environmental investigation agency

ILL WIND

From Amazon Forest Crimes in Ecuador to Wind Turbines in the U.S. and China

October 2024

Source: AdobeStock

CONTENTS

ACKNOWLEDGMENT

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ABOUT EIA

The Environmental Investigation Agency (EIA) is an award-winning nonprofit, internationally renowned for its use of pioneering innovative investigative techniques. For over three decades, EIA has exposed environmental crimes around the world, amplified frontline voices, and made the emergence of more equitable and sustainable management of the world's natural resources possible. Our organization has confronted the world's most pressing environmental problems, instigated systematic changes in global markets, supported communities' resistances, and promoted precautionary policies that protect the natural world from oppressive, neo-colonialist, and unfair exploitation.

EIA US
PO Box 53343
Washington DC 20009
USA
T: +1 202 483-6621
E: info@eia-global.org

eia.org

Design: www.designsolutions.me.uk

Source: AdobeStock

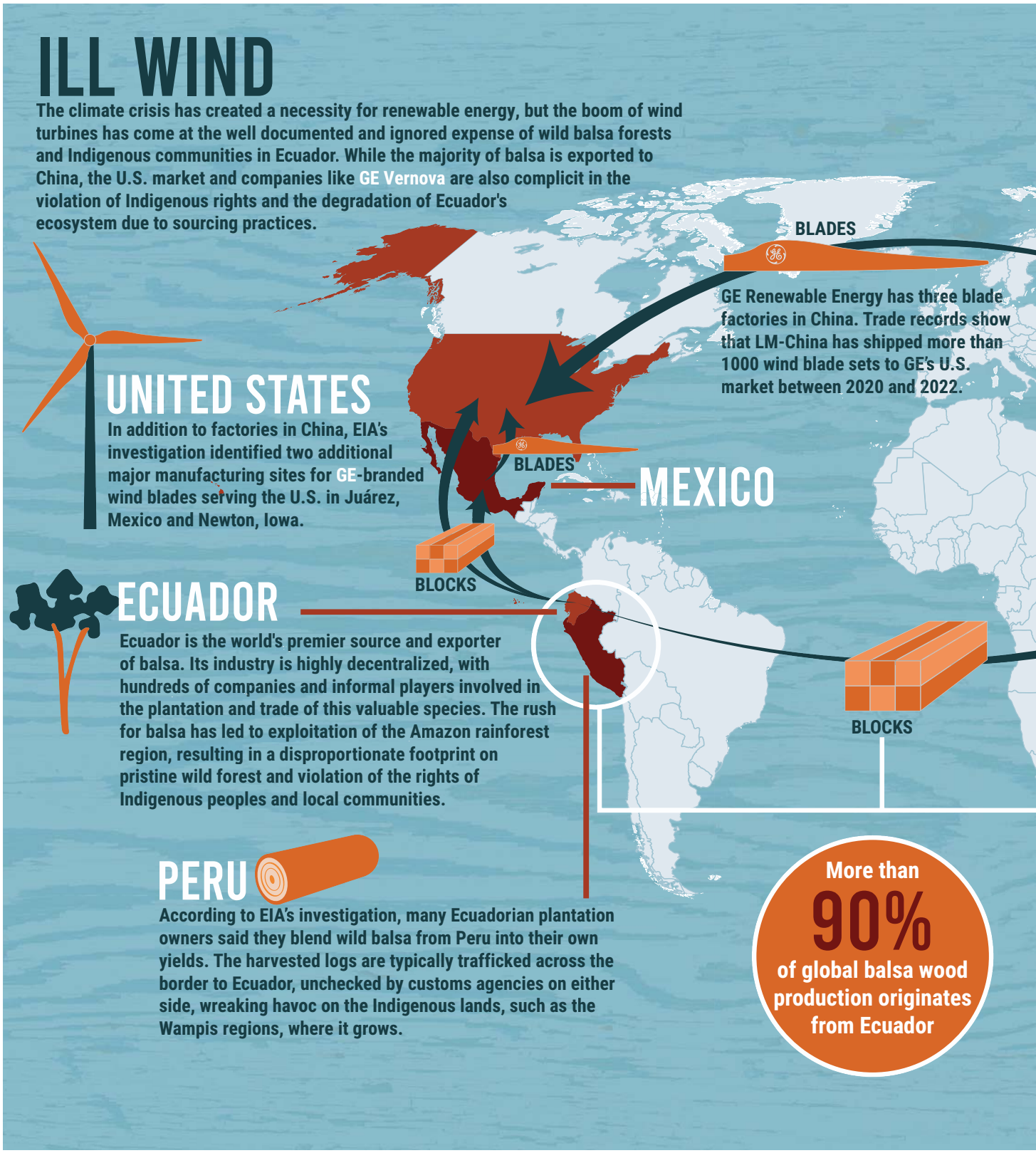
EXECUTIVE SUMMARY

The Environmental Investigation Agency (EIA) built upon existing reporting and conducted an unprecedented multi-year ground-truthing investigation that connects the dots between the illegal logging and human rights violations reported in the Ecuadorian and Peruvian Amazon, the insufficient due diligence by world leading wind blade manufacturers, and global energy provider giants like the recently incorporated GE Vernova.

At the nexus of Amazonian ecosystems, Indigenous People's rights, wind turbines, and major policy incentives in both China and the U.S. lies a tree species known as balsa (*Ochroma pyramidale*). This incredibly light and resistant wood, native from the Americas, has commonly been used as a core material for wind turbine blades.

Ecuador produces over 90% of the balsa in the world, with annual exports averaging 56,000 tons from 2013 to 2022. EIA investigators learned that until the late 2010s, the national production was mostly relying on the dense balsa plantations (over 15,000 hectares) established in the coastal lowland plain of Ecuador. In 2019-2020, the situation changed rapidly, as Chinese provinces rushed to meet their wind power capacity targets established as a consequence of the 2015-2020 5-year national development plan – which made expansion of wind energy capacity a priority.

The sudden demand increase from China led to the exhaustion of balsa wood plantations in Ecuador, in particular for "older" trees of 4-6 years, which are critical to achieve the average wood density required by blade manufacturers. Teams of loggers rushed to forests in the Ecuadorian Amazon to acquire more of these mature trees that were all of a sudden in high demand. Waves of illegal logging, incursions within protected areas and indigenous territories were widely reported. According to EIA findings, illegal loggers have ventured well-within the United Nations Educational, Scientific and Cultural Organization (UNESCO) Yasuni Biosphere Reserve, an area of 2.7 million hectares that comprises one of the most biodiverse forests on Earth and some of the last uncontacted Indigenous groups, the Taegari and Taromenane. EIA investigators were also told that as older balsa trees were becoming more difficult to find in Ecuador, illegal loggers ventured into the neighboring Peruvian forests, smuggled the balsa trees to Ecuador, and laundered them as "origin Ecuador."

