducing greenhouse gas emissions and supporting sustainable forest management practices. The results indicate that carbon trading can contribute to economic, environmental and social sustainability. Despite challenges such as regulatory complexity, this initiative can serve as a model for other companies looking to implement sustainability-based strategies.

**Keywords: PT CJI Pasuruan, potential, carbon trading, economic valuation, carbon pricing.**

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## **INTRODUCTION**

Climate change has become one of the most pressing global challenges, characterized by rising global temperatures, extreme weather conditions and significant ecological impacts (Ghil & Lucarini, 2020; Gössling et al., 2023; Hales, 2019). Greenhouse Gases (GHGs), especially carbon dioxide (CO<sub>2</sub>), are major contributors to climate change due to human activities such as fossil fuel combustion, deforestation, and industrialization. The researchers argue that the impacts of climate change not only damage the environment but also affect the global economy, with losses reaching billions of dollars per year due to climate-induced natural disasters (Formetta & Feyen, 2019). Amidst these challenges, climate change mitigation has become a top priority for many countries, including Indonesia, which plays an important role in global efforts through the management of its biodiversity-rich tropical forests. One of the most effective instruments for climate change mitigation is supporting carbon trading initiatives.

Carbon trading is a market-based mechanism within the value framework of the carbon economy, designed to reduce Greenhouse Gas (GHG) emissions through the purchase and sale of carbon credits (MJ et al., 2023). The instrument functions by allowing entities that successfully reduce their emissions below a set limit to sell their

excess allowances to others. There are two main carbon trading mechanisms: cap-and-trade and offsets. According to researchers, cap-and-trade systems set an upper limit on emissions for each entity, allowing those with emissions below the threshold to sell their surplus quota to those in need (UU Republik Indonesia et al., 2022). Meanwhile, offset mechanisms provide carbon credits to parties engaged in carbon sequestration activities, such as reforestation or forest conservation, which can then be traded on the carbon market (Cetera, 2022; UU Republik Indonesia et al., 2022).

As one of the largest tropical forest countries in the world, Indonesia plays a strategic role in mitigating climate change through sustainable natural resource management (Abram et al., 2021; He et al., 2021; Miller & Hutchins, 2017). To support these efforts, the government has issued various regulations, including Presidential Regulation No. 98 of 2021 concerning the Application of Carbon Economic Value, which serves as the legal basis for carbon trading (Presidential Regulation of the Republic of Indonesia No. 98, 2021). This regulation aims to support the country's commitment to reduce greenhouse gas emissions in line with Indonesia's Nationally Determined Contribution (NDC) targets. In addition, it promotes the utilization of tropical forests as strategic assets in carbon trading schemes, either through conservation-based emission reductions or enhanced carbon sequestration (França et al., 2020; Scerri et al., 2022). This initiative was further strengthened with the launch of Indonesia IDX Carbon, which establishes a formal market mechanism for carbon credit trading at the national level.

Forests play an important role in climate change mitigation due to their ability to absorb carbon dioxide through photosynthesis (Saatchi et al., 2021; Slik et al., 2018). This function positions forests as strategic assets in carbon offset schemes, where carbon credits can be generated from conservation activities and sustainable forest management. These credits can then be traded on carbon markets, providing both economic incentives and environmental protection (Cetera, 2022; UU Republik Indonesia et al., 2022). In addition, forest conservation prevents emissions caused by deforestation, a major global contributor to greenhouse gas emissions (Sukadi et al., 2020). Thus, sustainable forest conservation not only contributes to climate change mitigation but also creates economic opportunities through a growing carbon trading market.

Despite the potential for carbon trading through conservation areas in Indonesia, there is limited research specifically analyzing its implementation at the local level. Most studies focus on general carbon trading mechanisms or global forest management without exploring the specific opportunities and challenges of particular conservation areas (Mentari et al., 2024). In addition, there are gaps in the implementation of carbon trading policies, particularly regarding inter-agency coordination, monitoring and oversight at the national level (Chusi et al., 2024). Further research is needed to identify the economic and environmental benefits of conservation-based carbon trading while serving as a guideline for more effective implementation strategies in other regions with similar characteristics.

