ROBUSTA'S RECKONING

VIETNAM'S COFFEE BOOM RUNNING OUT OF FOREST, WATER, AND TIME

JUNE 2026

COFFEE WATCH

STAHNIX

CREDITS AND ACKNOWLEDGMENTS

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EXECUTIVE SUMMARY

Vietnam stands at the centre of the global coffee economy and at the centre of its environmental reckoning. It is the world's second-largest coffee producer, supplying roughly one in every five cups consumed globally and nearly 40% of global robusta exports. As the European Union moves to enforce deforestation-free supply chains under the EU Deforestation Regulation (EUDR), Vietnam is central to the debate.

Coffee's global footprint makes this centrality consequential. Coffee is the sixth-largest driver of commodity-linked deforestation worldwide and generates approximately 28.5 kg CO_2-equivalent per kilogram of product, with a significant share linked to land-use change. Vietnam's rise has therefore reshaped not only its own landscapes, but the global climate footprint of coffee.

Vietnam's coffee dominance was built through rapid, concentrated expansion across the Central Highlands. Coffee area increased from approximately 50,000 hectares in the mid-1980s to more than 700,000 hectares today. Nearly all Vietnamese coffee — approximately 93% — is produced in the Central Highlands, across Dak Lak, Lam Dong, Dak Nong, Gia Lai, and Kon Tum. Robusta accounts for approximately 97% of national production, and its agronomic requirements align almost perfectly with the basaltic plateaus of the region. Dak Lak alone accounts for roughly one-third of Central Highlands coffee area and produces more coffee than many entire producing countries.

This transformation was volume-driven rather than value-driven. Vietnam dominates global coffee supply, but captures disproportionately little of its value. Over 90% of exports still leave the country in low-value forms, with processed coffee contributing only around 9% of export value. The model depends on scale: producing more coffee rather than more value per hectare. Scale required land. And that land was not empty.

As recently as 1943, nearly 80% of the Central Highlands remained under forest cover, forming a largely continuous plateau of natural forest across what are now Dak Lak, Dak Nong, Gia Lai, and Lam Dong. Much of the land now under coffee was forest within living memory. Coffee did not drive this transformation alone, but it now operates within, benefits from, and depends on a landscape shaped by decades of frontier expansion, state-directed migration, land consolidation, and integration into global commodity markets.

This report combines satellite-based analysis, high-resolution coffee mapping, historical forest data, and research on water, soil, climate, and social vulnerability to assess the consequences of Vietnam's coffee boom. The picture is clear: coffee production in the Central Highlands has helped drive forest loss, water stress, chemical intensification, and social vulnerability in the very landscape on which the future of Vietnamese coffee depends.

Coffee expansion has left a measurable and lasting deforestation legacy. Using the European Commission Joint Research Centre's Tropical Moist Forest dataset and the CIAT high-resolution coffee cultivation map, **this report estimates that between 1990 and 2022, approximately 207,428 hectares of humid tropical forest were cleared within areas now mapped as coffee cultivation as of 2022. This area is almost the size of Luxembourg.** The loss is highly concentrated in Dak Nong, Lam Dong, and Dak Lak — plateau provinces where suitable coffee-growing conditions overlapped with remaining natural forest during the coffee boom.

This estimate is conservative. It captures forest loss within mapped coffee cultivation areas but does not account for associated land-use changes such as coffee processing and storage facilities, roads, housing for coffee farmers, or land under other crops within coffee production landscapes. Comparable data were available for broader production landscapes in Coffee Watch's Brazil Deforestation report, but not for Vietnam, meaning the full footprint of coffee-related forest conversion is likely larger than captured here.

The timing of forest loss follows a classic frontier cycle. Annual forest loss within today's coffee landscapes surged to around 15,000–20,000 hectares per year in the late 1990s and early 2000s, coinciding with explosive coffee expansion and rapid settlement of new frontiers. As accessible forest was depleted and most suitable land converted, both forest loss and new coffee expansion slowed. Recent declines in deforestation rates do not therefore signal a structural transition to sustainability. They reflect, in large part, landscape exhaustion. Much of the accessible forest has already been cleared.

The system that replaced forest is now under structural stress. Forests once regulated water, stabilised soils, buffered temperature extremes, stored carbon, and supported biodiversity-based pest control. Their removal replaced ecological infrastructure with simplified, irrigation-dependent monocultures reliant on groundwater and chemical inputs. Satellite imagery shows where trees disappeared. It does not show everything that disappeared with them: watershed regulation, groundwater recharge, soil carbon retention, and biological resilience.

Groundwater — the backbone of coffee production — is being over-extracted. Between 57% and 95% of coffee irrigation water in the Central Highlands is drawn from groundwater. In some areas, wells that were once 10–15 metres deep now reach up to 45 metres, indicating dramatic declines in accessible water tables. Studies suggest that maintaining groundwater balance under current irrigation practices would require a reduction of roughly 35% in coffee area, even before additional climate stress is considered.

Climate volatility is amplifying these pressures. During the 2015–2016 El Niño drought, reservoirs across the Central Highlands fell to 10–50% of designed capacity, river flows declined by up to 90%, and around 152,000 hectares of agricultural land were affected, causing estimated losses of approximately USD 269 million. Coffee yields fell by up to 25% in affected areas. In a deforested and irrigation-intensive plateau landscape, rainfall deficits now translate more directly into groundwater stress, while surplus years fail to recharge aquifers at the same rate because infiltration capacity has been weakened and extraction continues.

The future climate outlook is severe. Climate projections suggest that up to half of Vietnam's coffee-growing area could become unsuitable by mid-century without major shifts toward shade-based agroforestry and climate-resilient production. The dry season is expected to lengthen by almost three months, while coffee evapotranspiration — the crop's water demand — is projected to increase by 20 to 120 mm annually under mid-century scenarios. The future viability of coffee in the Central Highlands may therefore depend less on temperature alone than on whether water can continue to be extracted at scale.

At the same time, soil and chemical pressures are intensifying. Conversion from forest to coffee has reduced topsoil organic carbon by roughly 30%, weakening water and nutrient retention. Vietnam's pesticide use has increased three- to five-fold over roughly 25 years, with imports surpassing USD 1 billion. Coffee ranks second only to rice in national pesticide consumption despite occupying far less land. Provinces with high coffee intensity also show elevated Biological Oxygen Demand (BOD), indicating worsening water quality stress associated with fertilizer runoff, pesticide use, processing waste, and degraded watershed systems.