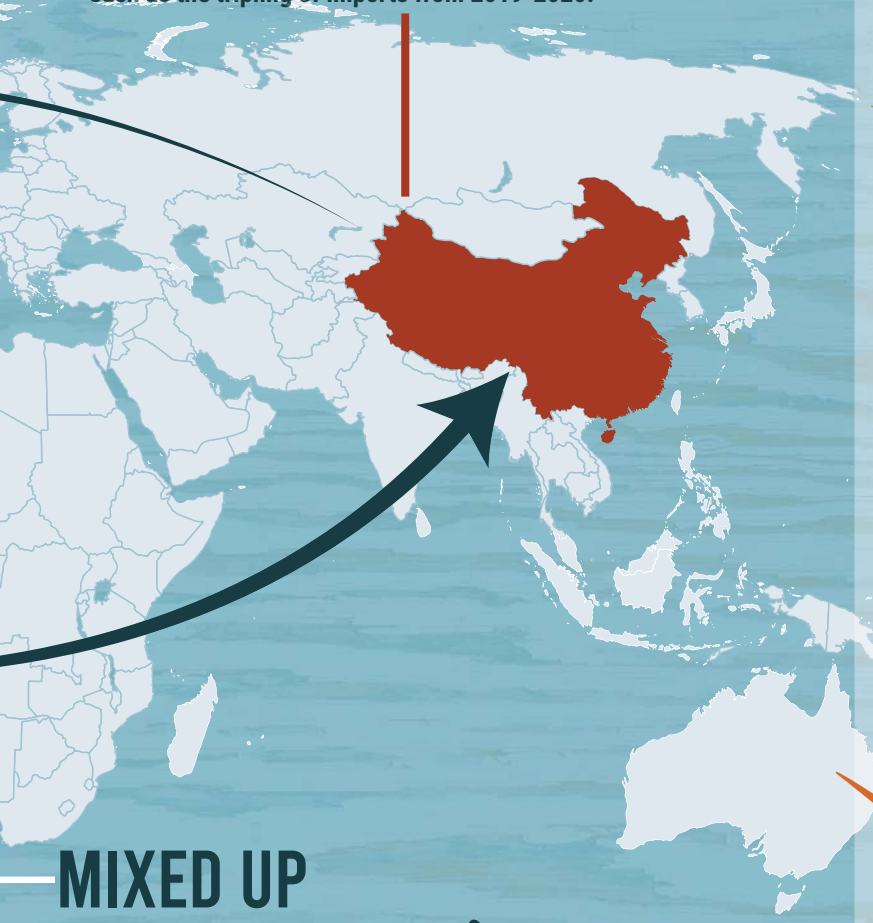


Source: EIA

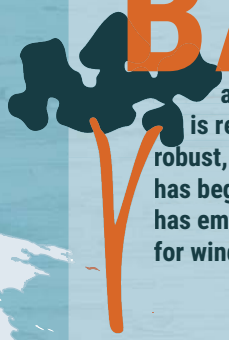
Figure 1
Global balsa wind blades supply chain.

CHINA

China leads in annual new installation and accumulated total capacity of wind energy, absorbing over 75 percent of balsa exports from Ecuador. Any abrupt demand change originating from China will have a huge impact on Ecuador, such as the tripling of imports from 2019-2020.

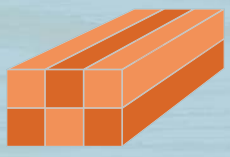


BALSA,



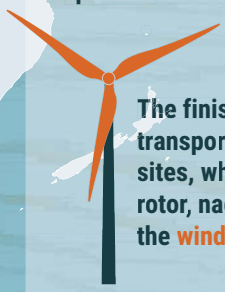
a rapidly growing tree species, is renowned for its lightweight, yet robust, nature. As the wind energy sector has begun to soar in recent decades, balsa has emerged as the preferred core material for wind turbine blades.

Wild balsa is often **logged** in Ecuador's Amazonian heartland, much of it spanning the territories of Indigenous communities, or smuggled from Peru.



Most balsa exported from Ecuador is in the form of **blocks** or **panels**.

These are processed into specific core structures known as "kits," tailored to meet the requirements of blade manufacturing clients, which are then assembled into **wind blades** at specialized factories.



The finished blades are typically transported separately to wind project sites, where they are attached to the rotor, nacelle, and tower to complete the **wind turbines** for power generation.

MIXED UP

PLANTATION BALSA
Ecuador

+

WILD BALSA
Ecuador + Peru

=

ECUADOR'S
BALSA EXPORTS

Optimal density of the balsa element of the finished wind turbine falls between 120-150 kg/m³. According to EIA's investigation, **the only way to achieve optimal density is by mixing balsa** from Ecuador's plantations (usually capped at 100 kg/m³) and natural forests, often from Indigenous lands, in Ecuador and Peru. Multiple exporters corroborated this reliance on wild balsa to bridge the gap, with blending ratios oscillating between 50-50 to 70-30.

According to EIA's investigation this skyrocketing demand has had a long-lasting effect. It appears that since the 2019-2020 balsa boom, the entire balsa production sector continues to depend upon the logging of natural forests, with a blending of plantation vs. natural forest balsa that allegedly varies between 10% and 70%, depending upon exporter. These mixing practices in Ecuador have global repercussions (Figure 1).

According to EIA's findings, leading global blade manufacturers, including TPI Composites and LM Wind Power, have rarely questioned or controlled the origin of the balsa wood they have used. Investigators were told that as long as the balsa wood meets quality and density requirements, origin apparently matters very little. The faulty due diligence across the wind turbine supply chain has profound consequences. The EIA investigation shows that energy provider giants in the U.S., such as the publicly listed company GE Vernova (NYSE: GEV), and world leading wind turbine manufacturers in China, like Goldwind (金风科技) and Mingyang (明阳风电), have allegedly relied for years on balsa supply chains linked to illegal logging, violations of Indigenous People's rights, smuggling, and corruption.

> **"EIA:** You're saying you almost 'have to' mix to meet the clients' requirements?
> **Fadelma:** It's a standard. Everyone mixes. If they tell you they don't mix and only use plantation balsa, it's full of B***SH*T."

As the Inflation Reduction Act (IRA) – which incentivizes the installation of wind farms - is progressively implemented in the U.S. and as China again approaches the end of a 5-year national development plan (2021-2025), the immediate future looks grim for Ecuadorian and Peruvian forests and communities who call them home. However, the concentrated supply chain – one major production country with a handful of well-identified exporters, the growing awareness on the demand side about the real cost of the energy transition – both ecologically and from a human rights perspective, and the influential role of public policies in China and the U.S. offer clear opportunities for change.

In response to EIA's request for comments, GE Vernova, TPI Composites, 3A Composites Core Materials, and Ecuabalpro denied any wrongdoing and expressed confidence in their supply chains. Their answers are available in their entirety at https://eia.org/report/ill-wind/.

EIA recommends:

The Ecuadorian government

- **Launch an investigation into the major balsa exporters regarding their sourcing practices and their reliance on illegal balsa from the Amazon.**
- **Increase intelligence gathering and enforcement cooperation with Peruvian authorities.**
- **Encourage the development and implementation of a nation-wide traceability and transparency system for balsa sourcing.**

Wind blade manufacturers and wind power developers

- **Suspend the use of balsa until Ecuadorian supply chains are traced and transparent.**

The U.S. and Chinese governments

- **Increase dialogue and mutually beneficial cooperation in order to support the emergence of a legal, fair, traceable, and transparent balsa supply chain, leveraging the Sunnylands Statement.**

European Union

- **Focus enforcement efforts on the balsa wood supply chain compliance, during early implementation of the European Union Deforestation Regulation (EUDR).**

The Peruvian government

- **Launch an investigation into illegal logging of balsa from the Amazonian natural forest and establish information exchange and necessary joint enforcement against balsa trafficking across the border.**

