Biomass Energy Expansion at the Expense of Indonesia's Gorontalo Forests



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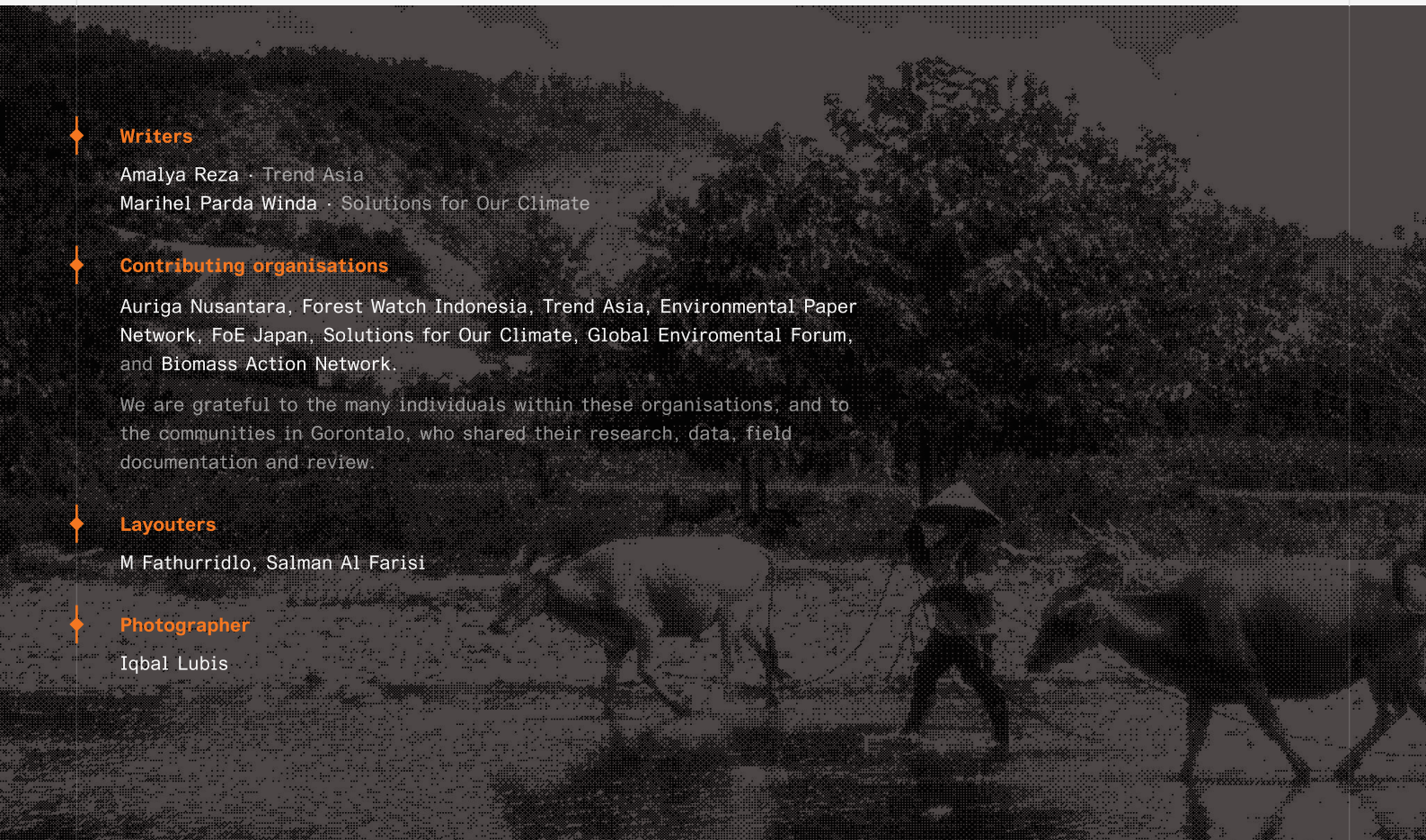
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Executive Summary

Gorontalo Province, located in the Wallacea biodiversity hotspot on the island of Sulawesi, Indonesia, is increasingly becoming a centre of industrial woody biomass production. Driven by domestic energy policies and growing international demand for wood pellets, particularly from Japan and South Korea, the expansion of energy plantation forests (Hutan Tanaman Energi, HTE) is placing increasing pressure on natural forests, biodiversity, ecosystem services, and the rights and livelihoods of Indigenous Peoples and Local Communities (IPLCs).

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Photo: Iqbal Lubis/Trend Asia

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This report challenges the assumption that industrial large-scale woody biomass is inherently a climate-friendly energy source, highlighting how the conversion of natural forests into monoculture plantations can undermine climate mitigation objectives while generating significant ecological and social costs.

There are ten energy plantation concessions in Gorontalo, covering more than 265,000 hectares. Trend Asia's latest analysis of four of them, operated by PT Banyan Tumbuh Lestari (BTL), PT Inti Global Laksana (IGL), PT Gorontalo Citra Lestari (GCL), dan PT Gema Nusantara Jaya (GNJ), found 9,617 hectares of deforestation between 2020 and 2026, while 44,685 hectares of forests still standing inside these concessions remain at risk. The scale of forest conversion is particularly evident in the concession of PT BTL, which has lost 42% of the forest it contained in 2020, and where satellite imagery analysis by Auriga Nusantara identified approximately 720 hectares of deforestation between January and April 2026 alone. Field investigations indicate that wood harvested from these PT IGL and BTL is processed at the PT Biomasa Jaya Abadi pellet mill in Pohuwato Regency, which supplies Japanese trading company Hanwa, illustrating the connection between forest conversion and industrial biomass production.



More than 8,000 of 265,000 hectares of forest were cleared within these concessions between 2021 and 2025. That equals to:

100x Monas area

23,4x Central Park New York

The consequences extend beyond forest loss. Gorontalo's tropical moist forests provide critical habitat for endemic and threatened species, support watershed functions, store carbon, and sustain local livelihoods and cultural identities. Energy plantation concessions overlap around 75,412 hectares of Key Biodiversity Areas, 59,623 hectares of Important Bird Areas, and forests used by the Indigenous Polahi People, raising concerns about habitat fragmentation, ecosystem degradation, and the long-term resilience of these landscapes. In Pohuwato, residents who demanded unfulfilled benefit-sharing obligations have reportedly been detained and criminalised, raising questions about the implementation of Free, Prior and Informed Consent (FPIC) and the equitable distribution of benefit from the energy transition.



A prone to flooding warning sign in North Gorontalo.

These impacts expose significant weaknesses in existing governance and sustainability safeguards. Indonesia's Timber Legality and Sustainability Verification System (SVLK) does not prevent natural forest conversion that is permitted under a concession's work plan or that takes place on land outside state forest estate. Voluntary certification schemes, such as the Forest Stewardship Council (FSC) and the Sustainable Biomass Program (SBP), also face concerns regarding transparency, implementation, and their ability to address cumulative forest conversion, biodiversity loss, and Indigenous rights. The concession of PT

Gema Nusantara Jaya, FSC-certified in 2017-2021 and again in 2024, lost 1,592 hectares of forest between 2020 and 2026, raising questions about whether sustainability certification adequately captures forest loss and community-related risks.

International demand remains an important driver of biomass production in Indonesia. Japan and South Korea continue to support woody biomass through energy policies, market mechanisms, and, historically, substantial subsidies. Both countries have introduced reforms, but neither has established a comprehensive phase-out of large-scale biomass or a due diligence framework that addresses deforestation, ecosystem conversion, lifecycle emissions, and human rights risks across imported biomass supply chains.

The climate implications are particularly significant. Because carbon dioxide released through biomass combustion is not counted in the energy sector, biomass can appear carbon-neutral while the loss of carbon stored in natural forests goes largely unaccounted for.

The evidence from Gorontalo demonstrates the need to reconsider the role of large-scale woody biomass in energy transition strategies. A credible transition must deliver measurable climate benefits without accelerating deforestation, undermining biodiversity, or compromising the rights of IPLCs.

Responsibility for what is happening in Gorontalo is shared along the entire supply chain. Japan and South Korea, whose subsidies and import demand drive this expansion, should phase out public support for large-scale woody biomass and make deforestation-free, rights-respecting sourcing a binding condition for imported biomass. Power utilities, trading companies such as Hanwa, and the banks and investors that finance them should stop sourcing from converted natural forests and carry out due diligence that engages directly with affected communities. Certification schemes such as FSC and SBP should enforce their own rules on forest conversion rather than lend it credibility. Indonesia, for its part, should legally protect all remaining natural forests, close the loopholes in SVLK, and uphold community rights, including FPIC. In both producer and consumer countries, the energy transition should prioritise energy efficiency, electrification, solar, and wind alongside the protection and restoration of natural ecosystems.



Key findings



1. **Biomass plantations are expanding into Gorontalo's forests.** Ten energy plantation concessions spanning more than 265,000 hectares, with 9,617 hectares of deforestation recorded inside 4 active concessions during 2020–2026, about 18% of the forest they contained in 2020, with 44,685 hectares of forest still at risk. In the PT Banyan Tumbuh Lestari alone, 42% of the forest has been lost, with another 720 hectares identified in January–April 2026.

2. **Forest conversion threatens exceptional biodiversity and sensitive watersheds.** Gorontalo lies within the Wallacea biodiversity hotspot, and about 28% of the concessions area (75,412 hectares) overlaps Key Biodiversity Areas and 59,623 hectares of Important Bird Areas. Some concessions also lie upstream of flood-prone communities in Pohuwato, where clearing may aggravate runoff and erosion.

3. **Communities face mounting landrights concerns.** Concessions linked to the PT Gorontalo Panel Lestari pellet supply chain contain more than 24,500 hectares of tropical rainforest, in areas that overlap the territory of the Indigenous Polahi People. In Pohuwato, disputes over plantation benefit obligations have been accompanied by reported detentions and criminalisation.

4. **Japanese and South Korean demand is driving the expansion of Indonesia's pellet industry.** In 2024, exports to these two countries accounted for more than 98% of Indonesia's reported wood pellet production, demonstrating the industry's overwhelming dependence on these markets. Between 2021 and 2025, Japan's wood pellet imports from Indonesia increased from 28,000 to 405,000 tonnes, while South Korea's nearly tripled from 315,000 to 898,000 tonnes. Japanese trading company Hanwa holds a reported 20% stake in PT Biomasa Jaya Abadi, a major pellet producer in Gorontalo.

5. **Policy reforms have yet to close major safeguards gaps.** Existing demand for wood pellets continues, despite South Korea scaling back some biomass subsidies, and Japan introducing lifecycle emissions requirements in April 2026. Meanwhile legality checks, certifications and corporate site visits do not necessarily prevent forest conversion or ensure meaningful consultation with affected communities.