These pressures reinforce one another: deforestation reduces water retention; irrigation increases groundwater extraction; soil degradation reduces resilience; drought amplifies pest outbreaks; pest pressure drives further chemical intensification; and chemical intensification further degrades soils and water systems. Studies report nematode and fungal infections in 36–43% of productive coffee plantations and 79% of replanted farms in the Central Highlands, leading to mortality in roughly 40% of replanted areas. The production system is eroding the ecological foundations on which it depends.

This ecological fragility is mirrored by social vulnerability. Vietnam's coffee sector consists of approximately 640,000 smallholder households cultivating over 700,000 hectares across 1.4 million plots, with smallholders producing about 95% of national output. Most farms are small, fragmented, and exposed to price volatility, climate shocks, and rising input costs. Environmental and economic risks are therefore absorbed where capacity is weakest.

The Central Highlands remains one of Vietnam's poorest regions. Rural poverty rates are significantly higher than the national average, and ethnic minority communities — roughly one-third of the regional population — face disproportionate poverty and land insecurity. A poverty assessment found that 54% of coffee growers in the Central Highlands were living in poverty, with 29% classified as extremely poor. Ethnic minority communities account for half of poor coffee growers and two-thirds of those considered extremely poor. An estimated 15–20% of coffee-growing land lacks formal land-use rights certificates, directly constraining livelihoods, access to finance, and EUDR compliance.

Labour risks persist. Around 1.75 million children are engaged in labour nationwide, and available evidence suggests child labour in coffee is significantly underreported. Official statistics reported around 34,000 children in coffee production in 2014, but independent evidence suggests the true number may be far higher, potentially closer to half a million if widespread household reliance on child labour is reflected across the sector. Children have been documented in hazardous coffee tasks including spraying chemicals, carrying heavy loads, and using sharp tools; some children involved are as young as six.

Pesticide exposure also poses serious human health risks. A major study of pesticide exposure in Vietnam's agricultural sector found that 35% of tested workers showed pesticide poisoning, including 14% acute and 21% chronic cases. These risks fall not only on adult farmworkers but also on children, farming families, and communities that depend on the same water systems affected by agrochemical runoff.

These social conditions are not separate from environmental degradation. They help sustain it. Farmers operating under thin margins, insecure tenure, weak bargaining power, and limited access to finance are structurally driven toward practices that deepen ecological stress: over-irrigation, excessive chemical inputs, and expansion into marginal lands. Social vulnerability is the channel through which ecological pressures translate into risk.

The EUDR represents a critical intervention. But not a complete solution. Its December 2020 cutoff establishes a clear boundary against renewed frontier expansion at a moment when climate volatility and hydrological stress are intensifying. But the cutoff excludes most historical deforestation in Vietnam's coffee sector. Coffee grown on land cleared before 2020 can still be considered compliant, even if that land sits within a chemically degraded, water-stressed monoculture system.

Implementation also risks creating a two-tier coffee economy. Large exporters are developing traceability systems, while many smallholders lack basic documentation: more than half do not maintain consistent harvest records, and only around 10% keep plot-level data. Land tenure gaps are especially acute among ethnic minority farmers. If EUDR compliance becomes a fast lane for large, well-documented exporters while smallholders are excluded, the regulation could deepen inequality rather than reduce it.

Vietnam's official 2030 coffee strategy signals a shift from expansion to intensification. Plans indicate a reduction of roughly 57,000 hectares in Central Highlands coffee area by 2030, with the largest cuts concentrated in Dak Lak, Dak Nong, and Lam Dong. At the same time, yield improvements of around 1.2 tonnes per hectare are expected to sustain output. But less land does not necessarily mean less pressure. It may mean more pressure per hectare — more fertiliser, more pesticides, more irrigation, and deeper stress on soils, water, and ecosystems — unless intensification is accompanied by agroforestry, soil restoration, water management, and reduced chemical dependence.

The risk is not only domestic. Vietnam exports coffee across multiple regulatory regimes. EU markets remain central, with Germany importing around USD 488 million of Vietnamese coffee in 2022 and Italy USD 332 million. But the United States, China, Japan, Australia, Korea, the United Kingdom, and other non-EU markets collectively account for a majority of export value; the United States alone imported around USD 365 million in 2022. If EU-bound supply chains tighten traceability while equivalent volumes flow to markets with weaker oversight, deforestation pressure will not disappear. It will shift.

Consumption-based maps make this clear. The same forest frontiers linked to Germany and Italy also supply the United States, China, and Japan. The watershed does not differentiate by destination port. A bifurcated compliance architecture risks certifying documentation rather than reducing landscape-level pressure. Effective implementation therefore requires strong EUDR enforcement within Vietnam's jurisdiction and alignment across major importing economies, including the UK, United States, China, Japan, and other consumer markets.

Vietnam's coffee success story has entered a new phase. The frontier that enabled its rise has largely been exhausted. What remains is a production system constrained by water scarcity, soil degradation, biodiversity loss, labour insecurity, and climate volatility. The next decade will determine whether this system stabilises or deteriorates further.

Compliance with deforestation regulations is necessary but not sufficient. Halting new deforestation is the first structural step toward rebuilding ecological resilience. But the coffee industry and the Vietnamese government must go further: protect remaining forest fragments, restore shade and riparian buffers, regulate groundwater extraction, reduce pesticide and fertiliser dependence, support smallholder traceability, secure land rights, pay living incomes and wages, and invest in farmer-centred agroforestry.

The past cannot be undone. But what remains can still be protected, and what has been degraded can still begin to recover. The less forest Vietnam's coffee heartland has left, the more important it becomes to protect it. The choice now is whether Vietnam's coffee future locks in fragility or begins to rebuild resilience.

1 COFFEE AT A CROSSROADS

VIETNAM'S COFFEE BOOM AND THE REGULATORY RECKONING AHEAD

Vietnam sits at the centre of the global coffee economy. It is the second largest coffee producer in the world. It supplies roughly one in every five cups consumed globally, accounting for about 19% of global coffee supply, and a dominant share of worldwide robusta exports (Dang et al., 2025). As the European Union moves to enforce deforestation-free supply chains under the European Union Deforestation Regulation (EUDR), few producing countries are as central to that transition as Vietnam.