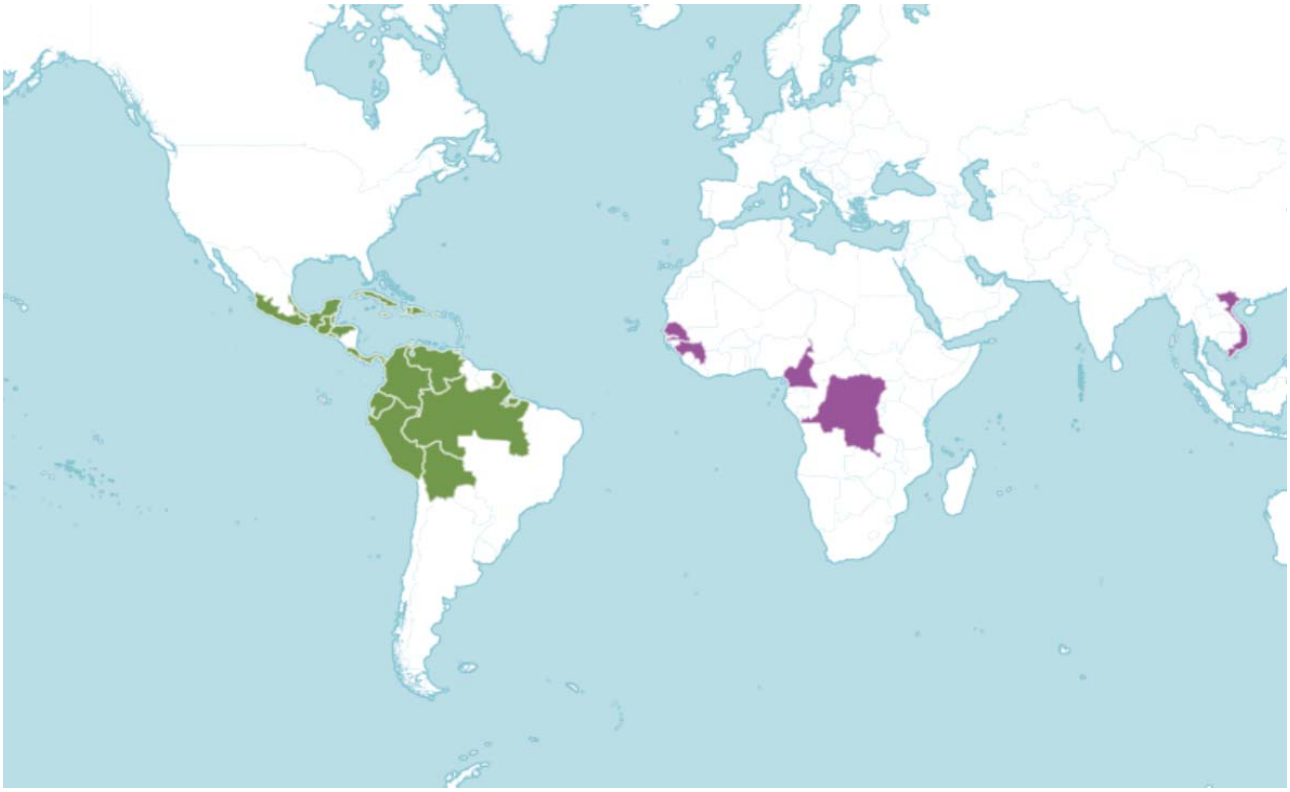
Source: Forest ad Kim Starr

BALSA: CRITICAL TIMBER FOR THE ENERGY TRANSITION

The global climate crisis urgently calls upon all nations to act. July 2023 was the Earth's hottest month[1] ever recorded. Sweltering heat waves blanketed the planet, sending temperatures soaring above 100 degrees Fahrenheit in the middle of winter in parts of South America.[2] Scientists caution that due to the detrimental effects of climate change – largely propelled by fossil fuel consumption – such intense heat waves will become our new reality.[3] Compounding the problem, these increasingly common and severe heat extremes drive up fossil fuel usage,[4] particularly as the demand for air conditioning surges. This is especially concerning when nearly 60% of global power generation still hinges on fossil fuels.[5]

To disrupt this "vicious cycle,"[6] an urgent global pivot towards renewable energy is imperative. Considering that both the European Union (EU) countries and the U.S. currently source a mere 22% of their energy from renewables, there is an undeniable need to expedite the adoption of renewable energy. Recognizing this, in March 2023, the 27 EU nations revised their 2030 renewable energy goals, increasing the target from 32% to a potential 45%, starting with an intermediary target of 42.5%.[7] Meanwhile, the U.S. Biden Administration has declared a goal of 100% "clean electricity" by 2035.[8] Furthermore, in 2022, the U.S. government passed the Inflation Reduction Act (IRA),[9] with nearly $400 billion in federal funding dedicated to advancing clean energy and an additional $43 billion in tax credits to incentivize its adoption.[10] Thanks to the newly available IRA tax credits, GE Vernova, the top wind equipment provider in the U.S.,[11] expanded its facility in Schenectady, NY, hiring 200 new workers[12] to assemble the largest onshore wind turbines ever manufactured in the United States.[13]

The International Renewable Energy Agency (IRENA) estimates U.S. $35 trillion will be required to finance this global energy shift.[14] Beyond financial investment, there's also the matter of sourcing essential materials for fossil fuel-free energy production, including steel, copper,



Source: POWO

Figure 2
World distribution of balsa.[18]

aluminum, lithium, cobalt, graphite, and rare earths. It's projected that the global energy transition from 2022-2050 might necessitate the production of 6.5 billion tonnes of these materials.[15]

Among the numerous materials currently needed to achieve a timely transition to renewable energy, one item that receives little attention proves to be critical to wind energy development. Balsa (*Ochroma pyramidale*), a rapidly growing tree species native to the Americas, is renowned for its lightweight yet robust nature.[16]

"Plantabal: We used to work with Peru… It didn't go well. There's lot of issues with the origin of the wood. We basically had some problems with paperwork that was fake and some investigations are ongoing there.[…]**"**

Its unique combination of strength and lightness makes it ideal for products like model airplanes, surfboards, buoys, and life rafts. As the wind energy sector began to soar in recent decades, balsa emerged as the preferred core material for wind turbine blades.

Balsa is indigenous to the American tropics, spanning from Guatemala through Central America and extending to the north and west coast of South America, reaching as far as Bolivia.[17] Balsa wood has recently been introduced to some southeast Asian and African countries (Figure 2).

Ecuador is the world's primary source and exporter of balsa. It accounts for over 90% of global balsa wood production.[19] Most of the balsa originating from Ecuador is absorbed by the wind turbine industry.[20] In 2020, China bought 77% of Ecuadorian balsa wood exports (in value), followed by the EU and the U.S. with a share of 12% and 11% respectively.[21]

According to EIA's investigation, the fast-rising global demand for wind blades made of balsa wood has driven increased pressure on Amazonian ecosystems in Ecuador, frequently in breach of the law and in violation of Indigenous People's rights.