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CHAPTER 0

Indonesia’s forests at risk

Photo: Iqbal Lubis/Trend Asia



Map 1: Chip mills in Indonesia: Bioenergy and pulp & paper threats to forests and Key Biodiversity Areas.
Source: Auriga Nusantara and Earth Insight

Southeast Asia's tropical forests were once among the largest in the world, extending across Vietnam, China, Laos, Burma, Malaysia, and Indonesia. These forests remain vital habitats, supporting nearly two-thirds of global plant and animal diversity. At the end of the 20th century, Indonesia's islands of Sumatra, Borneo, and New Guinea were notable for retaining vast expanses of dense, lush rainforest. However, over the past century, extensive areas have been destroyed or degraded. Since the 1990s, the expansion of pulpwood and oil palm plantations, mining, and other industrial activities has led to the destruction and degradation of significant portions of these forests.

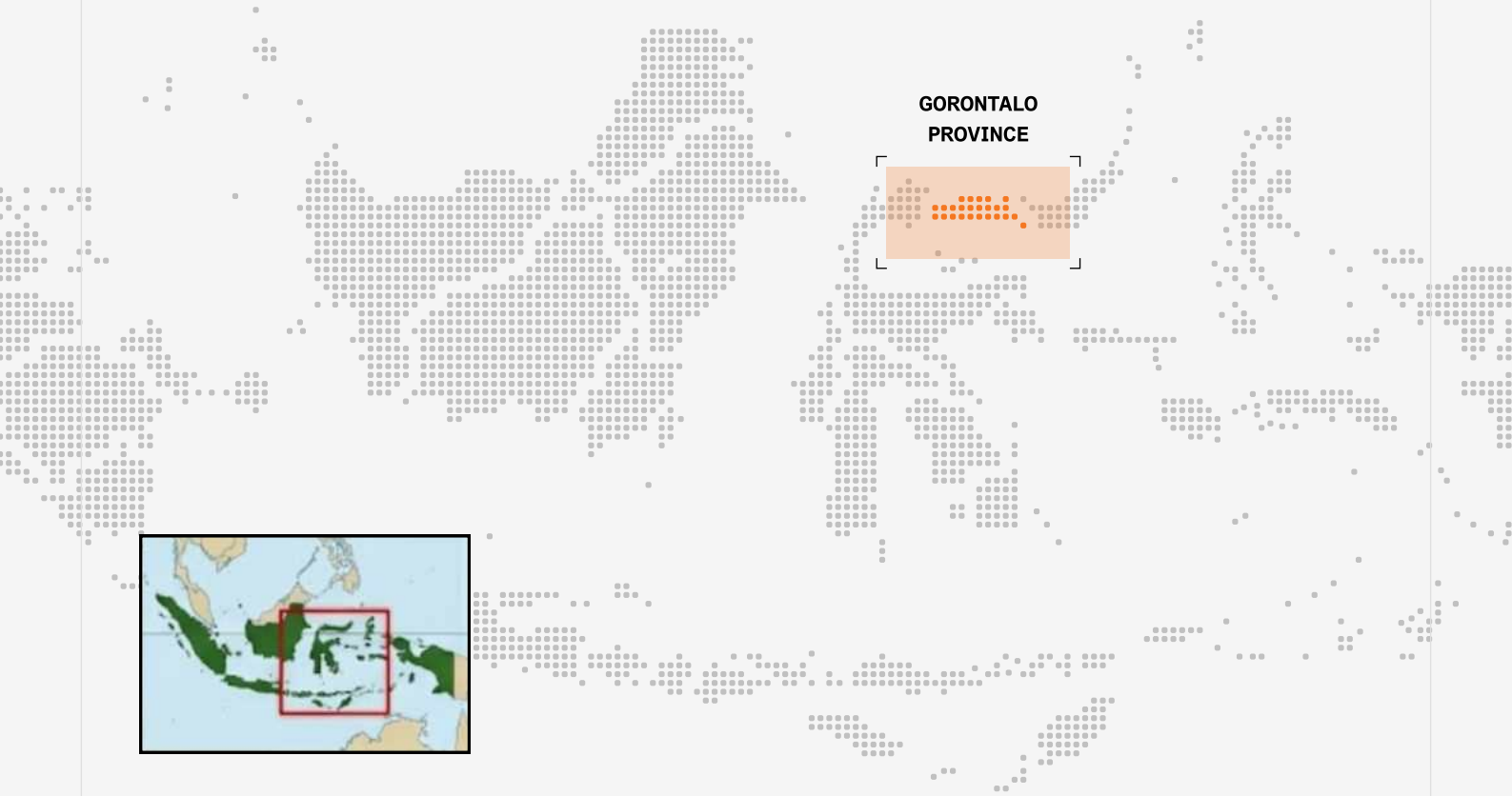
After falling to a historic low in 2021, deforestation is once again on the rise. Indonesia lost approximately 430,000 hectares of forest in 2025, a 66% increase on 2024 and the highest level in eight years. Having exhausted much of the available land in Sumatra, deforestation has shifted to Borneo and is now advancing aggressively into Sulawesi and North Maluku (Auriga Nusantara, 2026).

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CHAPTER 1

How the biomass boom reached Gorontalo

Photo: Iqbal Lubis/Trend Asia

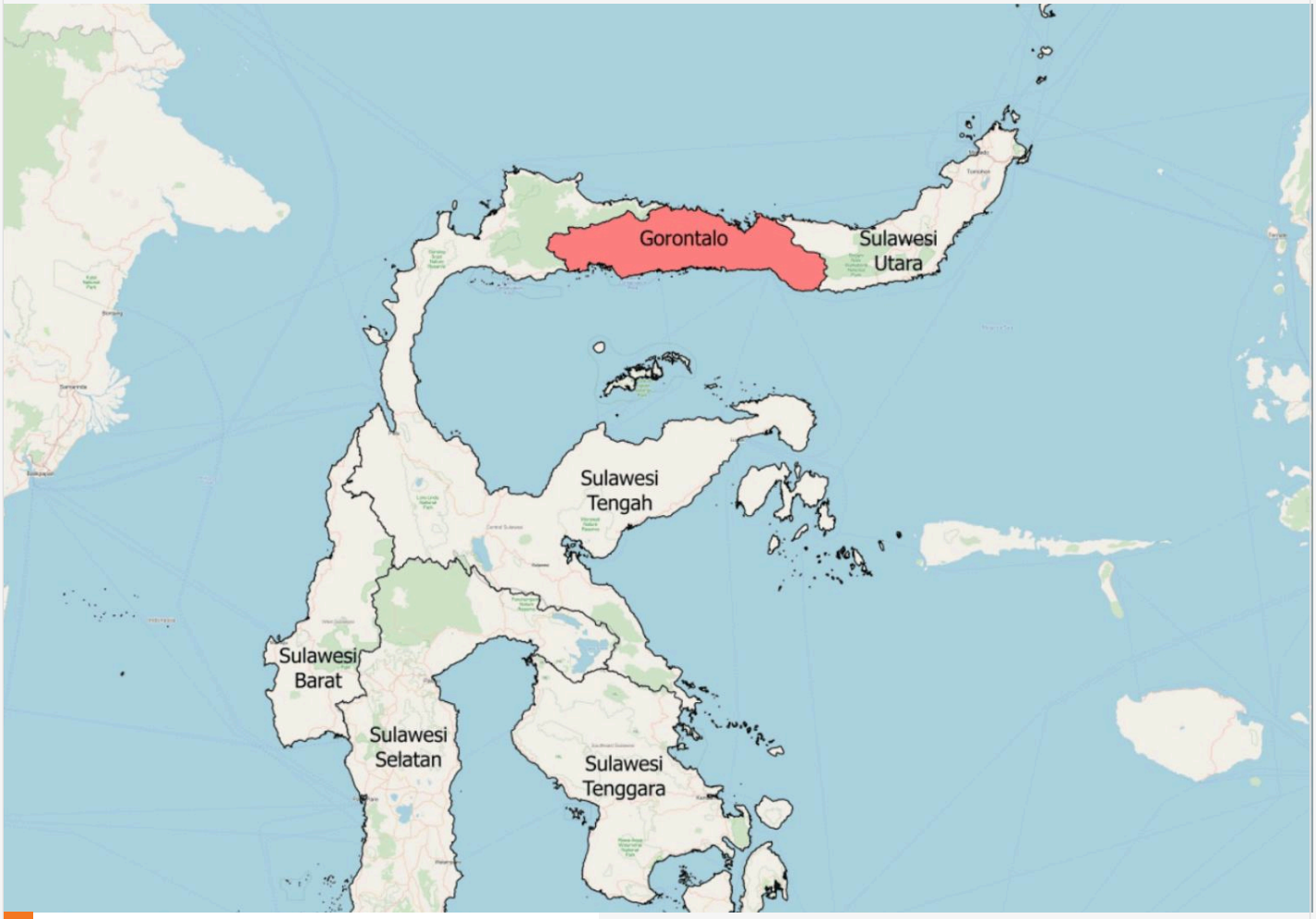


The growing use of woody biomass as renewable energy is creating new demand for feedstocks, both in Indonesia and overseas. Governments have promoted biomass as a way to reduce reliance on fossil fuels, like replacing a portion of coal with wood pellets in existing power plants. But unlike wind and solar, biomass power requires a continuous supply of fuel. Meeting this demand means producing, harvesting, and transporting large quantities of wood, placing growing pressure on forests and other land resources in producing regions.

Indonesia has embraced biomass as part of its energy transition strategy. Its Second Nationally Determined Contribution and National Energy Policy identify bioenergy as a means of reducing emissions, including through the establishment of energy plantations on degraded land. Under the country's Electricity Supply Business Plan for 2025–2034, 0.9 GW of new bioenergy capacity is planned alongside the continued operation and expansion of coal-fired power generation (Government of Indonesia, 2025; Ministry of Energy and Mineral Resource, 2025). Rather than retiring existing coal plants, the government is also promoting biomass co-firing, which involves burning wood alongside coal to reduce the amount of fossil fuel consumed (Transisi Energi Berkeadilan, 2025).

This policy direction could substantially increase domestic demand for woody biomass. In 2024, PLN co-fired approximately 1.62 million tonnes of biomass across 47 coal-fired power plants (Suara Energi, 2025), far below its earlier target of 10.2 million tonnes a year across 52 plants by 2025. At the same time, growing imports from Japan and South Korea have created an additional market for Indonesian wood pellets (EPN, 2025). Together, domestic energy policies and international demand are creating incentives to expand biomass production and establish new plantations and processing facilities.

Gorontalo, on the island of Sulawesi, has emerged as one of the regions supplying this growing industry. Large areas of land have been allocated



Map 2: Map of Sulawesi showing Gorontalo Province.

to industrial plantations for energy production, while wood pellet processing facilities connect local timber production to international markets in East Asia. According to Forest Watch Indonesia (FWI), nine companies now hold ten energy plantation concessions in the province, covering more than 265,000 hectares. These developments illustrate how demand for renewable energy can translate into land-use changes far beyond the power plants where biomass is ultimately burned.