Vietnam's sheer scale of production has shaped the global coffee system. During the 1998–2002 coffee crisis, a surge of low-cost robusta exports from Vietnam helped flood global markets and push prices to historic lows (Fridell, 2014). Within little more than a decade, Vietnam moved from being a marginal producer to the world's second-largest exporter, fundamentally altering global supply. This expansion was driven by deliberate state policy, which Fridell describes as "coffee statecraft," including the mobilisation of land, labor, credit, and irrigation to rapidly scale production.

As a result, what happens in Vietnam now influences global coffee prices and trends. Changes in its production—whether driven by climate shocks, regulation, or policy—can ripple across global coffee markets and affect producers and consumers far beyond its borders.

Vietnam's rise as a coffee superpower was built on a dramatic expansion across its Central Highlands region, mostly at the expense of forests. Over the past four decades, Vietnamese coffee area increased from roughly 50,000 hectares in the mid-1980s to more than 700,000 hectares today, transforming the basaltic plateaus of Dak Lak, Lam Dong, Dak Nong, Gia Lai and Kon Tum into the engine room of the global robusta trade.

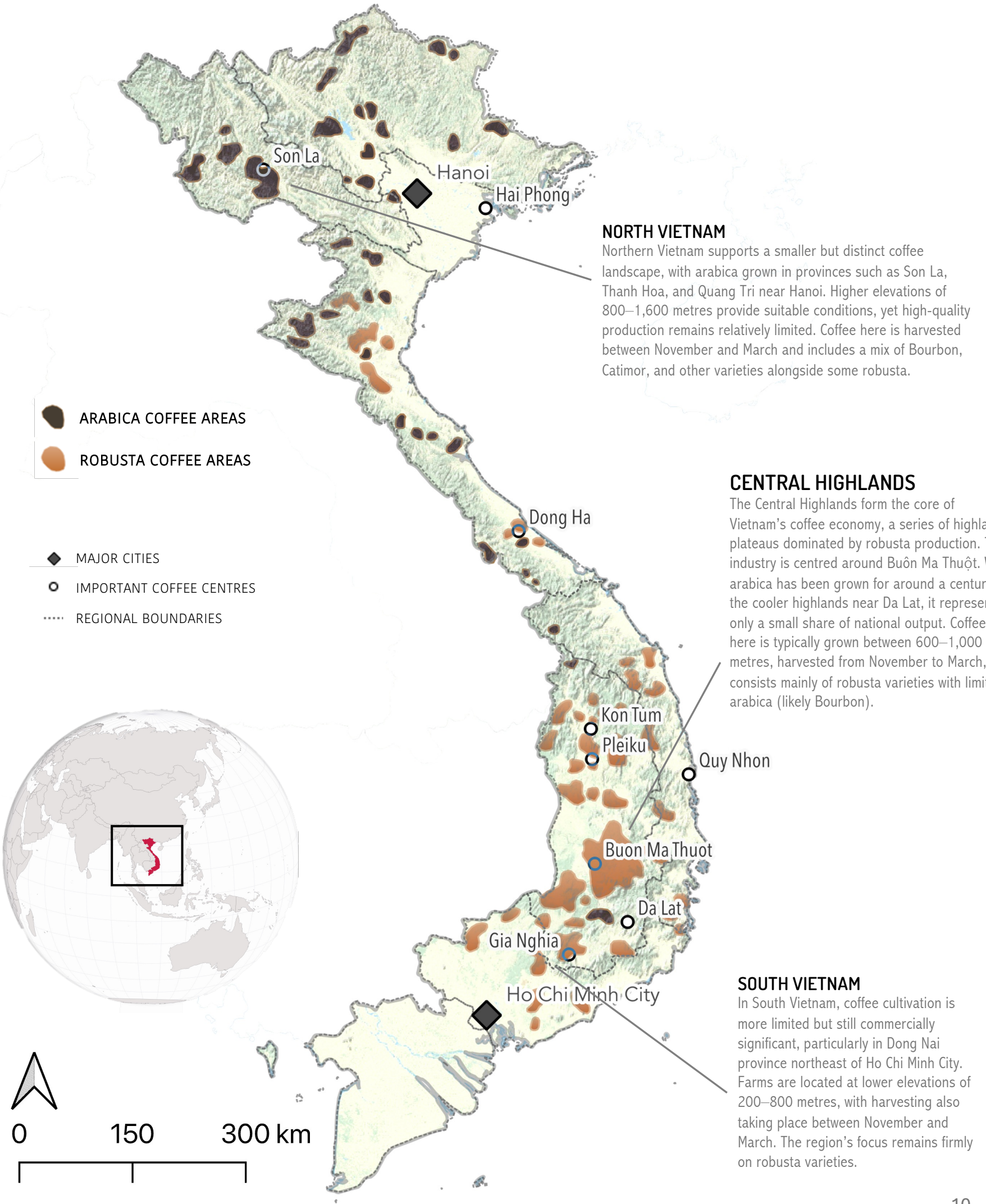
This coffee expansion in Vietnam has been overwhelmingly volume-driven rather than value-driven. Vietnam dominates global coffee supply but captures disproportionately little of its value. Over 90% of exports still leave the country in low-value forms – the sector remains heavily reliant on low-grade robusta exports, with limited processing, weak branding, and minimal participation in higher-value segments of the global market (Tuyen et al., 2025). This model depends on scale: producing more coffee rather than more value per unit. That, in turn, requires land. This transformation did not occur on empty land but often took place on forests.

The Central Highlands once formed one of Southeast Asia's most ecologically significant forest regions. Historical forest mapping compiled by Wege et al. (1999) indicates that in 1943, nearly 80% of the region remained under forest cover, forming a largely continuous plateau of natural forest across what are now Dak Lak, Dak Nong, Gia Lai and Lam Dong.

FIGURE 1.1

VIETNAM'S COFFEE HEARTLAND: A LANDSCAPE DOMINATED BY ROBUSTA

Coffee cultivation in Vietnam follows a distinct geographic logic. Arabica appears in scattered highland pockets, while robusta is concentrated across the Central Highlands, forming a dense and contiguous production belt that drives the country's global dominance.



NORTH VIETNAM

Northern Vietnam supports a smaller but distinct coffee landscape, with arabica grown in provinces such as Son La, Thanh Hoa, and Quang Tri near Hanoi. Higher elevations of 800–1,600 metres provide suitable conditions, yet high-quality production remains relatively limited. Coffee here is harvested between November and March and includes a mix of Bourbon, Catimor, and other varieties alongside some robusta.