FROM PLANTATION DEPLETION TO FOREST DESTRUCTION

Under the Cover of Plantation

Over 90% of the balsa used in the world comes from Ecuador.[22] Information publicly available and shared by Ecuadorian balsa wood producing companies frequently describes the origin of the balsa as from plantations.[23] Kew, the United Kingdom's Royal Botanic Gardens, captures the known state of play "Over 95% of balsa wood comes from Ecuador, where it is grown in dense plantations."[24] Balsa plantations primarily established in the Ecuadorian Coastal plain offer densities around 1,000 trees per hectare, with trees growing quickly, and ready to be cut at 6-10 years of age at heights of 22 meters, and 32 centimeters in diameter, on average.[25]

According to the Ecuadorian Association of the Wood Industry (Asociación Ecuatoriana de Industriales de la Madera, AIMA) there are about 15,000 hectares planted with balsa in Ecuador.[26] Plantation types fall into two categories. The first are the small and medium-sized producers who have plantations of up to 40 hectares (and an average size of plantation smaller than 5 hectares). These producers frequently sell their production to traders who will gather large volumes for resale to processing-exporting companies.[27] A second category is made of the large balsa producers that have production units well over 100 hectares. These companies usually produce, process and export balsa. EIA's investigation focused on the top-13 Ecuadorian producers-exporters, and their supply networks.

The leading producer of balsa wood in the world, an Ecuadorian company named Plantabal S.A. - which is part of a complex U.S. - Swiss corporate structure (Box 1), offers a good description of the alleged role of coastal plantations in the balsa wood producing industry:

> "The 3A Composites Core Materials Ecuador operation, Plantabal S.A., has spearheaded the balsa wood business for over 85 years. 3A Composites is the largest forester in Ecuador, with thousands of hectares planted every year, and a pioneer in the sustainable balsa composite materials, BALTEK® core.[...] **Our balsa is 100%-plantation grown on the company's land holdings** and in long-term partnership with local landowners who value balsa as a sustainable crop. It is our company's stringent policy never to clear virgin rainforest for new planting. [...] **The Ecuador operation supplies BALTEK® composite materials to our industrial customers worldwide**. [emphasis added]"[28]

The company also highlights that "All 3A Composites Core Materials managed plantations are FSC®-certified and all our balsa wood products can be ordered as FSC®-certified."[29]

BOX 1.

3A COMPOSITES: AN INTERNATIONAL CORE MATERIALS GIANT

Plantabal S.A., the largest balsa producer and exporter in the world, is owned by Baltek Inc., a U.S. composites material company registered in High Point, North Carolina.[30] Baltek manages the U.S. operation of 3A Composites Core Materials, which is a global organizational unit (business area) within the 3A Composites Group (Figure 3), itself part of a Swiss publicly listed conglomerate, Schweiter Technologies.[31]

Plantabal is basically a forest management company only, and it does not engage in direct sales with clients. It relies on its parent company, Baltek Inc. (itself a subsidiary of 3A Composites Group) to manage the marketing and distribution of its balsa products under the trade name Baltek series (Figure 4).

Source: 3A Composites Core Materials

Figure 3
Baltek Inc. office building in High Point, NC.[32]

Figure 4
Balsa products under 3A Composites Core Material/Baltek Inc.[33]

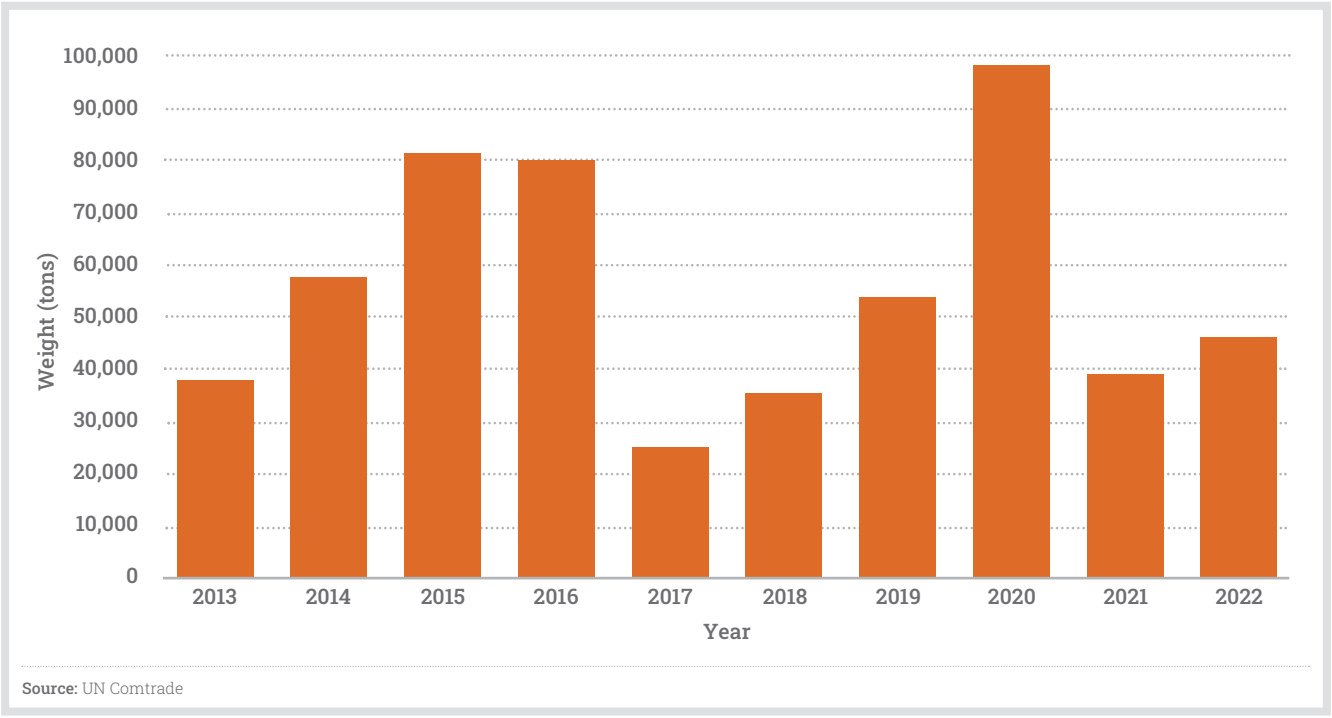


Figure 5
Reported export of balsa from Ecuador, by weight.

Mixing: The Industry's Dirty Secret

EIA's investigation focused on the top 13 balsa exporters, accounting for 55% of the trade. Several of the largest players own plantations in Ecuador. This is the case for Plantabal S.A., a subsidiary of 3A Composites Core Materials, a company headquartered in the U.S. (North Carolina), which owns 14,000-hectares of balsa plantations. Depending on the nuanced requirements of their clientele, balsa trees on these plantations take anywhere between 5-7 years to mature into viable wind blade materials.

EIA investigators were told by balsa producers and exporters that the optimal density for balsa used in finished wind turbines varies between 120 to 150 kilograms per cubic meter. According to these sources, this ideal density goal could in theory be achieved by harvesting plantation balsa wood of different ages, since younger trees (between 3 and 5 years) are lighter (density under 100 kilograms per cubic meter) and older trees (between 5 and 7 years) are significantly heavier (density above 100 kilograms per cubic meters).

However, as global demand surged rapidly in the second half of the 2010s (Figure 5) and boomed in 2019-2020 as a consequence of China's 5-year Plan (Box 2), EIA investigators learned that most of the balsa wood plantations were quickly depleted of their older trees. Most if not all balsa producers and exporters quickly turned to natural forests as a convenient and immediately available replacement. This is where they found the older and denser trees they need to meet their clients' orders.

"**EIA**: So before this, the [balsa] demand was quite stable, and the boom was caused by China?
Ecuabalpro: Yes, China is the only reason for driving up the demand."