The expansion is particularly concerning given Gorontalo's ecological significance. Located within Wallacea, one of the world's most distinctive biogeographic regions, the province's natural forests provide habitat for endemic and threatened wildlife, including the maleo, anoa, babirusa, and Sulawesi hornbill (FWI, 2024). The forests also store carbon, regulate water flows, and support local livelihoods. Although energy plantations are often promoted as a productive use of degraded land, their expansion into natural forests can undermine these functions. Unlike natural forests, monoculture plantations of fast-growing trees cannot provide the same biodiversity, carbon storage, or ecosystem benefits (FWI, 2024; IPCC, 2022).



Photo 1: Maleo (Macrocephalon maleo),a bird endemic to Sulawesi. CC BY-SA 4.0 (Ariefrahman)

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CHAPTER 2

International demand: How Japan and South Korea fuel Indonesia's biomass industry

Photo: Iqbal Lubis/Trend Asia

Japan and South Korea are among the world's largest importers of wood pellets, alongside the United Kingdom. Since the early 2010s, both countries have provided substantial financial support for biomass electricity generation through renewable energy policies, helping create a growing international market for wood pellets (EPN, 2025). For producing regions such as Gorontalo, these policies have translated into demand for timber, investment in processing facilities, and incentives to expand energy plantations.

Indonesia's wood pellet industry is overwhelmingly dependent on these two markets: in 2024, exports to Japan and South Korea accounted for more than 98% of the country's reported production.

Demand from these countries therefore underpins the industry; without it, Indonesia's wood pellet production would be unlikely to exist at anything approaching its current scale. Official trade data should nonetheless be read with caution: Trend Asia's analysis of Gorontalo's wood pellet exports in 2024 found discrepancy of around 110% and Statistics Indonesia (BPS) trade data, a sign of weak traceability on the supply chain.

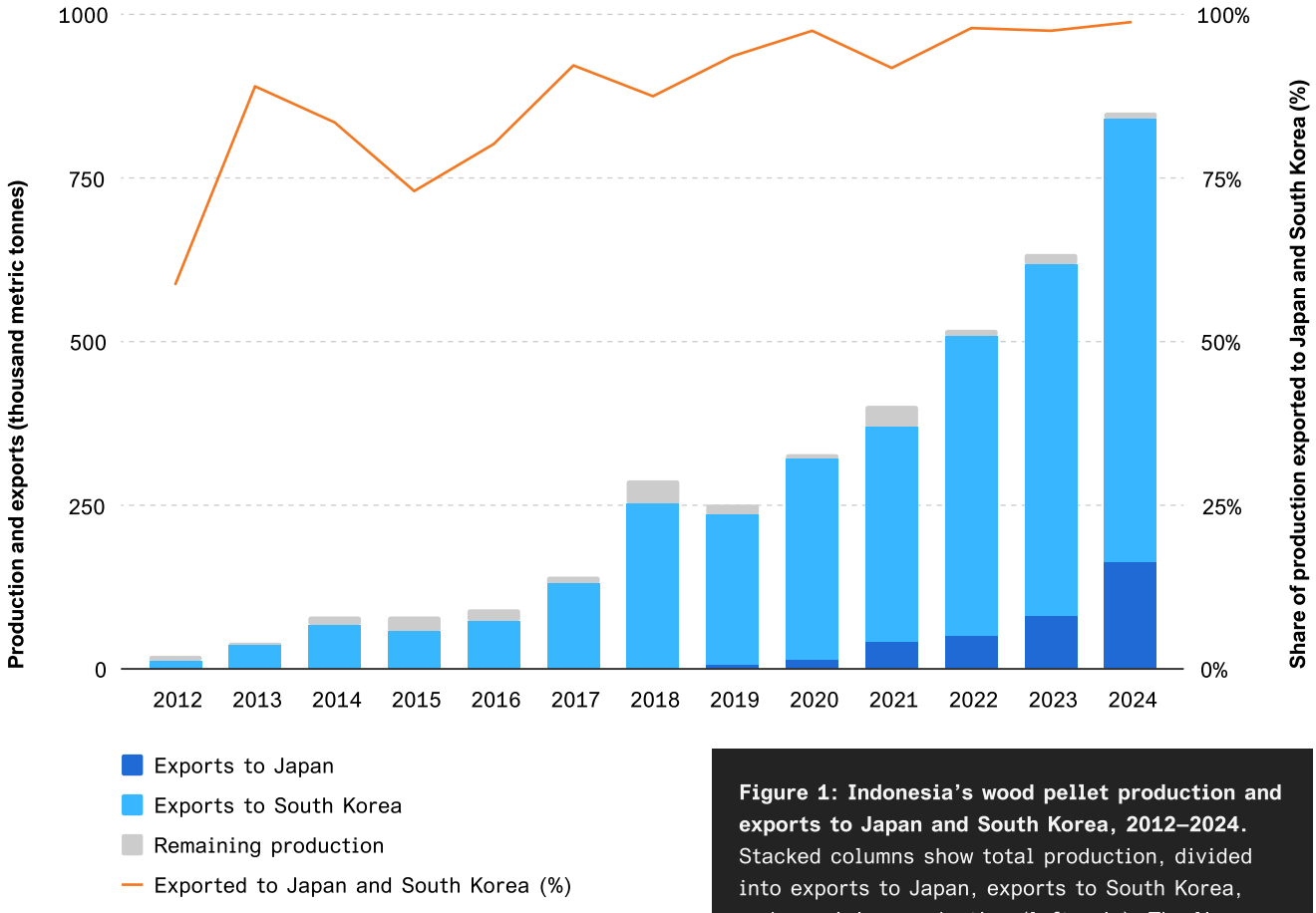


Figure 1: Indonesia's wood pellet production and exports to Japan and South Korea, 2012–2024. Stacked columns show total production, divided into exports to Japan, exports to South Korea, and remaining production (left axis). The line shows combined exports to these two countries as a percentage of total production (right axis). Sources: FAOSTAT (production) and ITC Trade Map (trade).

2.1

Japan: Growing imports despite tighter sustainability requirements

Japan's Feed-in-Tariff (FIT) scheme has been a major driver of biomass power development since its introduction in 2012. By guaranteeing electricity purchase prices, the scheme encouraged investment in biomass power plants and increased demand for imported wood pellets. More recently, Japan has begun shifting large-scale biomass projects towards the Feed-in-Premium (FIP) scheme, under which generators receive payments on top of market electricity prices.

Biomass is part of Japan's long-term energy strategy. The country's Seventh Strategic Energy Plan, adopted in 2025, projects biomass to account for 5–6% of electricity generation by 2040, up from 4.1% in 2023 (METI, 2025). Rather than planning a complete phase-out, the government continues to envisage biomass as a component of its future electricity mix.

Indonesia has become an increasingly important supplier to this market. According to Japan's trade statistics, wood pellet imports from Indonesia increased more than fourteen-fold between 2021 and 2025, from about 28,000 to 405,000 tonnes (Trade Statistics of Japan, n.d.). This rapid growth reflects the expanding commercial ties between Japan's biomass power sector and Indonesian producers.

These links extend beyond fuel imports. Japanese trading company Hanwa Co., Ltd., which supplies biomass fuels including wood pellets and palm kernel shells, holds a 20% stake in PT Biomasa Jaya Abadi (BJA), a wood pellet producer in Gorontalo. In written replies to civil society organisations, Hanwa has confirmed that it sources wood pellets from PT BJA. Its involvement in PT BJA illustrates how Japanese companies participate directly in biomass production and trade in Indonesia, rather than simply purchasing fuel from overseas suppliers (FWI, 2024).

In response to growing scrutiny of biomass sustainability, Japan has introduced additional requirements for supported biomass power projects. Since April 2026, applicable projects have been required to meet lifecycle greenhouse gas emissions reporting requirements covering the biomass supply chain, including overseas production and transportation. These changes represent an effort to strengthen oversight of the climate impacts associated with imported fuels.

However, Japan's emissions reporting remains voluntary to existing power plants, and even if they do, smokestack emissions fall outside the reporting boundary. The Clean Wood Act, introduced in 2017 and amended in 2023, also focuses primarily on verifying the legality of timber rather than ensuring that imports are free from deforestation or ecosystem degradation.

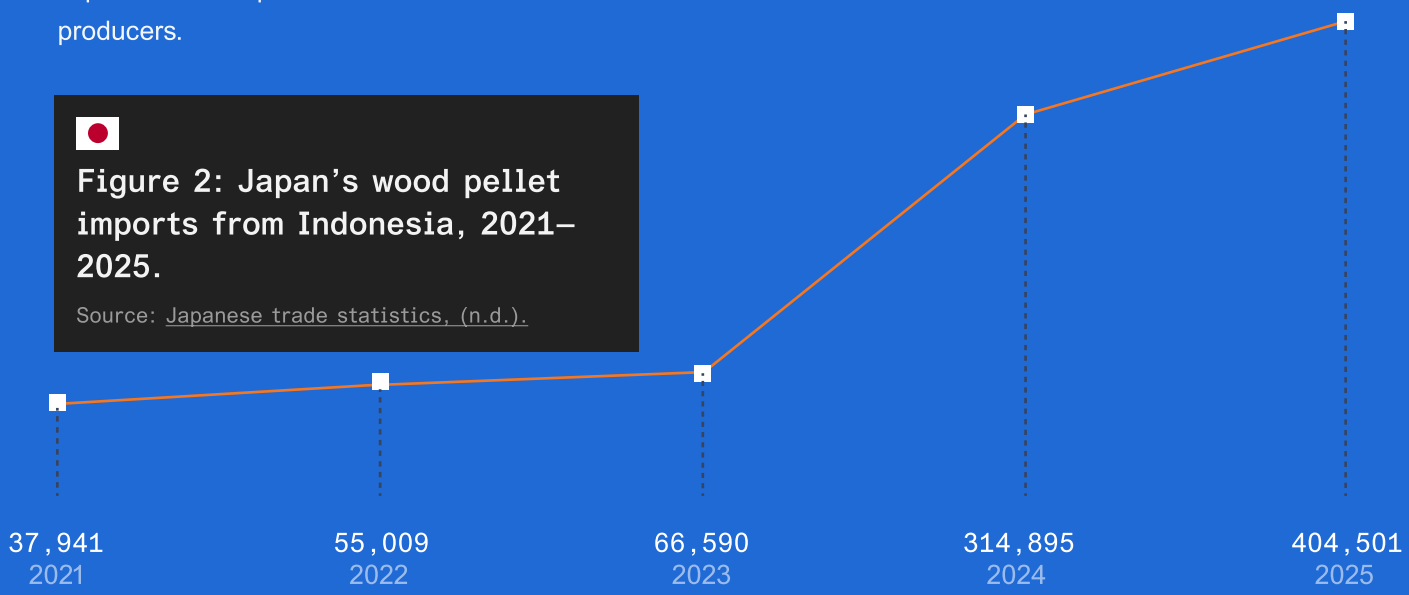


Figure 2: Japan's wood pellet imports from Indonesia, 2021–2025.