CENTRAL HIGHLANDS

The Central Highlands form the core of Vietnam's coffee economy, a series of highland plateaus dominated by robusta production. The industry is centred around Buôn Ma Thuột. While arabica has been grown for around a century in the cooler highlands near Da Lat, it represents only a small share of national output. Coffee here is typically grown between 600–1,000 metres, harvested from November to March, and consists mainly of robusta varieties with limited arabica (likely Bourbon).

SOUTH VIETNAM

In South Vietnam, coffee cultivation is more limited but still commercially significant, particularly in Dong Nai province northeast of Ho Chi Minh City. Farms are located at lower elevations of 200–800 metres, with harvesting also taking place between November and March. The region's focus remains firmly on robusta varieties.

Source: Stylised representation of coffee growing areas based on Vietnam Govt. data (2014), CGIAR's Spatial Production Allocation Model (2020), CIAT data (2022) and World Atlas of Coffee (Hoffman 2018)

As recently as the 1990s, the region held a large share of Vietnam's remaining high-biomass, high-biodiversity forests (Meyfroidt and Lambin, 2008). What followed was sustained forest conversion in the highlands, driven by state-directed resettlement, market incentives, and demographic pressure. The ecological consequences were concentrated and severe in the coffee heartland even as national-level forest cover statistics appeared to improve - a misleading aggregate that masked continued destruction at the frontier (Meyfroidt and Lambin, 2008; Meyfroidt et al., 2013; Van Khuc et al., 2018).

Coffee's environmental footprint makes Vietnam's coffee a globally significant climate concern. A significant share of coffee's emissions is linked to land use change – especially deforestation. Coffee is a major driver of commodity-linked deforestation on our planet, responsible for around 1% of global deforestation (Singh and Persson, 2026). Vietnam has played a big role in that crisis. Global life-cycle analyses indicate that roasted coffee generates around 28.5 kg CO_2-equivalent per kilogram of product, placing it among the most carbon-intensive agricultural commodities per unit weight (Poore & Nemecek, 2018). In the Central Highlands, carbon-footprint assessments find that monocrop farms are net GHG sources, emitting roughly 0.37 t CO_2-eq per tonne of coffee produced (Kuit et al., 2020). Vietnam's role as one of the world's largest robusta exporters therefore carries climate implications that extend far beyond its borders, both through the embedded emissions of the exported coffee and through the deforestation that enabled its production boom.

This report combines new satellite-based analysis with existing scientific research to examine the environmental consequences of Vietnam's coffee boom. Using newly developed spatial mapping of coffee cultivation and forest loss, we estimate how much humid tropical forest has been cleared within areas now used for coffee production.

We combine this with historical forest mapping, research on soil and water stress, and satellite indicators of rainfall and soil moisture. The picture is clear. Coffee production in the Central Highlands is killing remaining forests, draining water resources, and soon much of the region will no longer be viable for coffee production if it continues under the current pesticide-soaked monoculture paradigm.

Deforestation for coffee in Vietnam has been terrible - both extensive and long-lasting. Our spatial analysis found that between 1990 and 2024, approximately 207,428 hectares of humid tropical forest were cleared within areas that are now mapped as coffee cultivation as of 2022.

In just one generation, coffee has been the driving force behind the loss of one third of the forests in the Central Highlands, where nearly all of Vietnamese coffee grows. That area is equivalent to clearing a forest almost the size of the entire country of Luxembourg.

Indeed, one main reason why deforestation is tapering off in the Central Highlands, is because much of the accessible forest has already been cleared. In other words, there are hardly any readily accessible forests left to kill.

Consumption-based analyses also show that robusta coffee has been one of the dominant drivers of deforestation within Vietnam itself. A spatial assessment of global commodity supply chains by Hoang and Kanemoto (2021) identified robusta coffee as the second-largest commodity driver of deforestation in Vietnam between 2006 and 2015.

Deforestation in Vietnam's coffee belt was not accidental but the result of deliberate policy choices, alongside corporate complicity. Beginning in the late 1970s and accelerating through the 1980s and 1990s, the Vietnamese government helped resettle lowland Kinh migrants into the highlands to assert territorial control, relieve demographic pressure elsewhere, and generate export revenue (De Koninck, 1999). This state-led expansion was reinforced by international development support for export-oriented coffee production, including World Bank–backed sector programs and credit flows that promoted rapid growth of Vietnam's coffee industry during the 1990s (Meyfroidt and Lambin, 2008; Fridell, 2014). Coffee became the economic engine of this strategy, entangling state policy, commodity markets, and forest conversion in ways that cannot be reduced to spontaneous smallholder clearing alone.

This history matters for the regulatory debate today: if deforestation was partly state-engineered, then market-based compliance mechanisms alone are not only insufficient but also unfair. The institutions that helped shape this development model, including international financial institutions and industry working together with governmental authorities, must have a role in supporting Vietnam's transition to a more resilient coffee economy.

The coffee frontier drove deforestation, replacing a functioning ecosystem with a fragile production system, now evident in stressed water, degraded soils, and growing climate instability. Besides forest loss, groundwater development is approaching its limits. In some watersheds, sustainable aquifer balance would require a reduction of coffee area of roughly one-third under prevailing irrigation practices – or a major shift towards different irrigation. Soil organic carbon has fallen where forest was replaced by coffee. Pest pressure has intensified. Chemical inputs have escalated. El Niño-Southern Oscillation (ENSO)-linked drought shocks now hit harder in a landscape stripped of its natural buffers, while extreme rainfall runs off degraded soils rather than replenishing aquifers (Meyfroidt and Lambin, 2008b). The ecological debt accumulated during the boom years is now compounding under climate volatility. This is why timing matters for the EUDR. The EUDR is the first binding mechanism capable of interrupting the structural link between international demand and forest loss.

The EUDR must be implemented—without it the damage will continue, but even with it, more needs to be done. The EUDR arrives at a moment when the remaining forest faces mounting ecological and climatic pressure. Global modelling suggests that climate change could reduce the area suitable for coffee production by roughly half by 2050, with Vietnam among the most severely affected regions (Bunn et al., 2015; Läderach et al., 2017). As current coffee-growing areas become less viable, pressure will increase to expand into remaining forest patches or new frontier landscapes. Deforestation-free regulation cannot undo the losses of the past four decades. But it can shape what happens next.

Delays in EUDR will increase the risk of further forest loss, deepen environmental stress, and push producers into more fragile and marginal lands. The choice facing policymakers, industry leaders, and the Vietnamese state is simple: repeat the cycle of expansion and degradation, or begin a transition toward a more resilient coffee system. The window for that choice is narrowing.