The prominent balsa wood exporter further explained the situation to EIA investigators:

"**EIA**: So during the boom, where did you get the extra balsa needed?
Ecuabalpro: We had to get it from other providers…
EIA: Where do they get their balsa from?
Ecuabalpro: Other plantation… or from the forest. It was up to them.
EIA: You mean the wild rainforest?
Ecuabalpro: Yes.
EIA: What is the sourcing portion, plantation versus wild balsa?
Ecuabalpro: About fifty-fifty."

In response to EIA's request, Ecuabalpro general manager stated "ECUABALPRO can emphasize that their wood sourcing strictly complies with Ecuadorian regulations, which are recognized by the European Commission as stringent and environmentally conscious and prevent illegal logging."

According to EIA's investigation, the depletion of plantations in 2019-2020 has had a long-lasting effect, since it has driven exporters and producers to continue to rely heavily on balsa from the wild to meet their clients' orders. In 2024, multiple exporters corroborated this reliance on balsa from natural forests, with blending ratios varying between fifty-fifty and seventy-thirty:

BOX 2.

CHINA'S 5-YEAR PLAN AND THE 2019-2020 "BALSA BOOM"

China's renewable energy development is largely driven by national policies. The Chinese state government designs and implements an overarching social-economic plan every five years, usually setting development goals for almost all primary sectors.[34] Ever since China overtook the United States as the world's largest greenhouse gas emitter,[35] climate change related goals, including specific renewable energy targets, have been gaining momentum and become mandatory to achieve.[36] Once the national 5-year goals are set, each province sets up its own development targets that would then be aggregated to match the national goals.

The development and implementation of provincial goals frequently suffer delay, which end up causing a rush for provinces to meet their targets in the final year(s) of the five-year cycles. In the case of the 2015-2020 plan, the National Energy Bureau didn't set an economy-wide wind development goal until November 2016.[37] It then took each province almost a year to come up with their respective wind power installation target. Transforming these targets into actions took many more months and resulted in a rush to build wind farms across China in 2019-2020 – leveraging the national subsidies available for new wind projects, triggering skyrocketing balsa import volumes during this period, and consequently causing the production rush – or "balsa boom" - in Ecuador. China installed three times as much wind capacity in 2020 as in 2019.[38]

The 2021-2025 wind development targets are set to double the wind capacity installed in the prior 5-year cycle. Industry insiders told EIA investigators that balsa wood demand from China began to rise in 2023-2024, signaling an early warning that another "balsa boom" may be on the horizon.

Figure 6
Blocks of balsa ready to be shipped, after plantation and wild source are mixed.

"**EIA**: We heard you almost 'have to' mix balsa from the wild forest, true?
Mamba Wood: Yes, because plantation balsa is lighter and the wild ones are heavier.
EIA: Roughly how much you got from wild balsa into that mix?
Mamba Wood: Ours is about seventy [plantation] vs. thirty [wild] but others could mix more [wild balsa]."

"**EIA**: Why would you go sourcing from the east rainforest?
Middleman: Here [the west coastal region] you have to wait a minimum of 3 to 4 years to be able to cut, in the east it is 2 or 1.5 years, because of the density. I know because I have worked in large companies for 8 years."

The mixing practices are not limited to small traders and producers. According to multiple sources, Plantabal (a subsidiary of 3A) – the company known as the leading global supplier of balsa (cf. Box 1) - has practiced mixing of plantation and balsa from natural forests for years. This apparently contradicts the statement on the company's website "Our balsa is 100%-plantation grown on the company's land holdings."[39] A manager from Plantabal told investigators that the company does rely on trees from natural forests, "but only 5 to 10%," they explained. The veracity of this information was called into question by all actors who spoke to EIA investigators. As one of Plantabal's competitors explained:

"**EIA**: You're saying you almost 'have to' mix to meet the clients' requirements?
Fadelma: It's a standard. Everyone mixes. If they tell you they don't mix and only use plantation balsa, it's full of B***SH*T.
EIA: So even as large as 3A, they mix too?
Fadelma: Especially 3A! They mix more than 60% from the wild.[...] 3A would say: 'I can tell you this balsa is from which of our lands, where it came from.' That's not true because 60% of balsa they get, they buy it. They don't even know where it's coming from.
EIA: Even for them? They have ten thousand...
Fadelma: Yes, they have a lot of plantations. But that doesn't mean they don't buy from outside. I know suppliers who supply 3A too. And 3A buys from other places, satellite collection points, etc. It's not a 100% production from their own. No, No!
EIA: Would you say, industry-wise, 80%, or maybe 60-80% is from the wild?
Fadelma: I wouldn't say 80%, but maybe 60% from the wild, 40% from plantation."

In practice, the mixing process typically unfolds as follows: balsa logs, whether originating from plantations or wild forests, are initially peeled and then cut into elongated sticks. These sticks are subsequently assembled to construct blocks (Figure 6). The density of this assembled structure is then gauged, and it's at this juncture that the precise blend of plantation-grown and wild balsa sticks is determined to ensure the resultant block meets the optimal density for wind blade core materials.

The Rush to the Ecuadorian Amazon: A Complex Reality

According to EIA's investigation, in order to meet the demand from their clients, each exporter has forged its own unique relationships with dedicated traders or middlemen responsible for procuring balsa wood from natural forests. On occasion, investigators were told that exporters might dispatch representatives to oversee the sourcing directly. However, more often than not, the exporters explained that they rely on the traders to source for them, which spare them tedious trips to the eastern regions of the country. As these main exporters explained to investigators, their primary concern hinges on the quality of the wood. If the balsa from natural forests meets the desired quality and density standards - exhibiting neither excessive weight nor signs of pest infestation - its origin seldom matters. One of the exporters explained:

"**EIA**: If you have to go sourcing from the Amazon, how would you do it?
Mamba Wood: They [traders] just transport here, so you don't need to go searching by yourself. It will be more difficult for you to go there. We have established suppliers. We just call them and they will take care of the sourcing for us."