Source: Japanese trade statistics, (n.d.).

As a result, wood harvested legally from converted natural forests still enters Japanese biomass supply chains. The continuing growth in Indonesian pellet imports makes it particularly important to assess whether Japan's evolving safeguards can address these risks.

2.2

South Korea: Scaling back subsidies while imports continue to grow

South Korea's biomass industry has likewise been shaped by government incentives. Since the introduction of the Renewable Portfolio Standard (RPS) in 2012, power utilities have been able to earn Renewable Energy Certificates (RECs) for biomass power generation. These certificates provide an additional source of revenue beyond electricity sales, with preferential weightings making biomass an attractive option for power producers.

As a result, woody biomass has grown into South Korea's second-largest renewable energy source. In 2024, forest-derived materials accounted for 78% of solid biomass used for energy, while approximately 82% of wood pellets were imported (MOTIE, 2025; Korea Forest Service, n.d.). Indonesia has become an increasingly important supplier, with South Korea's pellet imports from the country nearly tripling between 2021 and 2025 (Korea Customs Service, n.d.).

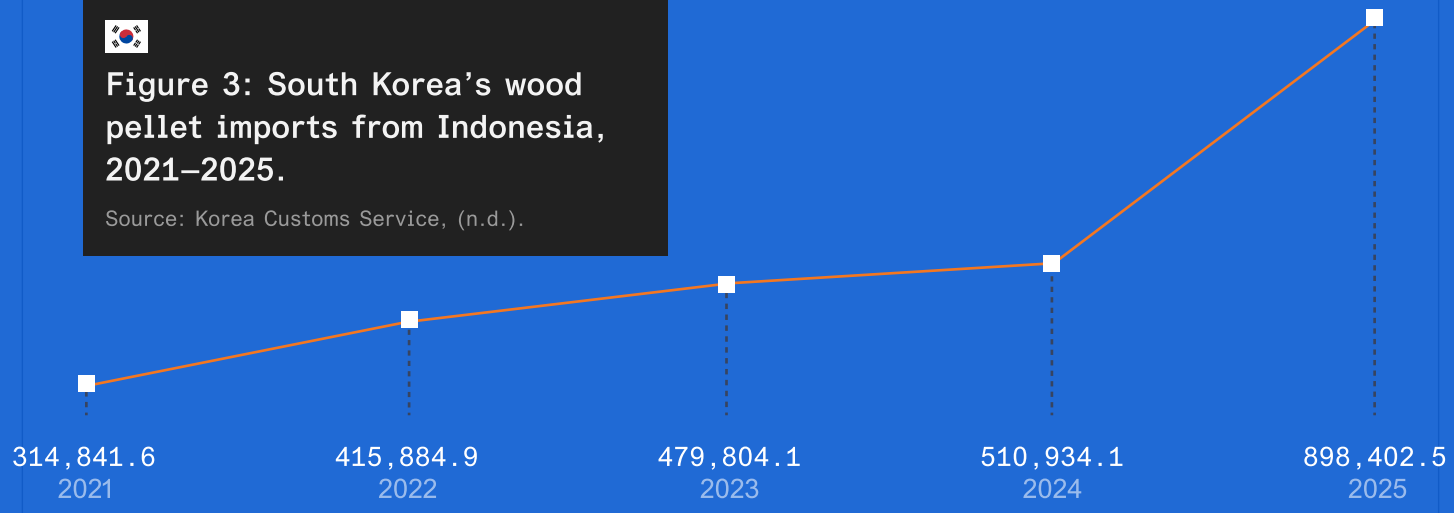
Growing concerns over biomass' climate and environmental impacts have prompted a significant shift in government policy. In December 2024, South Korea announced plans to scale back biomass subsidies under the RPS. The reforms, implemented in 2025, removed REC eligibility for new biomass power plants and coal-biomass co-firing at state-owned power plants, while reducing support for electricity generation from dedicated biomass facilities. However, certain categories, including domestically-sourced 'unused forest biomass', continue to receive preferential support (Song, 2025).

These reforms mark an important departure from South Korea's previous approach. Nevertheless, they do not immediately eliminate demand from existing power plants. The rapid increase in imports from Indonesia through 2025 illustrates how established biomass supply chains can continue operating even as the policy environment begins to change.

Beyond subsidies, South Korea's timber import regulations also leave significant sustainability concerns unresolved. Under the Act on the Sustainable Use of Timbers, importers must provide documentation demonstrating that timber products originate from legally harvested sources. Certification schemes such as the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC) may be used as evidence of legality, although not mandatory.

Figure 3: South Korea's wood pellet imports from Indonesia, 2021–2025.

Source: Korea Customs Service, (n.d.).



Like Japan's framework, these requirements focus primarily on legal harvesting (Korea Legislation Research Institute, n.d.) rather than comprehensively addressing deforestation, biodiversity loss, carbon emissions, or human rights risks. Consequently, timber may comply with import requirements without necessarily meeting broader sustainability expectations.

2.3

Beyond legality: The limits of demand-side reforms

Japan and South Korea have taken different approaches to reforming their biomass policies. Japan has focused on strengthening emissions reporting and adjusting financial support mechanisms, while South Korea has begun withdrawing subsidies from several categories of biomass power generation. Both developments reflect growing recognition of the limitations of large-scale woody biomass as a climate solution.

Yet neither country has established comprehensive safeguards to prevent biomass imports from being associated with natural forest conversion or violations of community rights. Nor have recent policy reforms immediately reduced the demand created by existing biomass power facilities.

For Gorontalo, this creates a continuing tension between the economic incentives to expand biomass production and the need to protect forests and local communities. The consequences are already visible in the province's expanding plantation concessions, where forest conversion and community conflicts have raised questions about the environmental and social costs of supplying international biomass markets.

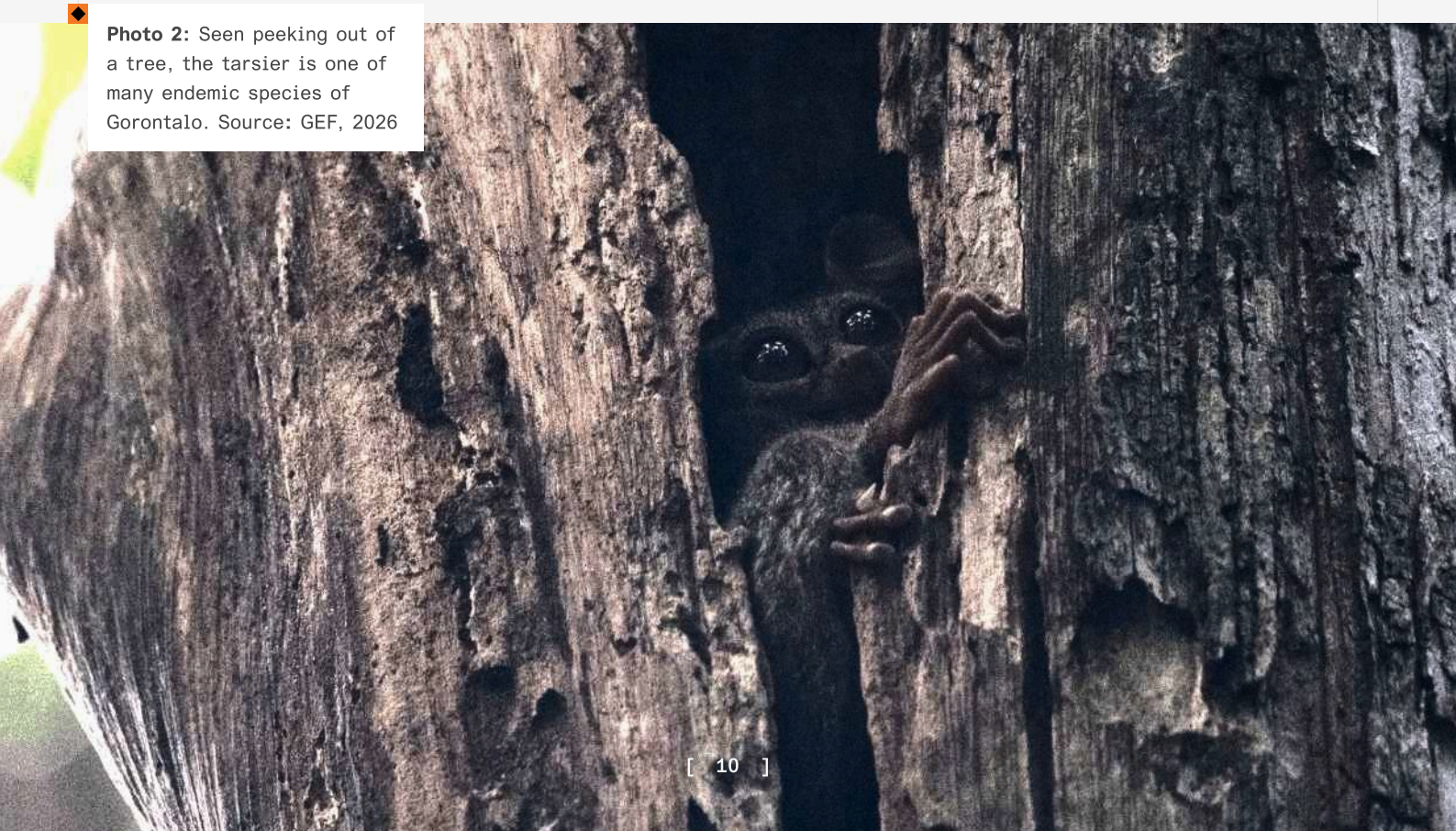


Photo 2: Seen peeking out of a tree, the tarsier is one of many endemic species of Gorontalo. Source: GEF, 2026

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CHAPTER 3

The consequences of biomass expansion in Gorontalo

The expansion of industrial biomass production in Gorontalo is placing increasing pressure on natural forests, biodiversity, and local communities. While energy plantations are promoted as a source of renewable energy, their development raises serious concerns about deforestation, ecosystem degradation, and the rights of Indigenous Peoples and local communities (IPLCs). This section examines the environmental and social impacts of biomass expansion, focusing on forest conversion, biodiversity loss, watershed degradation, and the implications for community livelihoods and Indigenous land rights.