2 FROM FOREST TO COFFEE FRONTIER

THE CLEARING OF VIETNAM'S CENTRAL HIGHLANDS

To unpack what is at stake, we take a deeper look at the landscape where Vietnam's coffee is grown. Nearly all, approximately 93%, of Vietnamese coffee is produced in the Central Highlands (NIAPP, 2013; Dang et al., 2025). The Central Highlands is a geographically concentrated plateau system where forest, water, and agricultural expansion have collided for decades. We examine how that landscape has changed, what remains, and what those changes mean for the future of deforestation-free coffee supply chains.

A. FROM COLONIAL CROP TO POST-REFORM BOOM

Vietnam's coffee industry evolved through distinct political and economic phases that shaped its environmental footprint. Coffee was first planted across parts of the Central Highlands in the 1920s under French colonial administration, but remained modest in scale for decades. By 1975, planted area had only grown to roughly 20,000 hectares, interrupted periodically by war and political upheaval. Following reunification, the industry was nationalised and collectivised between 1975 and 1986, limiting private enterprise and keeping coffee production relatively constrained (Meyfroidt et al., 2013). These early decades established coffee's geographic foothold but not yet its dominance.

The decisive turning point came with the Đổi mới reforms beginning in 1986, which liberalised land rights and triggered an unprecedented production surge.

Coffee area expanded rapidly through the 1990s and 2000s, and Vietnam's share of global supply rose from less than 1% in the early 1980s to nearly one-fifth by 2020. Vietnam rose to become the world's second-largest coffee producer, behind only Brazil. This acceleration coincided with some of the highest deforestation rates recorded in the country's modern history, particularly across the plateau landscapes of the Central Highlands.

The dynamics of market liberalisation, migration and commodity expansion converged in the Central Highlands, where the environmental impacts of Vietnam's coffee boom have also been most severe.

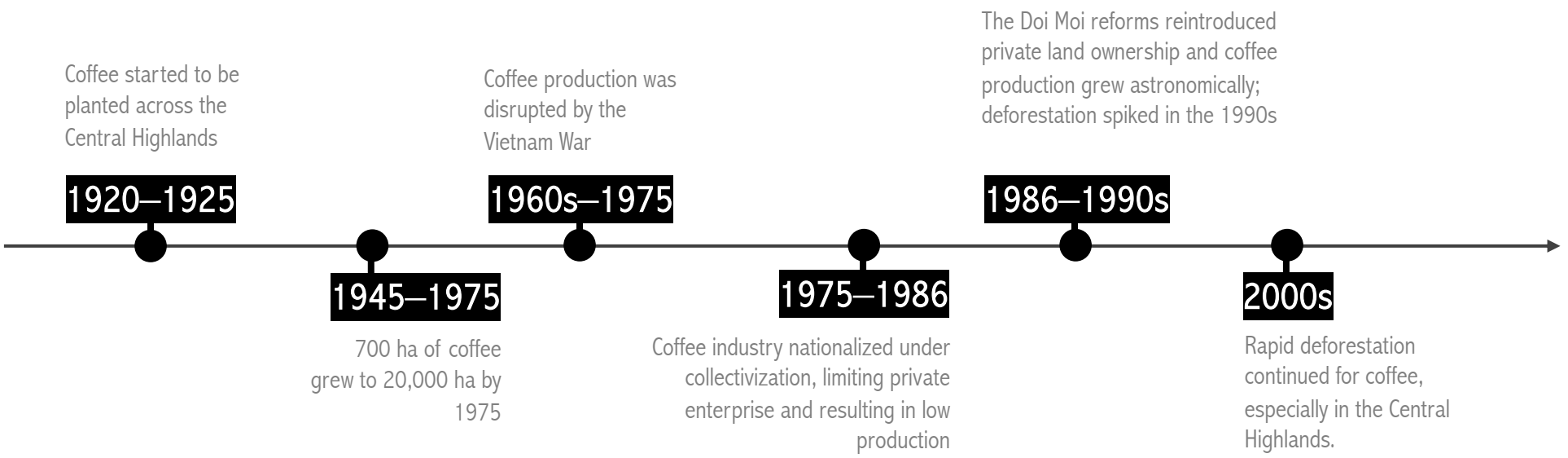
B. THE CENTRAL HIGHLANDS AS VIETNAM'S COFFEE EPICENTRE

The Central Highlands produces nearly all Vietnamese coffee. According to ICO country profile data (2019), the five Central Highlands provinces - Dak Lak, Lam Dong, Dak Nong, Gia Lai and Kon Tum - together account for the overwhelming majority of Vietnam's roughly 700,000 hectares under coffee cultivation.

While small pockets of Arabica are present in northern mountainous provinces and scattered zones in the central region, these areas are comparatively small and fragmented. Our study does not consider these areas.

FIGURE 2.1

KEY HISTORICAL MILESTONES IN VIETNAM'S COFFEE EXPANSION AND ASSOCIATED FOREST CONVERSION



By contrast, the Central Highlands form a dense, contiguous production belt stretching across Dak Lak, Lam Dong, Dak Nong, Gia Lai and Kon Tum. Dak Lak alone covers approximately 32%, followed by Lam Dong at 27% and Dak Nong at 21% (Crop Production Department, 2024; Dang et al., 2025). In production terms, the dominance is even clearer: Dak Lak alone produces more coffee than many entire producing nations like Uganda.

The concentration of coffee in the Central Highlands reflects agronomy reinforced by decades of policy. Robusta accounts for approximately 97% of Vietnamese production, and its agronomic requirements - lower elevations, warmer temperatures, and deep volcanic soils - align almost perfectly with the basaltic plateaus of the Central Highlands. French authorities introduced robusta to the Central Highlands in the early twentieth century, recognising its soils and rainfall as ideal for export cultivation (ICO, 2019).

After reunification, Vietnam expanded that foundation. The Đổi mới reforms from 1986 aligned credit, land policy and extension services to accelerate coffee expansion in the highlands (Marsh, 2007). The result is a sector whose spatial footprint is almost coterminous with a single highland ecosystem.

Any assessment of Vietnam's coffee sector is, in practice, an assessment of what has happened to the Central Highlands - we therefore focus our analysis there. This geographic specificity is analytically important: it means deforestation linked to coffee is not diffuse or hard to identify, but can be clearly traced to a specific, mappable landscape. It also means the environmental impacts are concentrated rather than spread out. Pressure on water, biodiversity, and forest carbon in the Central Highlands cannot be offset by better conditions elsewhere in the country.