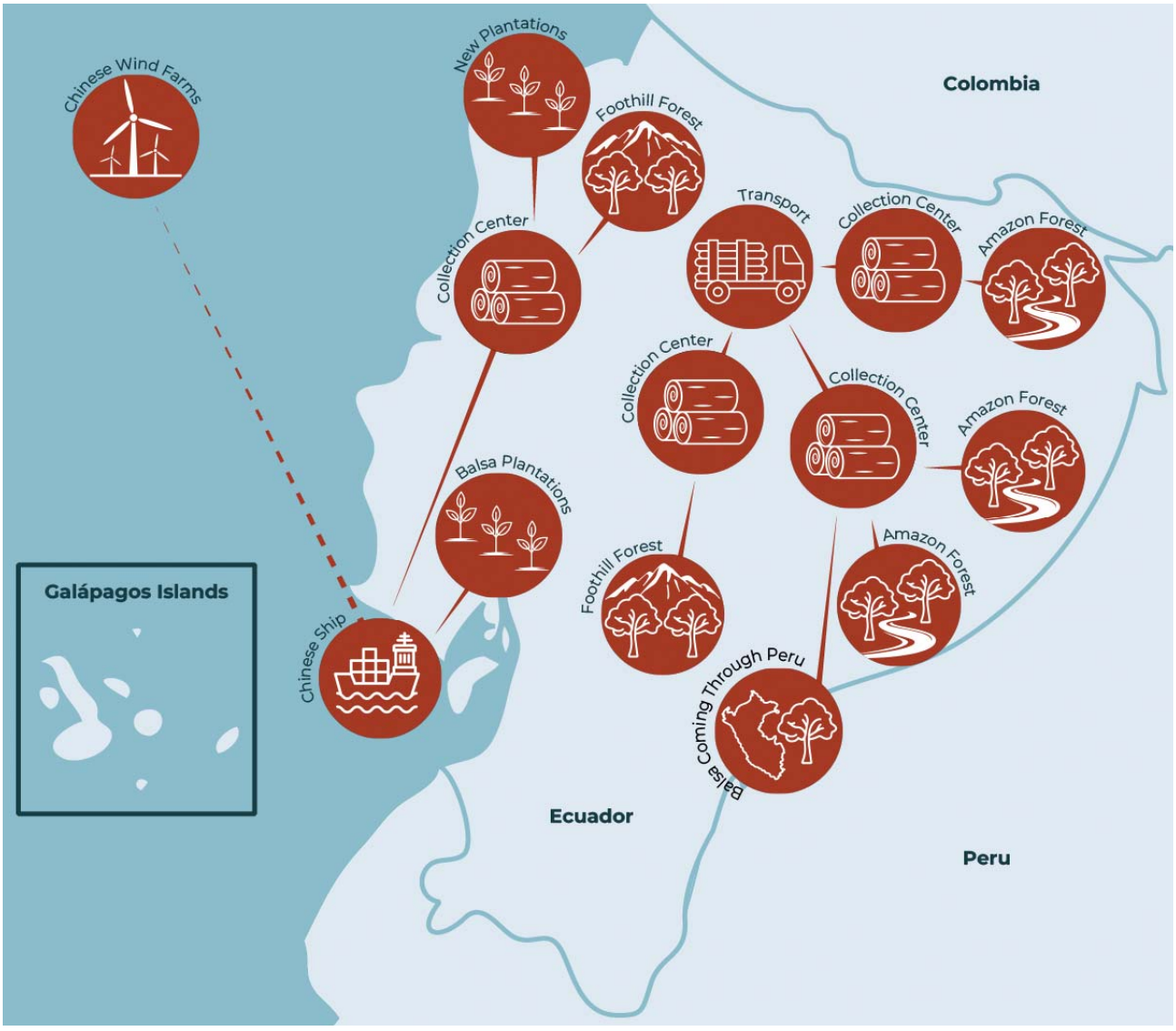
The EIA investigation found that balsa extracted from natural forests is often logged in Ecuador's Amazonian heartland, much of it spanning some of the last intact forest landscape in the country, unique protected areas, and emblematic Indigenous territories. Corroborating the multiple reports about the logging of balsa from the Ecuadorian Amazon, traders told EIA investigators that logging was taking place from north to south across most of the Amazonian provinces of the country, including Sucumbíos, Napo, Orellana, Pastaza, and Morona Santiago. Figure 7 presents the span of the balsa logging fronts in Ecuador.

The majority of insiders who spoke to EIA investigators acknowledged the unethical and often illicit nature underpinning the balsa logging operations in the Ecuadorian Amazon. As one trader confirms:

"**EIA**: would you say most of the balsa industry here is illegal?
Indubalsa: Yes, I agree."

Multiple traders also described the frequent incursion of logging teams well within protected areas, including in the Yasuní National Park, which is also part of the UNESCO Yasuní Biosphere Reserve. The biosphere reserve covers a landscape of more than 2.7 million hectares and includes some of the most biodiverse forests on earth (Box 3).[41] As one balsa trader explained to EIA investigators:

"**EIA**: What is being done there for people to say that it is illegal?
Middleman: Supposedly there are areas that are protected forests, like the Yasuní. But people still take,



Source: Acción Ecológica

Figure 7
Origin of the wild balsa.[40]

continue to take from the Yasuní. There are some huge trees there! At least I don't risk it because it's a crime."

Reports have revealed multiple negative impacts of the balsa fever on Ecuador's Amazon forests. Balsa exploitation has led to fragmentation and deforestation.[48] Loggers have taken advantage of newly established forest roads, opened for the exploitation and transport of balsa, to harvest other timber species. In some areas, the intensification of the balsa logging has been associated with drastic change in forest cover.[49] Balsa plantations have also been established after clear-cutting primary forests.[50]

Driven by the lure of high profits and benefitting from the absence of government control, loggers have pushed further into the Ecuadorian Amazon, invading indigenous territories. Illegal logging has been reported in the middle and lower basin of the Pastaza river in the Achuar territory, as well as other Indigenous territories, such as the Kichwa, Shuar and Waorani.[51] A large portion of the logging has reportedly been done without the consent of the Indigenous populations, as Tiyua Uyunkar, president of the Achuar Nation of Ecuador stated, when – accompanied by journalists - he confronted a group of loggers: "There is no authorization to take balsa wood out of our territory, I have not given that permission, gentlemen."[52]

Traders or middlemen typically intrude into indigenous villages, initially conducting reconnaissance to locate specific balsa trees for harvest. They then confront tribal leaders or land custodians to impose a price. Typically, a minimal down payment, around 20%, is offered. Once an agreement is forced, these traders bring in laborers—often outsiders or occasionally locals—to cut down the designated trees. After the trees are felled and roughly processed through peeling and sawing, the traders hastily settle the remaining payment with the tribes and proceed to transport the wood out of the area. As the loggers' incursions intensified and local income from tourism plummeted as a result of the COVID-19 pandemic, a growing number of Indigenous families started to be involved in the balsa wood logging operations. A report from WWF indicates that "around 80% of the inhabitants (more than 400 families) of 20 communities of indigenous nationalities Kichwa, Waorani and Shuar dedicated themselves to logging activity by cutting down trees located on their properties."[53]

"**EIA**: do you work with plantations or with native communities?
Middleman: In the east [part of Ecuador] we generally work with communities because of the permits. The head of the community gives me a piece of paper with which the management plan is made, but we also buy randomly. It is different from the work on the coast. In the east, the indigenous people gather with their small volume of wood, one pays, collects it and leaves."

BOX 3.

YASUNÍ LANDSCAPE: A VERY SPECIAL PLACE ON EARTH

The Yasuní landscape (Figure 8), which is composed of the Yasuní National Park and the surrounding Woarani Ethnic Reserve, covers over 2.7 million hectares of tropical forests in the northern Ecuadorian province of Napo. The Yasuní National Park is the largest conservation area in Ecuador. It covers some 1.1 million hectares of Amazon rainforest. The park includes a 700,000-hectare "untouchable zone" – the Tagaeri Taromenane Untouchable Zone, ZITT- permanently off-limits for any extractive operations.[43] The Waorani Ethnic Reserve is inhabited by at least two clans living in voluntary isolation. The park is at the heart of a larger 2.7 million hectare area covered by the UNESCO Yasuní Biosphere Reserve, which 75,000 people call home.