Photo: Iqbal Lubis/Trend Asia

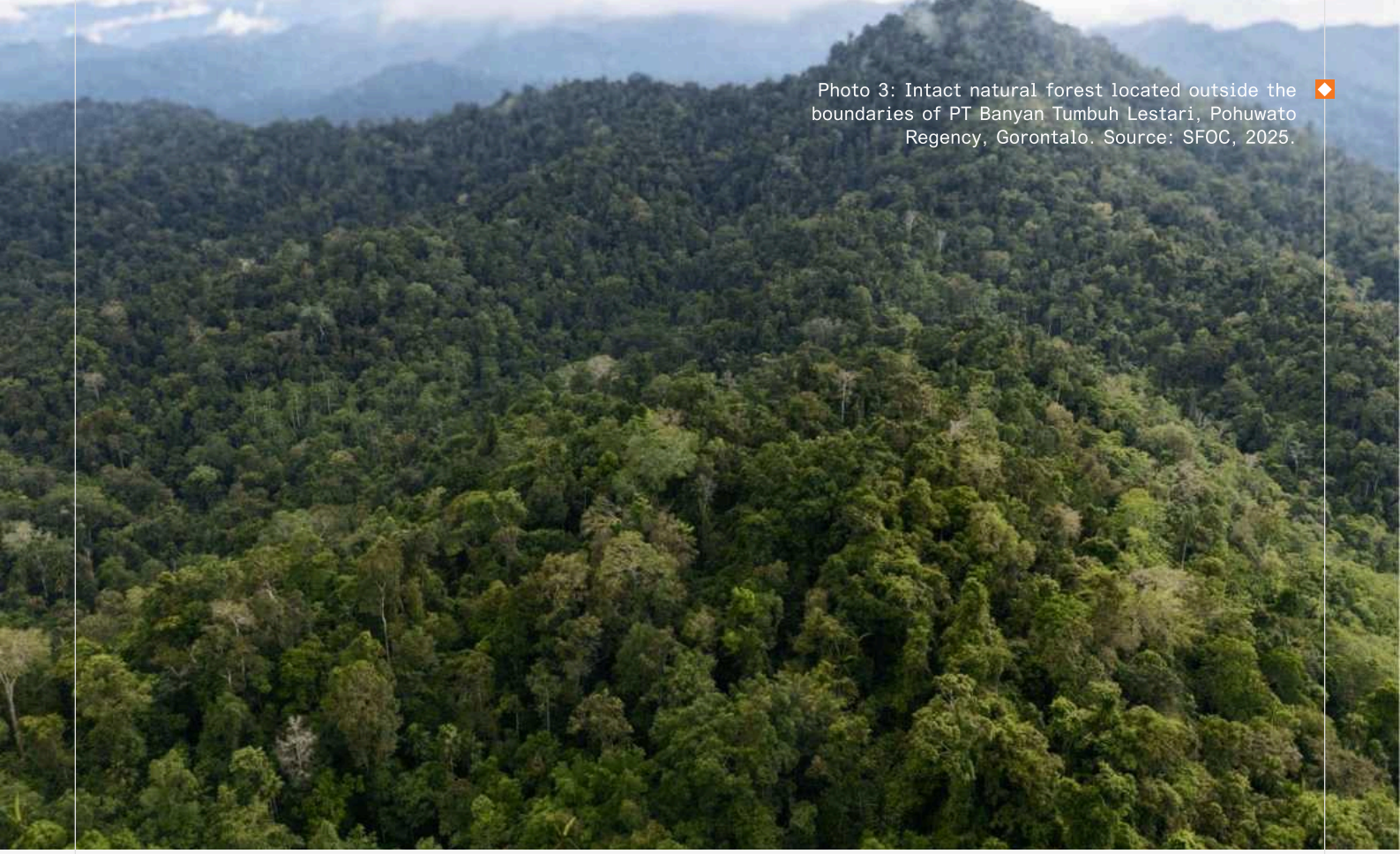


Photo 3: Intact natural forest located outside the boundaries of PT Banyan Tumbuh Lestari, Pohuwato Regency, Gorontalo. Source: SFOC, 2025.

3.1

Forest conversion and expanding energy plantations

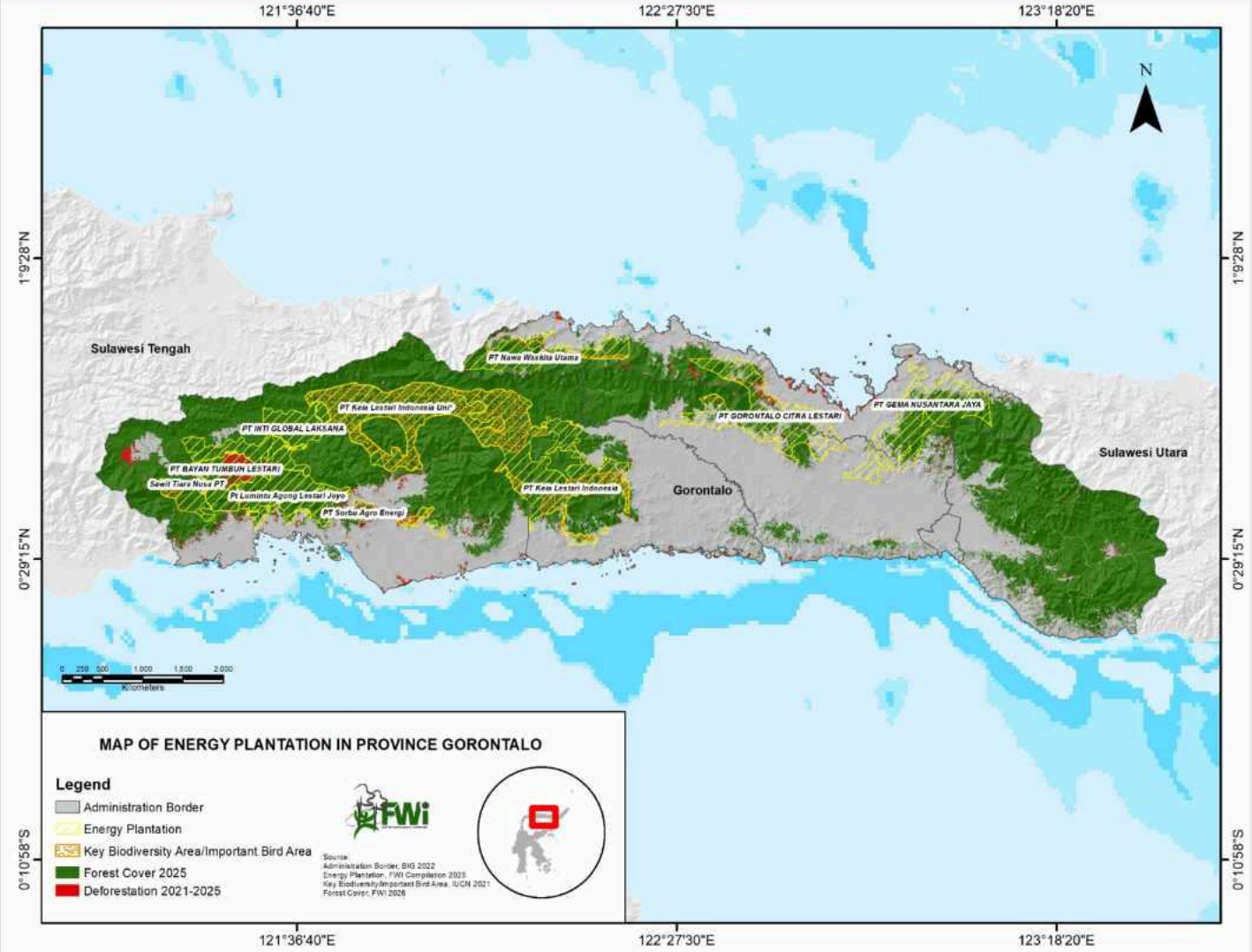
Gorontalo is part of Wallacea, a globally significant biodiversity hotspot known for its exceptional concentration of endemic species. Its natural forests provide habitat for wildlife found nowhere else in the world, while storing carbon, regulating water flows, and supporting the livelihoods of IPLCs. In the Popayato–Paguat landscape alone, 16 of the 23 recorded mammal species and 41 of 175 bird species are endemic, including species such as the maleo, anoa, babirusa, tarsier, and Sulawesi hornbill (FWI, 2024).

These forests are increasingly coming under pressure from the expansion of industrial energy plantations. FWI's latest findings highlight that across Gorontalo, nine companies hold energy plantation concessions covering more than 265,000 hectares, equivalent to approximately 21% of the province's total area of 1.24 million hectares (Pemerintah Provinsi Gorontalo, n.d.).

Based on FWI analysis, more than 8,000 hectares of forest were cleared within these concessions between 2021 and 2025, illustrating the growing footprint of the biomass industry in the province.

Clearing is not evenly spread across these concessions. In FWI's data, four of them, held by PT Banyan Tumbuh Lestari (BTL), PT Inti Global Laksana (IGL), PT Gorontalo Citra Lestari (GCL), and PT Gema Nusantara Jaya (GNJ), account for three-quarters of all forest clearing recorded across the ten concessions, despite covering only 38% of their combined area.

Trend Asia's more recent spatial analysis of these four concessions found that 9,617 hectares of forests were cleared inside them between 2020 and 2026, about 18% of the forests they contained in 2020 (Table 1; Maps 4 and 5). PT BTL stands out: it has lost 2,822 hectares, or 42% of its forest, leaving fewer than 4,000 hectares standing. PT GCL recorded the largest absolute loss, at 4,201 hectares. Together, the four concessions still contain 44,685 hectares of forests that remain at risk of conversion.

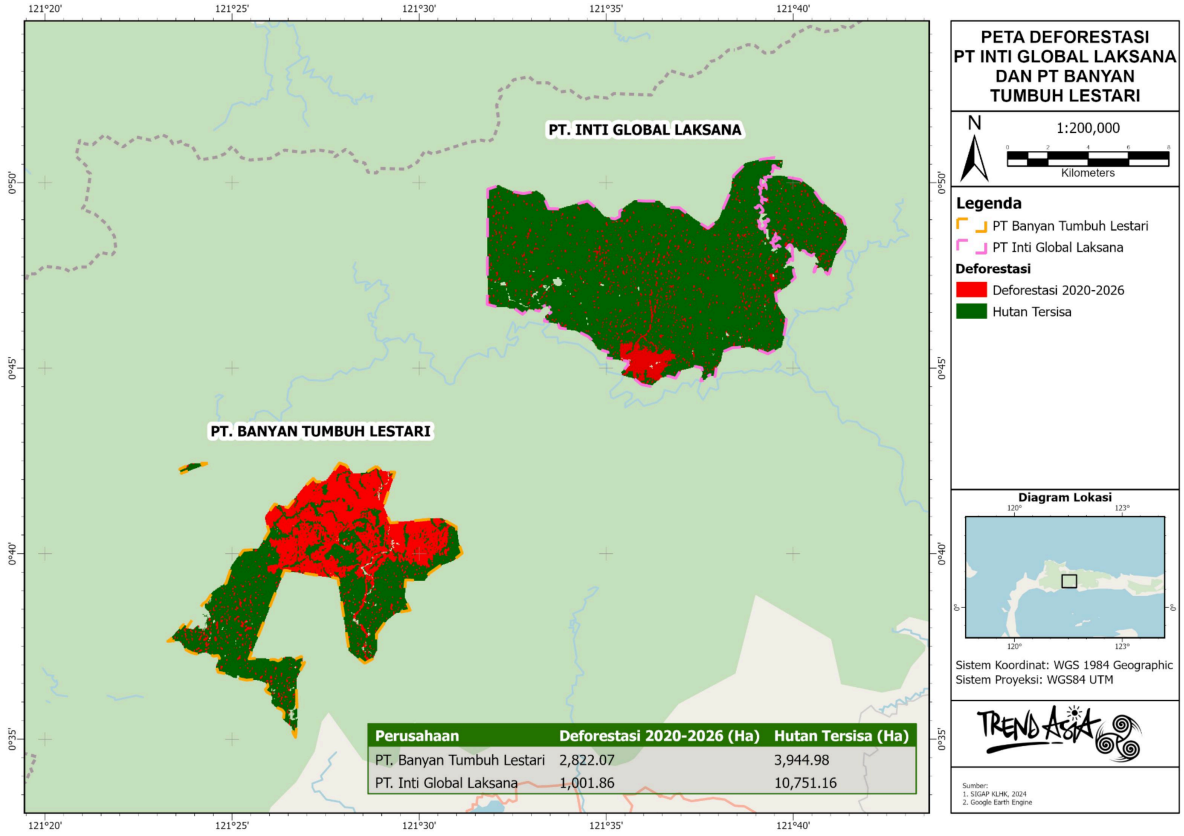


Map 3: Map of energy plantation concessions in Gorontalo. Source: Forest Watch Indonesia.