The potential of carbon trading does not only apply at the national scale but can also be implemented at the corporate level, as demonstrated by the conservation area of

PT Cheil Jedang Indonesia (CJI) Pasuruan. This area plays a role in supporting carbon trading schemes through offset and cap-and-trade mechanisms. Given its size and ecosystem characteristics, it has the capacity to serve as a significant carbon sink while preserving existing biodiversity. Research has shown that the carbon potential of conservation areas in Indonesia, such as the Katingan Mentaya Project, has resulted in positive environmental and economic impacts (Sukadi et al., 2020). Furthermore, sustainable management of conservation areas can support national emission reduction targets and create new economic value through carbon trading (Samasta, 2023). Based on these perspectives, it can be concluded that the PT CJI Pasuruan conservation area is not only ecologically relevant but also strategically important in supporting national climate change mitigation policies.

This research aims to analyze the potential for carbon trading in the forest conservation area of PT Cheil Jedang Indonesia Pasuruan, with a focus on exploring the applicable carbon trading mechanisms and their impacts on environmental and economic sustainability. The findings of this research are expected to contribute significantly to understanding how conservation areas can play an important role in climate change mitigation. By deepening the analysis, this research also aims to serve as a strategic reference for improving the effectiveness of carbon trading implementation in other conservation areas with similar characteristics.

## **RESEARCH METHOD**

This research used a qualitative approach to explore the potential for carbon trading in PT CJI Pasuruan's forest conservation area as a sustainability strategy, covering regulatory, technical, environmental and economic aspects. The researcher played a direct role in data collection and analysis through observation, and documentation, ensuring a deep understanding of the social, economic, and environmental context. The study utilized primary data obtained directly from stakeholders, and secondary data, including reports, regulations, and literature. Data collection methods included field observations of conservation conditions, forest management, and community interactions, as well as documentation of sustainability reports, carbon inventories, and policies. The analysis combines economic valuation-estimating carbon stocks and their monetary value using the formula  $NEK = SC02 \times Rp$ -and qualitative descriptive analysis, which follows data reduction, presentation, and verification. This approach provides holistic insights into the potential, challenges and long-term implications of carbon trading, taking into account regulatory, economic and environmental factors for sustainable forest management.

## **RESULTS AND DISCUSSION**

PT Cheil Jedang Indonesia (CJI) Pasuruan, a subsidiary of CJ Corporation of South Korea, has been operating in Indonesia since 1988, focusing on food, animal feed, pharmaceutical, and biotechnology production. Committed to sustainability, CJI integrates environmentally friendly practices into its operations and maintains internal and external conservation areas. Through annual field monitoring, the company ensures

effective conservation efforts that benefit biodiversity and surrounding communities. PT CJI Pasuruan manages two conservation areas: Internal Areas, which focus on sustainable environmental management within the company, and External Areas, which involve community collaboration for forest conservation and ecosystem restoration.

**Table 1. PT CJI Pasuruan Conservation Area**

No.	Conservation Area	Coordinate Point	Area
Company External			
1	Patuguran Mangrove Coastal Area	7°37'27.37"S ; 112° 57'29.54" E	3.8 Ha
2	Puspo catchment area: - Gondosuli - Palangsari	7°50'31.35"S ; 112° 52'02.93" E	2.6 Ha
Company Internal			
1	WWT C-Line Surrounding Area	7°41'51.24"S ; 112°57'55.75 "E	0.6 Ha
2	CJ Harmony Park "CJ's Garden of Life" area	7°41'51.24°S ; 112°57'55.75" E	0.25 Ha
Total Conservation Area			7.25 Ha

PT CJI is committed to environmental conservation and carbon emission reduction through its conservation areas, supporting global climate mitigation efforts while fostering positive community relations. Six months of observation and documentation in PT CJI Pasuruan's forest conservation area revealed strong carbon trading potential. The company's commitment to reducing greenhouse gas emissions through Carbon Pricing supports this initiative, aligning with its sustainability strategy and market-based carbon trading opportunities.

## CLIMATE CHANGE | MITIGATION

### MANAGEMENT OF GREENHOUSE GAS EMISSIONS (SCOPES 1, 2)

In 2021, CJ Cheiljedang committed to achieving 2050 Net-Zero to mitigate climate change. To this end, we aim to reduce GHG emissions from business sites by 25% by 2030 compared to 2020 levels. We monitor key indicators, such as GHG emissions by operational boundaries (Scopes 1, 2, and 3) and by country, as well as the GHG emissions intensity relative to production volume. Since 2022, we have enhanced accuracy and reliability by obtaining third-party verification for GHG emissions and energy usage at major domestic and overseas sites, including manufacturing sites in Indonesia, Vietnam, China, and the United States. In 2023, we introduced an internal carbon pricing system, expanded the installation of renewable energy, replaced outdated refrigeration equipment, and purchased Renewable Energy Certificates (REC) to further reduce GHG emissions. As a result, our Scope 1+2 GHG emissions in 2023 were 3.324 million tCO<sub>2</sub>eq, reflecting a 20.3% reduction from the previous year.