Many scientists have stressed the importance of the protection of this reserve due to its extraordinary biodiversity, state of conservation, and being home to one of the last indigenous tribes living in voluntary isolation.[44]

The Yasuní landscape comprises some of the most biodiverse forests on the planet.[45] 4,000+ plant species and 170+ mammals call Yasuní home.[46] Over 130 threatened species including the giant otter (*Pteronura brasiliensis*), white-bellied spider monkey (*Ateles belzebuth*), golden-mantled tamarin (*Leontocebus tripartitus*), giant armadillo (*Priodontes maximus*), and jaguar (*Panthera onca*) have been identified in the biosphere reserve. More than 650 tree and bush species have been identified in just one hectare, this corresponds to the total number of native tree species in North America.[47]

Figure 8
Yasuní Landscape is of Global Significance.[42]

As the report further describes, balsa – which was previously considered "weed" by community members – has become an important element of the local production systems. Many Indigenous families actively manage the secondary forest regeneration in order to favor the growth of the balsa trees, frequently counting from 20 to 30 trees on their plots of land.[54] The growing role of balsa wood in Achuar communities has reportedly spurred internal discord.[55,56] While the average price of balsa sawn wood exports to China was $722 per cubic meter, local communities were paid as low as 22 cents per tree.[57] The chaotic and fast development of the balsa economy deep into Ecuador's Amazonian regions has contributed to major social problems, including drug abuse and domestic violence.[58]

Peru: Smuggler's Cove

This dire extractive situation has extended well beyond Ecuador's borders. As Ecuadorian producers and exporters explained to EIA investigators, in order to meet the growing international demand, Ecuadorian loggers have crossed into Peruvian territory to fell balsa trees from natural forests, smuggle them back across the border, and export them as "origin Ecuador." The Pastaza River, in particular, has become a highway for transporting illegally logged balsa from Peru to Ecuador.[59]

Major Ecuadorian balsa producers described their smuggling operations to EIA investigators:

> "**EIA**: We heard there is balsa sourced from Peru as well…
> **Ecuabalpro**: Yes, it's common.
> **EIA**: What about the volume, large quantity?
> **Ecuabalpro**: Yes, big volume crossing the border."

The owner of a large export operation shared some insights into the smuggling operation and associated corruption:

> "**EIA**: Your balsa from Peru, does it have all the required documents?
> **Mamba Wood**: Once it gets in [Ecuador], you don't have to worry about it. You can treat it as yield from your own land [in Ecuador].
> **EIA**: So all the balsa from Peru, do they go through the normal importing procedure or are they trafficked in?
> **Mamba Wood**: Usually through trafficking. It normally involves paying the customs agents to cross the border. Once that has been taken care of, you have nothing else to worry about."

The illegal extraction of balsa from natural forest in Peru and its trafficking across the Ecuadorian border prompted a multi-year investigation led by the Peruvian National Police (PNP). This operation led to the seizure of a large quantity of illegal balsa wood and the arrest of 18 members of the so-called "balsa wood clans."[60]

These criminal groups reportedly evaded forest governance by falsely declaring the origin of the balsa and bribing enforcement officials to bypass regulations.[61]

The large-scale plundering of Peruvian forests by Ecuadorian loggers was also explained by Plantabal, Ecuador's largest balsa producer. EIA investigators learned that they began obtaining and using Peruvian balsa from natural forest during the 2019-2020 boom and continued until late 2023. As the manager from Plantabal, a subsidiary of 3A Composites, described to EIA Investigators:

> "**Plantabal**: We used to work with Peru… It didn't go well. There's lot of issues with the origin of the wood. We basically had some problems with paperwork that was fake and some investigations are ongoing there.[…]
> **EIA**: I was wondering, if you knew there is no balsa industry there, and there's legal issues, why did you even buy from them?
> **Plantabal**: Because they had older trees that nobody was doing anything with. Then when the boom was there, everything ran out and people were looking for balsa. We had places they could find it.
> **EIA**: So it's an opportunity thing, right?
> **Plantabal**: Yeah it's an opportunity thing but nobody wanted to be there if they had the choice because, first of all, the area of Peru is Amazonas which has some environmental concerns."

When reached by EIA for comments, 3A stated "3A Composites Core Materials (3A) would like to assure and certify that all balsa wood procured by our customers is sourced from sustainable, fully traceable sources.[…] 3A manages several thousand hectares of FSC-certified plantations for forestry management in both Ecuador and Papua New Guinea. In addition to this, Chain of Custody certification (CoC) which is used to guarantee the traceability from wood to finished product. Moreover audits and due diligence processes have been performed by customers. […] Due to confidentiality concerns, 3A will not comment on specific details of our contracts and relationships with our customers and suppliers."

Due to the negative impacts on their communities and lands, Indigenous groups have had no other choice than to organize their own anti-trafficking operations. In 2020, the independent government of the Wampis Nation in Peru, an indigenous community in the Amazonas and Loreto regions, began documenting and reporting illegal balsa logging activities on their lands.[62] By the end of the year, the Wampis authorities arrested 20 Ecuadorian illegal balsa traffickers.[63]

BLADE MANUFACTURERS: A CONVENIENT IGNORANCE

As EIA investigators learned, most balsa exported from Ecuador is in the form of blocks or panels. Upon arrival at the importing destination, these balsa blocks or panels are first processed into specific core structures known as "kits," tailored to meet the requirements of blade manufacturing clients.

EIA investigators were told that these balsa kits are then assembled into wind blades at specialized factories. The finished blades are typically transported separately to wind project sites, where they are attached to the rotor, nacelle, and tower to complete the wind turbines for power generation. The manufacturing of these kits and the assembly of wind turbines can be managed by a single entity or by different companies at different locations or even across different continents. Figure 9 illustrates the different stages of the process.

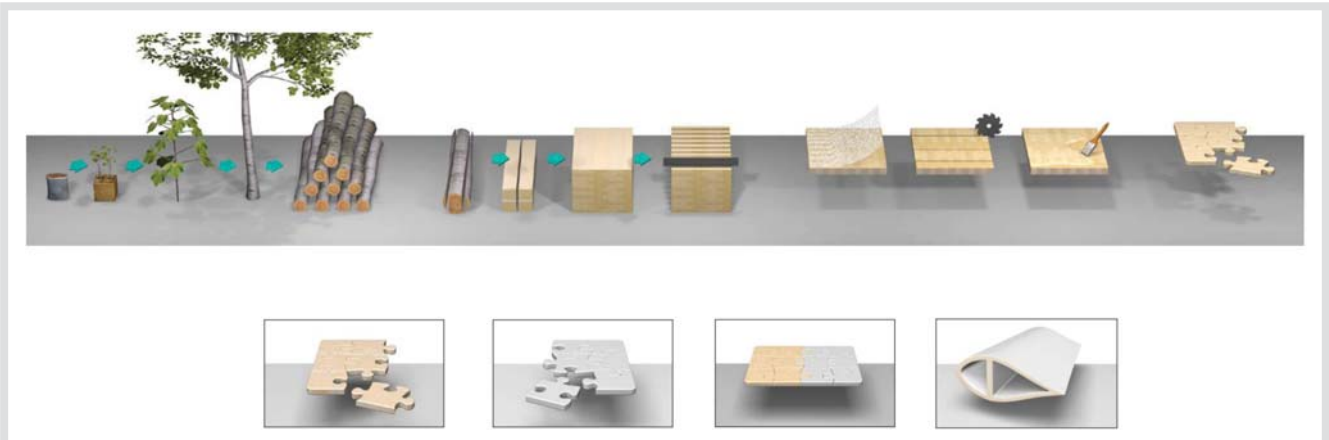
China, the EU and the U.S. currently lead the world in wind power capacity. Total installed capacity from these three regions combined accounted for more than 90% of the global wind capacity at the end of 2023.[65] EIA's findings indicate that these three regions are all exposed to tainted balsa supply chains.