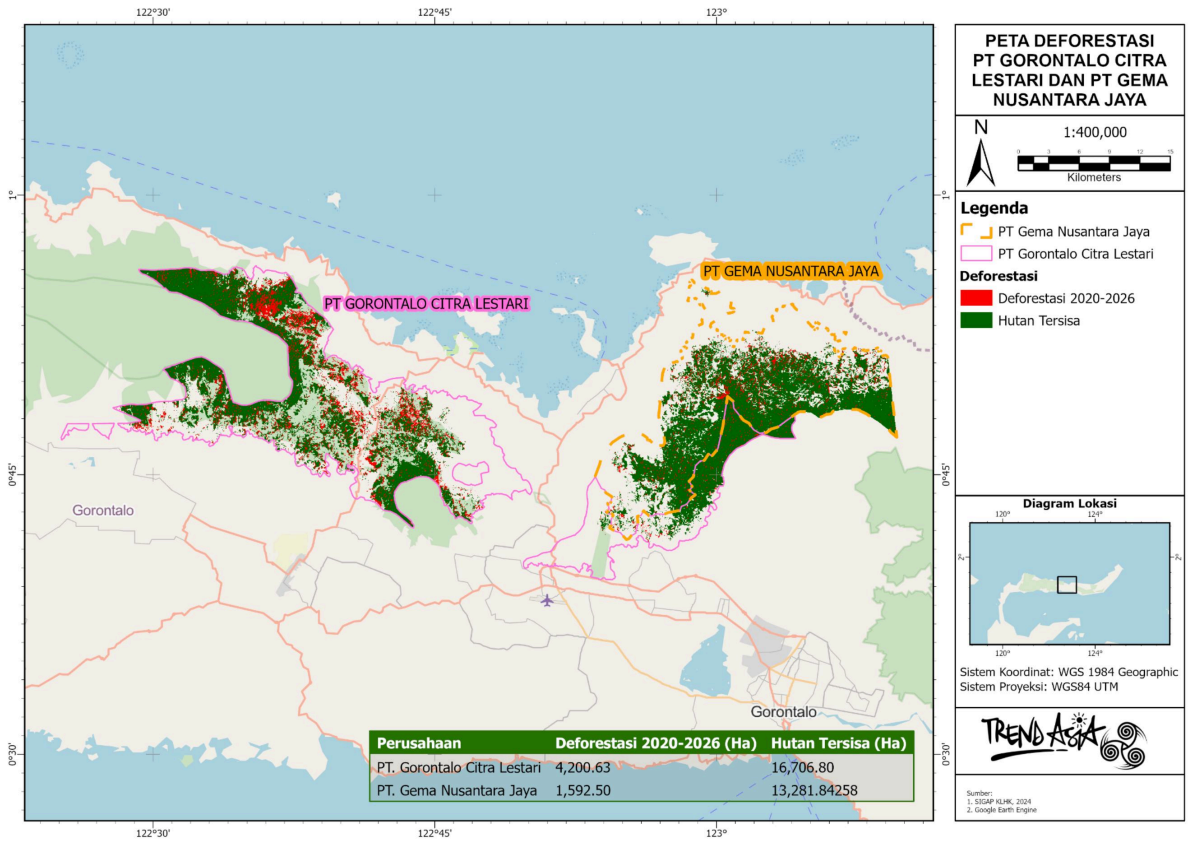
One of the most prominent examples is the wood pellet supply chain associated with PT BJA, which operates a pellet mill in Pohuwato Regency. The mill receives timber from plantation concessions operated by PT BTL and PT IGL. Together, these operations demonstrate how the expansion of industrial biomass production is directly linked to changes in forest landscapes.

Concession operator	Deforestation, 2020–2026 (ha)	Remaining forest (ha)	Share of 2020 forest cleared
PT Banyan Tumbuh Lestari	2,822.07	3,944.98	41.7%
PT Inti Global Laksana	1,001.86	10,751.16	8.5%
PT Gorontalo Citra Lestari	4,200.63	16,706.80	20.1%
PT Gema Nusantara Jaya	1,592.50	13,281.84	10.7%

Table 1. Deforestation and remaining forest in four energy plantation concessions in Gorontalo, 2020-2026. Source: Trend Asia (2026), based on SIGAP KLHK (2024) and Google Earth Engine.



Map 4. Deforestation in the PT Banyan Tumbuh Lestari and PT Inti Global Laksana concessions, Pohuwato Regency, 2020-2026. Source: Trend Asia, 2026.



Map 5. Deforestation in the PT Gema Nusantara Jaya and PT Gorontalo Citra Lestari concessions, North Gorontalo Regency, 2020-2026. Source: Trend Asia, 2026.

In October 2024, a coalition of environmental organisations from Indonesia, South Korea, and the United States, published a report highlighting the serious threat that the biomass industry poses to Indonesia's forests.

The report focused on deforestation in the PT BTL concession in Gorontalo (Earth Insight et al., 2024). Following its publication, a series of meetings took place with policymakers, investors, financial institutions, and buyers in South Korea and Japan, two major markets for Indonesian biomass. A report by a prominent Japanese media outlet quoted Hanwa Corporation, a major shareholder of PT BJA, as saying that it would avoid deforestation.

However, independent monitoring suggests that natural forest conversion is continuing. Auriga Nusantara's 2026 satellite-image analysis identified approximately 720 hectares of deforestation within the PT BTL concession between January and April 2026 (Auriga Nusantara, 2026). Hanwa has confirmed in correspondence with civil society organisations that it sources pellets from PT BJA, which processes wood from the BTL and IGL concessions.

PT BJA's ownership structure further illustrates the international connections behind this expansion. The company is jointly owned by PT Hijau Energi Bersama, associated with the Indonesian coal conglomerate Adaro, and Japanese trading company Hanwa Co., Ltd. Hanwa holds a 20% stake in BJA, linking production in Gorontalo directly to the international biomass trade (FWI, 2024).

The remaining six concessions, covering about 163,900 hectares, recorded around 2,080 hectares of forest clearing between 2021 and 2025 according to FWI (Table 2).

The scale and persistence of forest conversion raise questions about the industry's claims of sustainability. Although energy plantations are frequently presented as a way to produce renewable fuel from degraded land, converting natural forests into monoculture plantations entails the loss of existing carbon stocks, wildlife habitats, and ecological functions (Waring et al., 2020). The consequences extend well beyond the land cleared for pellet production.

Concession operator	Deforestation, 2021–25 (ha)	Concession (ha)
PT Keia Lestari Indonesia	270.01	52,140.66
PT Keia Lestari Indonesia Uni*	131.21	43,452.26
PT Lumintu Agung Lestari Joyo	523.74	39,397.31
PT Nawa Waskita Utama	307.17	18,394.67
PT Sorbu Agro Energi	773.05	9,444.47
PT Sawit Tiara Nusa	77.50	1,034.39

Table 2. Other biomass energy plantation concessions in Gorontalo

3.2

Biodiversity loss and watershed degradation

The environmental consequences of biomass expansion are particularly concerning in a landscape as ecologically important as Gorontalo. Natural tropical forests support complex ecosystems that cannot be replicated by monoculture plantations of fast-growing trees. Their conversion can fragment wildlife habitats, disrupt ecological processes, and reduce the resilience of surrounding landscapes (FWI, 2024; IPCC, 2022).

Energy plantation concessions already overlap with areas recognised for their exceptional biodiversity value. Based on Forest Watch Indonesia's spatial analysis, approximately 75,412 hectares of Key Biodiversity Areas (KBAs) and 59,623 hectares of Important Bird Areas (IBAs) fall within biomass concession boundaries in Gorontalo. Between 2021 and 2025, at least 17.5 hectares of natural forest were cleared within these overlapping KBAs, alongside nearly 6 hectares within IBAs.

Although the recorded clearing within these designated areas remains relatively limited compared with the total concession footprint, their overlap with energy plantations raises concerns about future expansion. Continued forest conversion could further fragment habitats used by endemic and threatened species, many of which depend on the ecological characteristics of natural forests (Zou et al., 2025).

The consequences of forest conversion also extend to water systems. Natural forests help regulate rainfall runoff, protect watersheds, and reduce soil erosion. Replacing them with industrial plantations can alter these functions, particularly where clearing occurs in upstream areas connected to downstream settlements (IPCC, 2022).

In June 2025, severe flooding affected approximately 1,235 people in Pohuwato Regency



Photo 4: Natural forests inside the PT Banyan Tumbuh Lestari concession are being cleared for monoculture biomass plantations. Credit: Auriga Nusantara, 2026.



Zaenuddin shows the flood marks inside his home in Tuweya Village, Wonggarasi District, Popayato Regency, Gorontalo Province

Photo 5. Aftermath of the June 2025 flood in Pohuwato Regency, Gorontalo, which affected around 1,235 people. Source: Trend Asia, 2025.

(Detik Susel, 2025). The PT BTL and PT IGL concessions associated with PT BJA overlap with the Lemito, Popayato, and Randangan river basins, which are located upstream of communities affected by flooding. According to Indonesia's National Disaster Management Agency, Pohuwato has the highest flood hazard level in Gorontalo, with more than 41,000 hectares exposed and approximately 87,500 people at risk.

Flooding results from multiple interacting factors, and the available evidence does not establish that biomass plantations caused the June 2025 event. Nevertheless, the expansion of plantations into forested watersheds warrants concern because forest conversion can increase surface runoff, accelerate erosion, and weaken the landscape's capacity to absorb heavy rainfall (Herath et al., 2025).