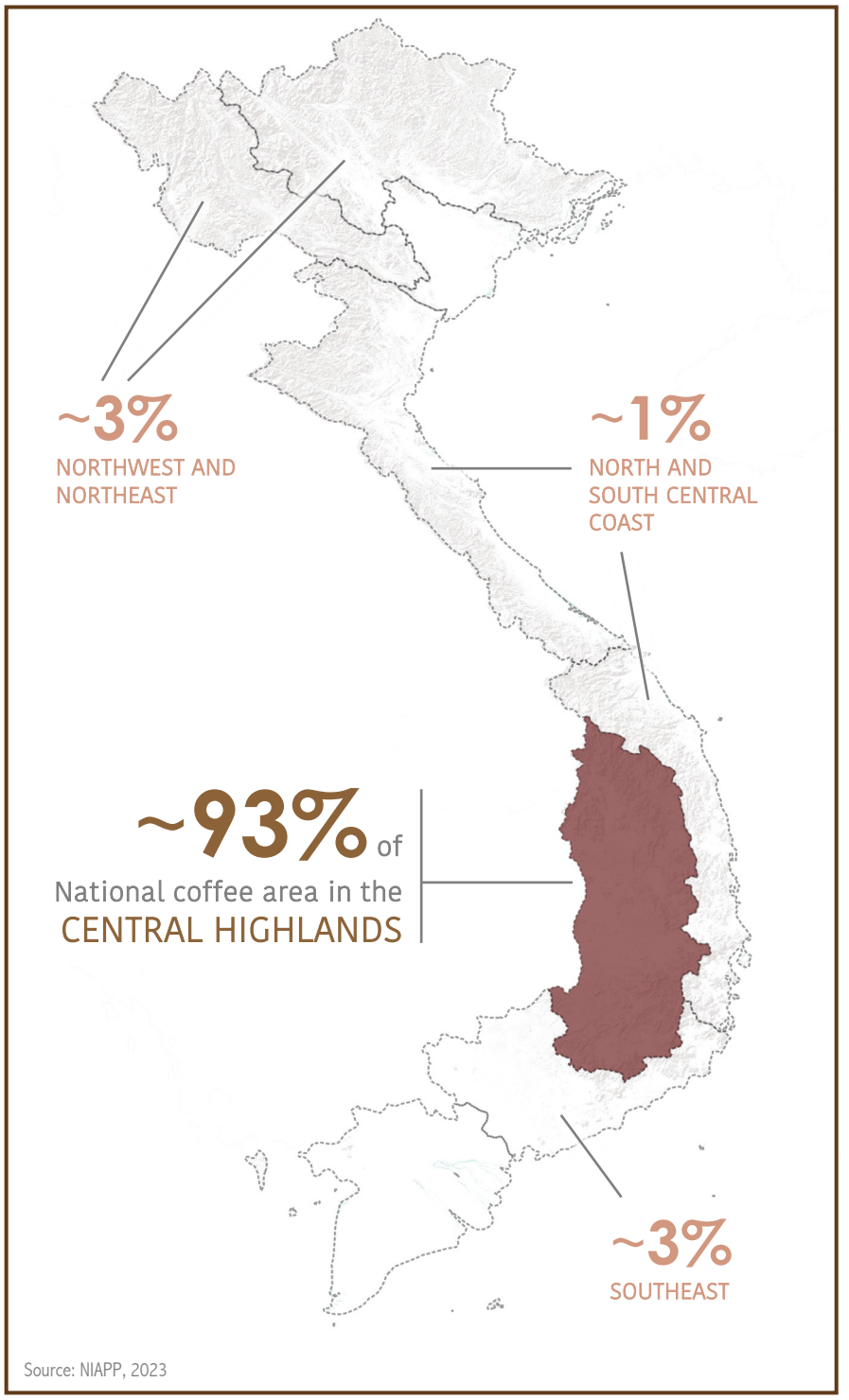
C. THE LONG ARC OF FOREST LOSS IN THE CENTRAL HIGHLANDS

Vietnam's Central Highlands have experienced sustained forest decline over multiple decades, both before and during the satellite era**.** While Landsat-based analyses document net forest loss of approximately 0.31% per year between 2000 and 2010 in Dak Lak and Dak Nong (Meyfroidt et al., 2013), earlier land use surveys show that agricultural expansion was already underway long before systematic satellite monitoring began. In Dak Lak province alone, agricultural land increased by roughly 9% between 1975 and 1992, largely at the expense of open canopy forest (Lindskog et al., 2005).