China Route

Given that China has been leading in annual new installation and accumulated total capacity of wind energy for a few years now, it's no surprise that it accounts for over 75% of balsa exports from Ecuador.[66] EIA investigations uncovered that China's top wind turbine manufacturers, including Goldwind (金风科技), Mingyang (明阳风电), and CSSC (中船风电), have been using balsa imported from Ecuadorian traders that practice mixing wild balsa with plantation yield.[67] Therefore, these top Chinese wind turbine manufacturers are at high risk of a contaminated balsa supply chain linked to all the problems in Ecuador.

Likewise, Chinese-based production facilities operated by Western corporations are no exception to such risk because they have been buying balsa from the same Ecuadorian exporters as their Chinese counterparts. For instance, LM Wind Power, a Danish wind blade manufacturer which has been acquired by GE,[68] owns three blade factories in China and has been named by 3A Core Materials as one of its major clients. Those LM factories compete with other blade manufacturers in supplying products to Chinese wind projects. It also exports part of its production to the U.S. market. Trade records show that LM-China shipped more than 1000 wind blade sets to GE's U.S. facilities between 2020 and 2022. Based on the trade data and EIA's findings, those blades would have run the same risk of being a product of mixed balsa sources.

It is notable that many of China's top balsa importers are also Ecuador's largest exporters. Global leading core materials companies like 3A, Gurit and Diab have established trading and distribution subsidiaries in China, facilitating sales of balsa from their production facilities in Ecuador. When questioned about the origin of their balsa, these traders and manufacturers either tried to dodge the inquiry or reluctantly acknowledged the possibility of sourcing from Ecuador's wild forests.



Source: 3A Composites Core Materials

Figure 9
Illustration of balsa component at different stages of wind blade manufacturing process.[64]

"**EIA**: I heard that in Ecuador they mix wild balsa with plantation yield, have you heard about that as well? Do you have to explain that to your clients?
Gurit (Tianjin) employee: What we care, and what our clients care, is the quality of the balsa blocks. As long as it matches the required density, we aren't concerned about origins. There is no need to do that."

"**EIA**: Are you aware of the origin of the balsa you use? We heard that some of them are coming from the wild.
Diab (Jiangsu) employee: [long pause]... it's complicated to comment on that..."

Before China and Ecuador signed a Free Trade Agreement in May 2023,[69] the Ecuadorian government had highlighted balsa as one of the country's most important export products to China, aspiring to be an integral part of the green energy supply chain.[70] The agreement's tariff reductions will serve to decrease the costs and increase the ease of the balsa trade between the two countries. Given the uncontrolled exploitation of wild balsa, the two nations most urgently need to work together to investigate the origin and supply chain issue.

U.S. Route

In 2022, General Electric announced that it would split into three publicly traded companies named GE HealthCare, GE Aerospace, and GE Vernova.[71] After GE Healthcare, GE Vernova was the second to be spun off. GE Vernova LLC was incorporated in April 2024, as GE Vernova Inc. and was listed on the New York Stock Exchange under ticker symbol GEV.[72] GE Vernova Inc. is a global energy equipment manufacturing and services company headquartered in the U.S. (Massachusetts).[73] According to the company, approximately 30% of the world's electricity is generated using the company's installed base of technologies.[74]

Source: EIA

Figure 10
Blade made for GE Vernova loaded on a truck at TPI's manufacturing plant in Chihuahua, Mexico.

As of April 2024, GE Vernova was organized into four divisions, one of them being GE Vernova Wind. The wind turbines used by GE Vernova are comprised of parts manufactured in multiple facilities across the globe. One of them is the aforementioned LM-China wind blade factories. According to EIA's investigation, it appears that the company relies on a few major manufacturing sites for the production of GE-branded wind blades serving the U.S. market. One is located domestically, in Iowa, and the other is located abroad, in the border Mexican state of Chihuahua. Both of these facilities belong to the same company, TPI Composites Inc. (Figure 10)

Founded in 1968 and headquartered in Scottsdale, Arizona, TPI is a world leading independent wind blade manufacturer.[75] According to EIA's investigation, TPI relies for some of its products on the use of Ecuadorian balsa, produced by the company Plantabal, as a manager from Plantabal explained to EIA investigators:

"**EIA**: Are you supplying major wind turbine manufacturers like GE?
Plantabal: Yes, we serve GE, Vestas, LM, etc.
EIA: We heard about TPI making blades for GE. Is TPI also your customer?
Plantabal: Oh yeah, TPI is one of our largest clients. Most of their balsa comes from us.
EIA: To what extent? 80%?
Plantabal: We're not the only one, of course. But we supply the majority."

In response to EIA's request for comments, GE Vernova stated: "The cornerstone of our commitment is constant vigilance to identify and address environmental and human rights risks across our value chain in good faith and to the best of our ability. We endeavor to develop and continuously improve our procedures to identify and address our salient human rights and environmental risks and impacts. We require our business partners across our supply chain to uphold high standards of integrity, sustainability, and respect for the environment and human rights. We are committed to embedding responsible practices across GE Vernova's vast and complex supply chain with integrity and innovation."

TPI stated "TPI remains committed to sourcing balsa wood from sustainable sources for the production of wind turbine blades and has established various contractual and due diligence processes to support this commitment. Due to confidentiality concerns, TPI will not comment on specific details of our contracts and relationships with our customers and suppliers."

As presented above, multiple streams of information indicate that Plantabal relies for a significant part of its production – between 10 and 40% – on balsa sourced from natural forests. According to Plantabal's manager, the company does not differentiate, from an origin and quality perspective, between the products shipped for the Chinese or U.S. markets, in other words all Plantabal's clients are exposed to the same level of risks regarding the origin of the balsa wood.

CONCLUSION AND RECOMMENDATIONS

The urgency of the global transition to renewable energy is real. When it comes to wind turbines, Ecuador plays a central role in this global energy shift.

EIA's findings indicate that the current wind turbine supply chain, including prominent balsa producers - Plantabal, major global manufacturers – TPI Composites and LM Wind Power, and giant energy provider – GE Vernova - are dependent on balsa supply chains that rely on trees logged in the Amazon, which are connected to Indigenous People's rights violations, environmental harms, and corruption. EIA investigations reveal that both the United States and China, the world's leaders in wind energy development, face similar risks of contamination in the balsa supply chain. In this context, EIA recommends:

The Ecuadorian government

- Launch an investigation into the major balsa exporters regarding their sourcing practices and their reliance on illegal balsa from the Amazon.
- Increase intelligence gathering and enforcement cooperation with Peruvian authorities.
- Encourage the development and implementation of a nation-wide traceability and transparency system for balsa sourcing.

Wind blade manufacturers and wind power developers

- Suspend the use of balsa until Ecuadorian supply chains are traced and transparent.

The U.S. and Chinese governments

- Increase dialogue and mutually beneficial cooperation in order to support the emergence of a legal, fair, traceable, and transparent balsa supply chain, leveraging the Sunnylands Statement.

European Union

- Focus enforcement efforts on the balsa wood supply chain compliance, during early implementation of the European Union Deforestation Regulation (EUDR).

The Peruvian government

- Launch an investigation into illegal logging of balsa from the Amazonian natural forest and establish information exchange and necessary joint enforcement against balsa trafficking across the border.

Source: AdobeStock

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environmental investigation agency

EIA US
PO Box 53343
Washington DC 20009 USA
T: +1 202 483-6621
E: info@eia-global.org
eia.org

EIA UK
62-63 Upper Street,
London N1 0NY UK
T: +44 (0) 20 7354 7960
E: ukinfo@eia-international.org
eia-international.org