These risks highlight why the environmental footprint of biomass production cannot be assessed solely by the amount of wood harvested or the legality of plantation operations. The location of concessions and their effects on surrounding ecosystems are equally important.

3.3

Community livelihoods and Indigenous Peoples' rights

The expansion of biomass plantations also raises concerns about land rights, community participation, and the livelihoods of people who depend on Gorontalo's forests. These landscapes provide resources and cultural connections that cannot be measured solely through their commercial value as timber or energy plantations.

Particularly concerning are the potential impacts on the Indigenous Polahi People, whose ancestral territories overlap with forest areas targeted for industrial plantation development. An assessment by Earth Insight and Aliansi Masyarakat Adat Nusantara (AMAN) identified more than 24,500 hectares of tropical moist forest within

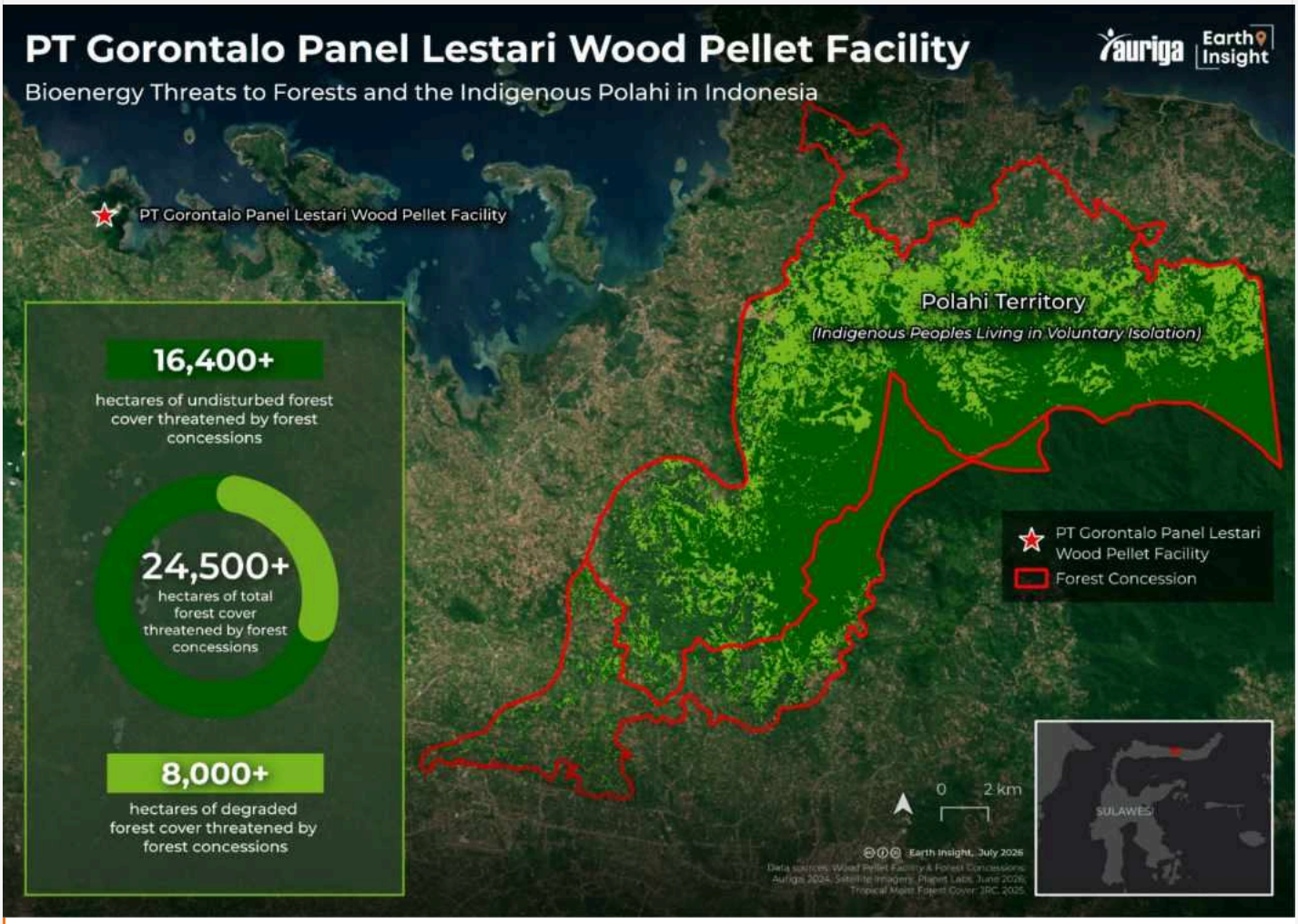
concessions associated with PT Gorontalo Panel Lestari's wood pellet supply chain. These areas include approximately 16,400 hectares of undisturbed forest and more than 8,000 hectares of degraded forest that remain important for biodiversity and Indigenous livelihoods (Earth Insight and AMAN, 2026).

The overlap between these concessions and Polahi territories raises concerns about the protection of Indigenous land rights and the potential effects of plantation development on communities with longstanding relationships to these forests.

Land disputes have also emerged in Pohuwato Regency, where former oil palm concessions have been converted into energy plantation areas. Community members have accused PT IGL and PT BTL of failing to fulfil plasma obligations, which require plantation companies to provide a share of plantation areas or benefits to local communities. Residents have argued that the permit conversion has not resolved longstanding disputes over access to land and the distribution of economic benefits. Rather, these grievances have continued as the plantations have shifted towards supplying biomass feedstocks.

Tensions have escalated in some areas. According to local advocacy organisation Japesda, several community members were detained and reportedly criminalised following protests over their rights (Lahay, 2026). Community representatives have also raised concerns about inadequate consultation and grievance mechanisms, including the implementation of Free, Prior and Informed Consent (FPIC).

Interviews conducted by Friends of the Earth Japan further documented concerns over the



Map 6: Forest areas overlapping Indigenous Polahi territory and concessions linked to PT Gorontalo Panel Lestari. Source: Earth Insight and Auriga Nusantara.

presence of security personnel, including police and military forces, around some concession areas. Residents reported feeling intimidated when accessing ancestral lands and participating in decisions affecting their communities (Nakane, 2025).

Taken together, these cases demonstrate that the consequences of biomass expansion are not limited to forests and biodiversity. They also raise questions about whether affected communities have a meaningful say in land-use decisions and whether the economic benefits of the industry are being shared fairly.

3.4

Why existing sustainability safeguards fall short

The continued reports of deforestation, ecological damage, and community disputes in Gorontalo raise questions about the effectiveness of the systems intended to ensure that biomass is produced sustainably. Although timber legality regulations, voluntary certifications, and corporate due diligence measures exist, they do not necessarily prevent natural forest conversion or address the full range of environmental and social risks associated with industrial biomass plantations.

1 Legality does not guarantee sustainability

Indonesia's Timber Legality and Sustainability Verification System (Sistem Verifikasi Legalitas dan Kelestarian, SVLK) was established to verify that timber products originate from legally authorised sources. While compliance with SVLK is mandatory, its primary focus remains on legality rather than the broader environmental consequences of timber production (SILK, n.d.).

This distinction is particularly important for industrial energy plantations. Forest conversion may be permitted under applicable land use authorisations, meaning timber associated with the clearing of natural forests can potentially satisfy legality requirements without meeting broader expectations for forest protection.

Implementation and enforcement also remain concerns. Independent monitoring has documented alleged environmental and administrative violations within Indonesia's timber industry, including cases involving certified operators. Kaoem Telapak's investigation, for example, identified more than 50 companies allegedly involved in illegal timber trading, some of which held SVLK certification (Kaoem Telapak, 2024).

2 Voluntary certifications do not prevent forest conversion

Voluntary certification schemes, including the FSC and Sustainable Biomass Program (SBP), are also used to demonstrate responsible forest management and biomass sourcing. However, these schemes have faced criticism over inconsistent implementation, limited transparency, and their ability to address cumulative forest loss, biodiversity risks, and Indigenous rights concerns (Earthsight, 2021; Robertson, 2025).

The case of PT Gema Nusantara Jaya (PT GNJ), an industrial timber plantation operator in North Gorontalo, illustrates these concerns. PT GNJ manages a concession of nearly 30,000 hectares and received FSC certification in May 2024, valid for five years. In 2021, the company transitioned from an industrial timber plantation model towards a multi-forestry business framework, including energy plantations for wood pellet production and carbon trading (Lahay, 2026).

Despite holding certification, forest loss has continued within the concession. Spatial analysis indicates that approximately 2,977 hectares of natural forest were cleared between 2011 and 2020, while at least 402 additional hectares were lost between 2021 and 2025 (Lahay, 2026; Lahay, 2026). Monitoring has also identified indications of road construction and planting in river buffer areas.

Jaringan Pemantau Independen Kehutanan (JPIK) has further raised allegations concerning PT GNJ's relations with local communities,

including inadequate consultation, the use of security personnel during land acquisition, and legal actions against individuals opposing the company's operations. These allegations raise questions about whether certification assessments and oversight adequately capture environmental and social conditions on the ground.

The broader limitations of voluntary certification are particularly significant when such schemes are used by importing countries or corporate buyers as evidence that biomass supply chains are sustainable. Certification alone cannot substitute for independent monitoring, effective enforcement, and comprehensive safeguards against forest conversion and rights violations.



Photo 6: Clear-cut forest concession in Gorontalo haul zone of a wood chip plant. Credit: Auriga Nusantara, 2026.

3 Corporate due diligence needs to extend beyond company assurances

Questions over the effectiveness of corporate oversight have also emerged in relation to PT BJA's wood pellet supply chain.

In March 2026, Japanese companies Hanwa and Tokyo Gas, both commercially linked to PT BJA, visited its operations in Pohuwato following increased scrutiny from Indonesian and international civil society organisations.

Public reporting indicates that the visit focused on legality, permits, and the company's contribution to local development. However, available accounts suggest that meetings were primarily held with company representatives and government officials, with limited evidence of direct engagement with affected communities or local civil society organisations (VOI, 2026).

Such visits may help companies assess regulatory compliance, but they are not sufficient on their own to establish whether biomass production is free from deforestation, ecosystem degradation, or community rights concerns. Meaningful due diligence requires independent assessment of environmental impacts and engagement with people directly affected by plantation operations.

The cases documented in Gorontalo reveal a recurring gap between the formal systems used to demonstrate sustainability and the conditions experienced in producing landscapes. As long as oversight remains narrowly focused on legality or company-level certification, the wider consequences of biomass expansion risk being overlooked.

CHAPTER 4

The road ahead: Preventing further biomass-driven deforestation

Photo: Iqbal Lubis/Trend Asia

The expansion of industrial biomass production in Gorontalo illustrates a growing challenge for the global energy transition. Policies designed to reduce dependence on fossil fuels have created new markets for woody biomass, but the environmental and social costs of supplying these fuels are often borne by the forests and communities of producing regions.