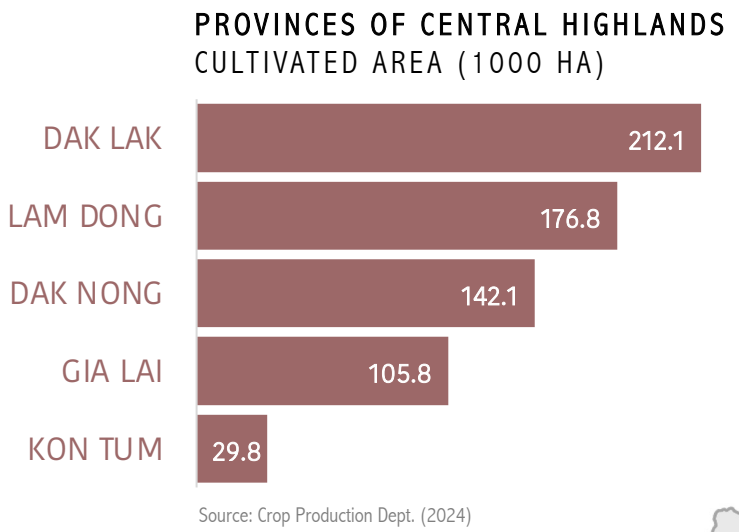
FIGURE 2.2

A NATIONAL CROP IN A SINGLE REGION: THE CENTRAL HIGHLANDS AS VIETNAM'S COFFEE CORE

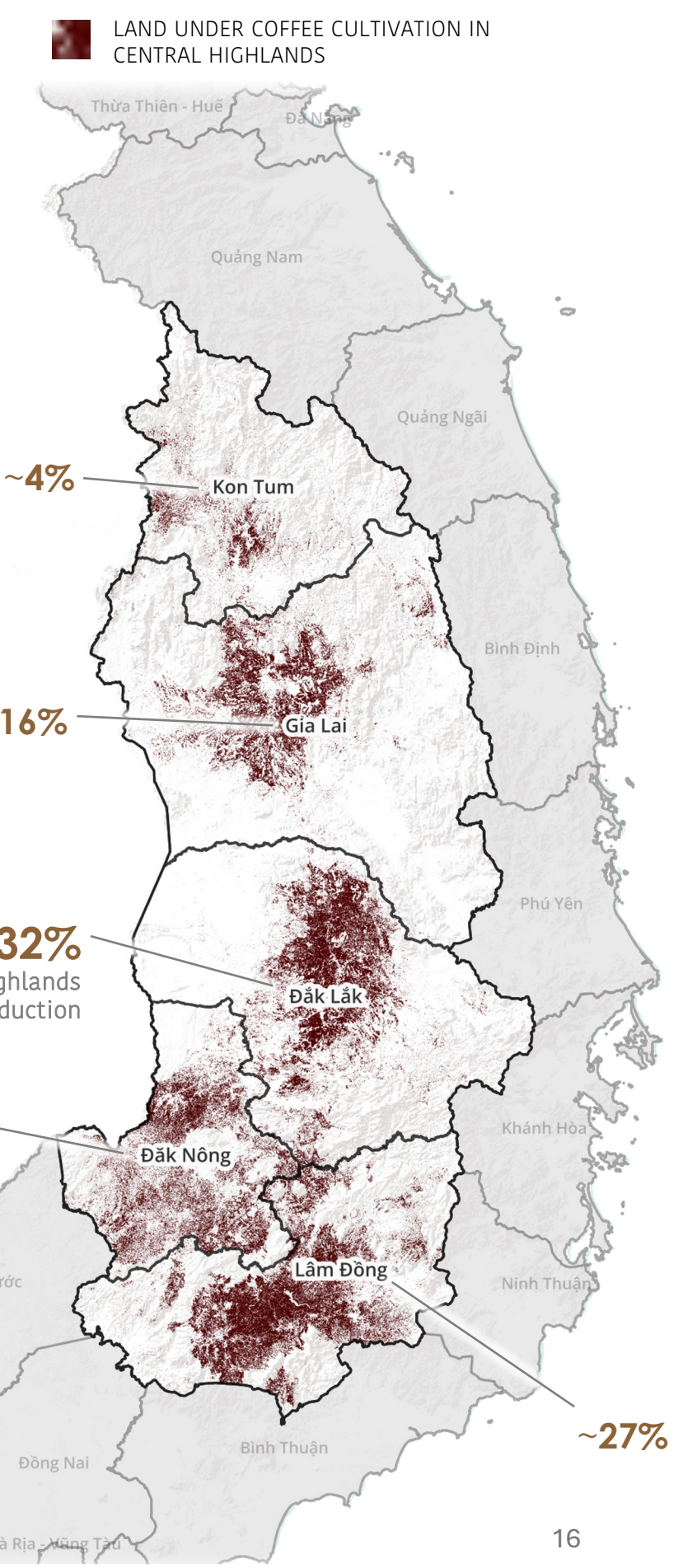
Coffee production in Vietnam is overwhelmingly concentrated in a single plateau ecosystem. Approximately 93% of national coffee area lies within the Central Highlands, with only small and fragmented pockets distributed across the Northwest, Northeast, Southeast, and South Central Coast. High-resolution coffee maps produced by CIAT confirm that cultivation forms a dense and contiguous production belt across provinces such as Dak Lak, Lam Dong, Dak Nong, and Gia Lai. This spatial concentration reflects the alignment of favourable soils, elevation, and climate, and explains both Vietnam's dominance in global robusta supply and the concentration of environmental pressures within this single landscape.



Source: NIAPP, 2023



Source: Crop Production Dept. (2024)



The arc of forest contraction therefore spans at least five decades, intensifying during the period of state-directed migration and agricultural expansion from the mid-1980s onward.

National narratives of Vietnam's "forest transition" obscure this regional reality. Although Vietnam shifted from net national deforestation to net forest gain in the early 1990s (Meyfroidt and Lambin, 2008), that recovery was geographically uneven. Forest regeneration occurred primarily in northern uplands and coastal rehabilitation zones, while deforestation persisted across the Central Highlands plateau. Moreover, national tree cover gains reflect plantation expansion and definitional changes, including the reduction of the canopy threshold for forest classification in 2008, which complicate official recovery claims (Kissinger, 2020; Phan et al., 2021).

To be clear, changing the definition of forests to obscure tree cover loss, does not actually protect forests – it merely obscures and obfuscates the problem. It is also worth noting for the record: tree plantations are not forests. They have a fraction of the benefits and positive impacts. Independent satellite-based analyses consistently show that mature natural forest continued to decline in the highlands through the 2000s and 2010s (Meyfroidt et al., 2013).

To establish an independent and spatially consistent baseline, this report draws on the European Commission's Joint Research Centre (JRC) Tropical Moist Forest dataset (v2024), one of the most comprehensive long-term satellite records of humid tropical forest change globally. The JRC TMF dataset is built on three decades of Landsat time-series analysis (1990–2024), classifying forest disturbance events by duration and sequence to distinguish short-term degradation from permanent deforestation (Vancutsem et al., 2020).

This methodological consistency is particularly important in the Vietnamese context, where as alluded before, national forest statistics have undergone definitional revisions, including a reduction of the minimum canopy threshold for forest classification in 2008 and subsequent land-use reclassification (Phan et al., 2021), complicating direct comparison across time. By applying a uniform detection framework across decades, the TMF dataset enables transparent assessment of forest extent and loss independent of administrative changes. Its development within the European Commission's scientific service also aligns the analytical baseline of this report with the regulatory framework of the EUDR itself, which relies on satellite-based verification and consistent definitions of deforestation risk.

Since 1990, the Central Highlands experienced a sustained and measurable contraction of tropical moist forest cover, losing nearly one-third of their remaining forest within a single generation. According to the European Commission's Joint Research Centre Tropical Moist Forest dataset, undisturbed forest in the region declined from approximately 2.49 million hectares in 1990 to 1.61 million hectares by 2024. Forest cover fell from 42.8% of the regional land area in 1990 to just 19% by 2020, before stabilising at similarly low levels in the early 2020s. The most rapid phase of loss occurred between 1995 and 2010, when large contiguous tracts of forest were converted or degraded.