**Figure 1. GHG Management**

Regular recording of greenhouse gas emissions enables carbon footprint monitoring and ensures transparent environmental reporting. PT CJI Pasuruan reports emissions not only in its Sustainability Report but also on the official SIMPEL Electronic website under the Ministry of Environment and Forestry.

GHG EMISSIONS				Unit: 1,000 tCO <sub>2</sub> eq
INDICATOR	2021	2022	2023	2030 TARGET*
Scope 1	2,877	2,823	2,196	25% reduction (compared to 2020 levels)
Scope 2	1,518	1,345	1,129	
Scope 3	10,303	10,286	9,528	
Total	14,698	14,454	12,853	-

\* The 2030 targets apply only to domestic sites in the Food Business Unit and to sites in the BIO Business Unit.

**Figure 2. CJ Greenhouse Gas Emissions Data**

PT CJI Pasuruan is registered with the National Registry System for Climate Change Control (SRN-PPI), a government-managed platform for recording climate mitigation actions, including carbon emissions measurement, reporting, and verification (MRV). This registration enables participation in carbon trading, with future potential to expand into the forestry sector by utilizing conservation areas to generate carbon credits.

**Registry Number Status**

Current Status <b>SPK Proponent DRAM</b>	Registry Number REG-10-PR-1-2025- 25516	Activity Name Action Energy Efficiency Industry with Modifying units Membrane Filter System, Continuous series becomes Parallel Batch	Name Of Proponent PT CHEILJEDANG INDONESIA PASURUAN
	Categories Energy	Year 2024	

**Figure 3. SRN-PPI Registration Number**

The conservation areas around PT CJI Pasuruan are well maintained, with healthy ecosystems and biodiversity. The Patuguruan Mangrove Conservation Area spans 3.8 hectares at coordinates 7°37'27.37 "S; 112°57'29.54 "E, located 8.4 km from the company. The area remains in good condition, with thriving mangrove vegetation, fresh air and clear waters, reflecting the success of PT CJI Pasuruan's conservation efforts.





**Figure 4. Location Map of Mangrove Conservation Area**



**Figure 5. Environmental Conditions of Mangrove Conservation Area**

Puspo Conservation Area covers 2.6 hectares at coordinates  $7^{\circ}37'27.37''$  S;  $112^{\circ}57'29.54''$  E, located 30.3 km from PT CJI Pasuruan. The area is well preserved, demonstrated by the fresh air quality and clear ambient water with healthy vegetation that has a large diameter and minimal damage. In addition, there is a diverse fauna dominated by birds that reflects the success of the company's conservation efforts. Puspo's conservation area works closely with the environmental community.