The scale of plantation development in Gorontalo demonstrates how quickly these pressures can accumulate. More than 265,000 hectares have been allocated to energy plantation concessions, and in just four of them 9,617 hectares of deforestation recorded between 2020 and 2026. Continued forest clearing in 2026 indicates that the impacts are ongoing, even as the sustainability of large-scale biomass energy faces increasing scrutiny.

At the same time, the policy environment in major importing countries is beginning to change. South Korea has started withdrawing renewable energy subsidies from several categories of biomass power, while Japan has introduced additional greenhouse gas reporting requirements and adjusted its financial support mechanisms. These developments represent important steps towards addressing the shortcomings of existing biomass policies.

However, their immediate effect on producing regions remains uncertain. Existing biomass power plants in Japan and South Korea continue to require fuel, and neither country has established a comprehensive plan to eliminate the demand for biomass associated with natural forest conversion. Meanwhile, Indonesia is promoting biomass co-firing in its own coal-fired power plants, creating another potential source of demand for wood feedstocks.

These overlapping policy and market pressures leave Gorontalo at a crossroads. Without stronger safeguards, the continued expansion of biomass plantations could place additional pressure on remaining natural forests, biodiversity, and community livelihoods. Conversely, changes in government incentives, sourcing requirements, and corporate practices could help prevent further damage.

The findings of this report point to three priorities: protecting remaining natural forests in producing regions, reducing policy-driven demand for large-scale woody biomass, and ensuring that companies are held accountable for the environmental and social impacts of their supply chains. Gorontalo is not just a local forestry dispute or a distant consequence of foreign electricity policy. It is a test of whether the costs of an energy transition are properly counted, and whether the places supplying its fuels share in the protections promised by that transition.

Recommendations

1 **Indonesia: Protect natural forests and community rights**

- **Prevent further conversion of natural forests for biomass plantations.** Establish and enforce legally binding protections against the conversion and degradation of remaining natural forests, including those outside formally designated protected areas. Review forest-use permits and concession arrangements that allow natural forests to be cleared for industrial energy plantations. Extend the permanent moratorium on new permits in primary forest and peatlands to secondary natural forests.
- **Strengthen implementation of Indonesia's Timber Legality and Sustainability Verification System (SVLK) and UU no.18/2013, on Prevention and Eradication of Forest Destruction.** Introduce a cut-off date for natural forest conversion and plot-level geolocation of timber origins, so that SVLK can verify deforestation-free supply chains rather than legality alone. Reinforce environmental safeguards against biodiversity loss and ecosystem degradation. Directly align SVLK sustainability standards with South Korea's and Japan's sustainability guidelines, establishing a joint geospatial tracking

mechanism to ensure zero-deforestation compliance from Indonesian concession sites to East Asian power plants.

- **Protect Indigenous Peoples and Local Communities (IPLCs).** Uphold land and resource rights, ensure meaningful consultation and Free, Prior, and Informed Consent (FPIC) where applicable, and address outstanding grievances concerning plantation development. End the criminalisation and intimidation of communities defending their rights.
- **Enforce sanctions against companies that convert natural forest or violate community rights.** Apply strict license revocation and blacklisting. Implement a zero-tolerance legal mechanism to permanently revoke the operational and export licenses of biomass producers verified to convert natural forests and/or commit social violations, such as land-grabbing and violence against Indigenous and local communities. Coordinate with South Korean and Japanese trade authorities to enforce a joint market blacklist preventing non-compliant companies from accessing their renewable energy markets.
- **Reconsider biomass expansion in the energy transition.** Assess the forest, land-use, and climate implications of biomass co-firing and industrial energy plantations before further expanding their role in national energy plans. Pause the issuance of new energy plantations permits until this assessment is completed. Prioritise energy pathways that do not depend on large-scale timber harvesting or the conversion of natural ecosystems.

2 Japan and South Korea: Reduce demand and strengthen import safeguards

- **Phase out public support for large-scale woody biomass power.** Establish clear timelines to end subsidies and other incentives that encourage large-scale forest biomass consumption, including support provided through Japan's Feed-in-Tariff/Feed-in-Premium (FIT/FIP) schemes and South Korea's Renewable Portfolio Standard (RPS). Ensure that existing support mechanisms do not continue to incentivise forest conversion abroad.
- **Strengthen sustainability and supply chain due diligence requirements.** Move beyond timber legality verification and voluntary certification by requiring companies to identify, prevent, and address risks of deforestation, ecosystem conversion, biodiversity loss, and human rights violations throughout their biomass supply chains.
- **Account for the full climate impacts of biomass energy.** Ensure that energy and climate policies consider emissions from biomass combustion, forest carbon stock changes, and land-use impacts. Avoid treating biomass as inherently carbon neutral or rewarding emissions reductions that exist primarily because of accounting conventions.
- **Prioritise genuinely low-carbon energy alternatives.** Redirect public support towards energy efficiency, electrification, and renewable energy sources such as wind and solar, while avoiding additional dependence on imported forest fuels.

3 Biomass companies and investors: Take responsibility for supply chain impacts

- **Implement robust No Deforestation, No Peat, No Exploitation (NDPE) commitments across the supply chain.** Exclude feedstocks associated with deforestation, natural forest conversion or degradation after agreed upon cut-off date, and human rights abuses. Apply these requirements across suppliers, subsidiaries, and plantation operations.
- **Conduct independent and meaningful due diligence.** Assess environmental and social risks at the landscape level, including impacts on biodiversity, watersheds, and community rights. Engage directly with affected communities and independent civil society organisations rather than relying exclusively on company assurances or regulatory compliance checks.

- **Improve transparency and accountability.** Disclose sourcing locations, suppliers, concession boundaries, sustainability assessments, and measures taken to address identified risks. Establish accessible grievance mechanisms and provide appropriate remedies where operations have contributed to environmental or social harm.
- **Hold certification schemes to their own rules.** The Forest Stewardship Council (FSC) should investigate forest clearing in the PT Gema Nusantara Jaya concession against its Policy to Address Conversion, and the Sustainable Biomass Program (SBP) should not accept feedstock from concessions where natural forest has been converted since 31 December 2020.

References

Auriga Nusantara. (2026). Deforestation inside the Banyan Tumbuh Lestari biomass concession in Gorontalo.

Earth Insight. (2026). New Analysis Shows Accelerating Threats to Biodiversity and Indigenous Peoples from Indonesia's Wood Pellet Supply Chains.

Earthsight. (2021). FSC hall of shame: The ethical wood label's long line of scandals.

Earth Insight, Auriga Nusantara, Forest Watch Indonesia, Earth Insight, Auriga Nusantara, Forest Watch Indonesia, Solutions for Our Climate, Trend Asia, and Mighty Earth. (2024). Unheeded Warnings: Forest Biomass Threats to Tropical Forests in Indonesia and Southeast Asia.

Environmental Paper Network. (2025). Burning Billions for Biomass. Biomass Action Network.

FAOSTAT. (n.d.). Forestry Production and Trade.

Forest Watch Indonesia. (2024). Kehadiran Kebun Energi: Kerusakan Ekologis dan Bentuk Penjajahan Baru.

Forest Watch Indonesia. (2024). Pelet Kayu Ilegal dari Gorontalo Ngalir ke Korea Selatan dan Jepang.

Herath, P, Croke, B, Prinsley, R, Vaze, J, and Pollino, C. (2025). A systematic review of forest cover for catchment-scale flood mitigation: A nature-based solution. Journal of Flood Risk Management, 18:e70125.

Intergovernmental Panel on Climate Change. (2022). Terrestrial and Freshwater Ecosystems and Their Services. In: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.

Intergovernmental Panel on Climate Change. (2022). Cross-Chapter Paper 7: Tropical Forests. In: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.

Intergovernmental Panel on Climate Change. (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories,

ITC Trade Map. (n.d.). [Data Set].

Japan Custom. (n.d.). Trade Statistics of Japan. [Data Set].

Kaoem Telapak. (2024). Analisa Peraturan Terbaru Sistem Verifikasi Legalitas dan Kelestarian (SVLK).

Korea Customs Service. (n.d.). Trade statistics. [Data set]

Korea Energy Agency. (2024). 2024년 신·재생에너지 보급통계. Korea New and Renewable Energy Center.

Korea Forest Service. (n.d.). 목재펠릿 생산 및 판매량.

Korea Legislation Research Institute. (n.d.). Act on The Sustainable Use of Timbers.

Lahay, S. (2026). Buntut tuntut plasma warga Pohuwato hadapi jerat hukum. Mongabay.

Lahay, S. (2026). Jejak konflik tenurial perusahaan hutan energi di Gorontalo Utara. Mongabay.

Lahay, S. (2026). Warga waswas ketika hutan Gorontalo Utara terus tergerus. Mongabay.

Maqoma, R. I. (2025). Berbagai Upaya Memperpanjang Usia Batu Bara dalam RUPTL 2025. Transisi Energi Berkeadilan.

Ministry of Trade, Industry and Energy. (2025). National statistics on biomass power generation. [data set submitted to the Office of National Assembly Member Park Jee-hye]

Nakane, A. (2025). 木質ペレットの生産現場では何が起こっているのか. Friends of the Earth Japan.

Nawu, A. (2025). Banjir terjang 2 desa di Pohuwato, 2 orang sekeluarga tewas. Detik Sulsel.

Robertson, R. (2025). Sustainable Biomass Program: Certifying the Unsustainable. Solutions for Our Climate.

Pemerintah Provinsi Gorontalo. (n.d.). Demografi.

Sistem Informasi Legalitas dan Kelestarian (SILK). (n.d.). Apa dan Bagaimana SVLK.

Song, H. (2025). South Korea to Reduce Subsidies for Biomass Energy, Explained. Solutions for Our Climate.

Sterman, J. D, Siegel, L, and Rooney-Varga, J. N. (2018). Does replacing coal with wood lower CO2 emissions? Dynamic lifecycle analysis of wood bioenergy. Environmental Research Letters, 13.

Suara Energi. (2025). Co-Firing Biomasssa di PLTU PLN Hasilkan 1,67 Juta MWh Listrik Hijau Sepanjang 2024.

United Nations Framework Convention on Climate Change. (2025). Second Nationally Determined Contribution Republic of Indonesia.

VOI. (2026). Receive a Visit from Tokyo Gas and Hanwa, Pohuwato Regent Ensures the Legality and Great Contribution of PT BJA.

Waring, B, Neumann, M, Prentice, I. C, Adams, M, Smith, P, and Siegert, M. (2020). Forests and decarbonization – Roles of natural and planted forests. Frontiers in Forests and Global Change, 3.

Zou, Y, Crowther, T. W, Smith, G. R, Ma, H, Mo, L, Bialic-Murphy, L, Potapov, P, Gawecka, K. A, Xu, C, Negret, P. J, Lauber, T, Wu, Z, Rebindaine, D, and Zohner, C. M. (2025). Fragmentation increased in over half of global forests from 2000 to 2020.. Science, 389:6765.

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