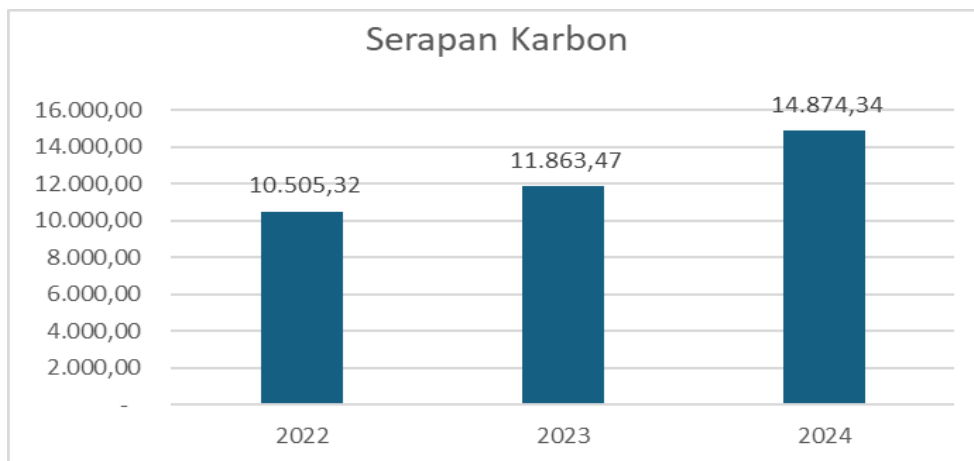


**Figure 6. Map of Puspo Conservation Area**

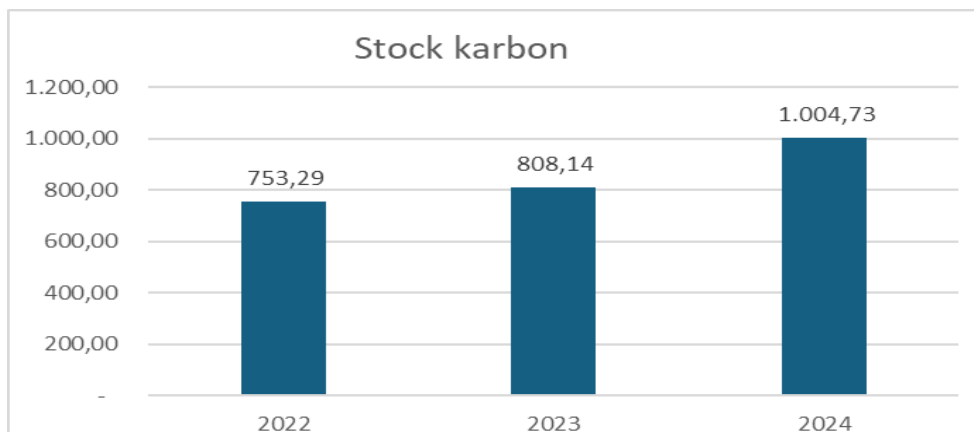


**Figure 7. Environmental conditions in Puspo Conservation Area**

PT CJI Pasuruan annually calculates carbon sequestration and stocks in the mangrove conservation area. Since 2022, the well-maintained condition of the Patuguran Mangrove area has contributed to an increase in carbon sequestration and stocks, reflecting sustainable conservation efforts.



**Figure 8. Carbon Sequestration in Patuguran Mangrove Area**



**Figure 9. Carbon stocks in mangrove conservation areas**

The diagram shows a significant increase in carbon stock and sequestration capacity in the mangrove conservation area, demonstrating effective management. Continued ecosystem maintenance, including regular maintenance and monitoring, has increased carbon sequestration, contributing to climate change mitigation efforts.

The well-maintained environment in the Puspo area reflects sustainable conservation efforts, which directly increases carbon sequestration and stocking capacity. Carbon stock and sequestration measurements were made in 2024, with details as follows:

**Table 2. Estimated Carbon Sequestration and Carbon Stocks**

Conservation Area	Carbon Stock	Carbon Uptake
Gondosuli	102.573	376.102
Palangasari	3.156	14.180
Total	52.864	448.825

Puspo conservation area has a higher carbon sequestration and storage capacity than other areas, due to its large diameter. Both conservation areas are an important part of PT CJI Pasuruan's sustainability strategy, supporting the SDGs on climate action, ecosystem conservation and forest carbon trading. The calculation of the 2024 carbon sequestration by PT CJI Pasuruan has been valued in Rupiah based on the Carbon BEI, which determines the Economic Value of Carbon.

**Table 3. Table of Estimated Economic Value of Carbon**

Conservation Area	Stock KA	Rates	Est. NEK
Puspo	52.864	IDR 77,000	IDR 4,070,565,660
Mangroves	1004,7	IDR 77,000	IDR 77,364,117
Total NEK Estimation			IDR 4,147,929,778

PT CJI Pasuruan has significant carbon sequestration potential, which can be converted into carbon credits for trading under applicable regulations. Despite its potential, carbon trading at PT CJI Pasuruan faces challenges, including the absence of a PBPH license, complex regulations, and an administrative process that takes years to complete. Market fluctuations also affect the pricing of carbon credits, affecting its long-term viability. However, carbon trading is aligned with the Sustainable Development Goals (SDGs) by driving economic benefits (SDG 8 & 9), promoting environmental conservation (SDG 13, 14, & 15), and improving social welfare (SDG 1, 4, & 10). It encourages sustainable forest management, improves air and water quality (SDG 6 & 12), and empowers local communities through financial incentives, education, and employment opportunities.



## **CONCLUSIONS**

The carbon trading potential at PT CJI Pasuruan supports sustainability across economic, environmental and governance aspects. The company conducts annual carbon sequestration calculations, maintains SRN accounts, and manages forest and mangrove conservation. Carbon trading offers additional revenue, ensures regulatory compliance, and aligns with the SDGs, reinforcing PT CJI Pasuruan's commitment to social and environmental responsibility.

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