While the rate of annual loss has moderated in recent years, this is likely in large part because the remaining forest is now substantially reduced, fragmented, and increasingly confined to upland and protected areas.

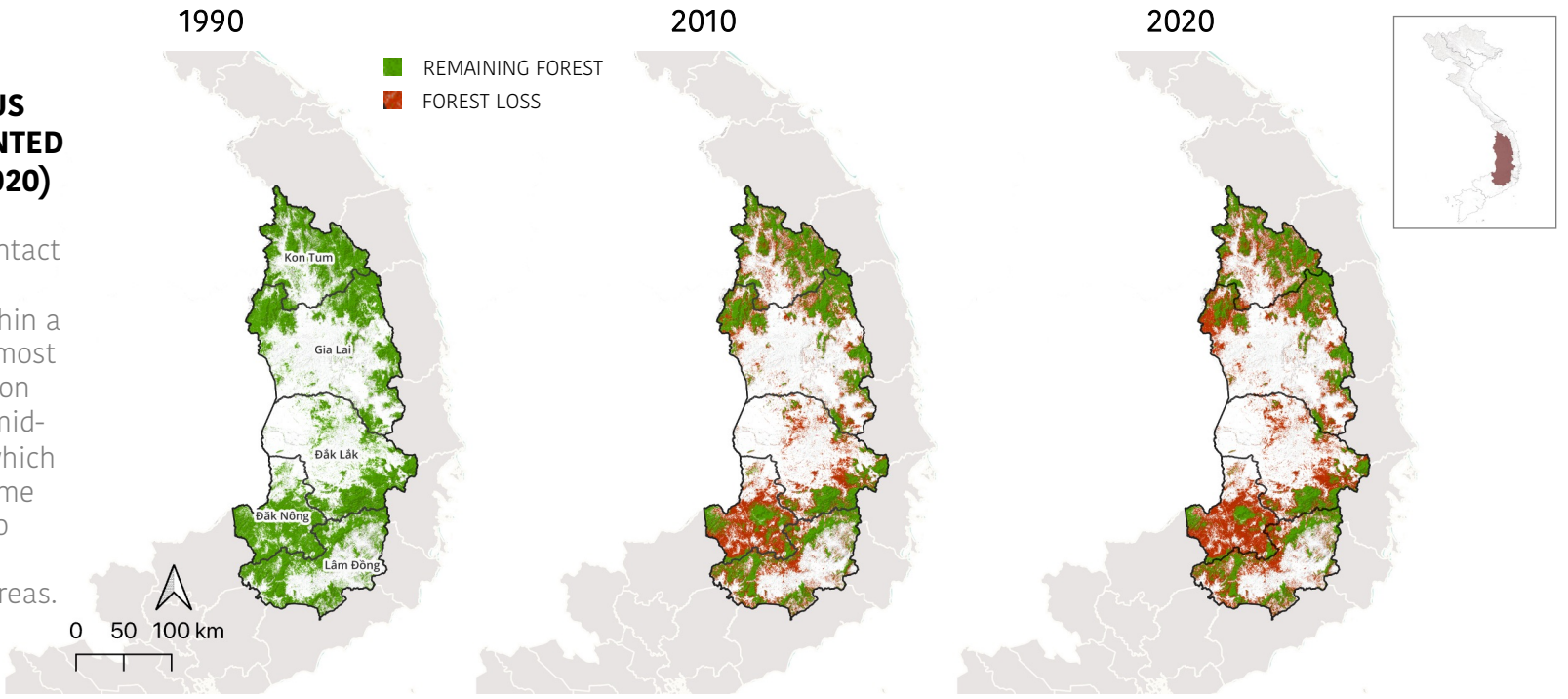
FIGURE 2.3

RUNNING OUT OF ACCESSIBLE FOREST: VIETNAM'S COFFEE FRONTIER NEARS ITS LIMITS

Vietnam's Central Highlands transformed from a largely intact forest landscape into a fragmented agricultural system within a single generation. Deforestation surged during the 1990s and 2000s, then slowed as accessible forest was exhausted rather than protected. What remains is limited, fragmented, and increasingly constrained by terrain and protected areas.

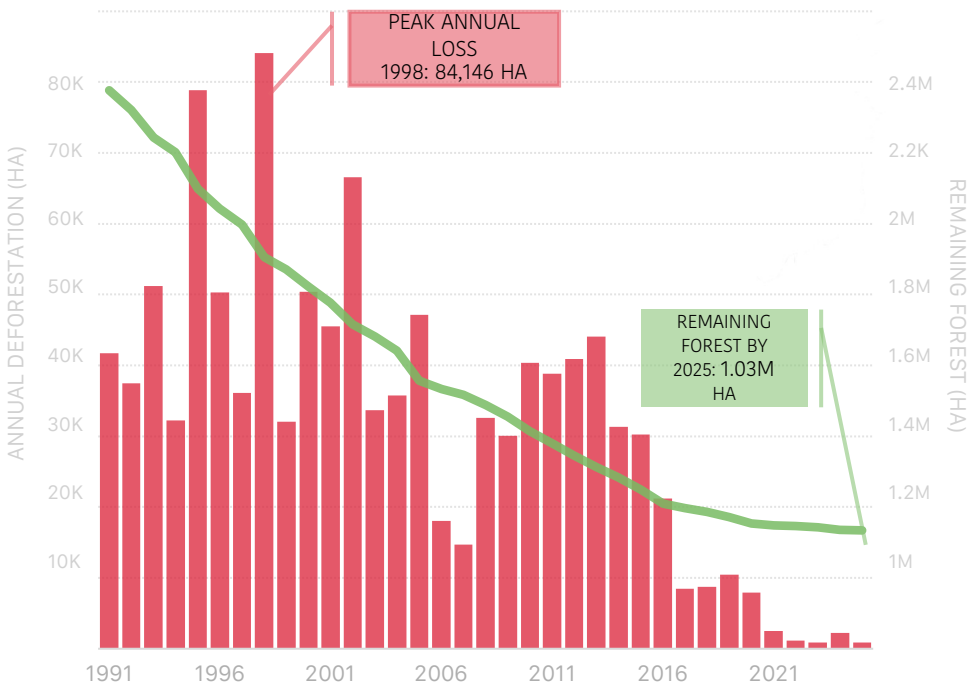
A. FROM CONTIGUOUS FOREST TO FRAGMENTED REMNANTS (1990–2020)

The Central Highlands shifted from a largely intact forest landscape to a fragmented mosaic within a single generation. The most rapid phase of conversion occurred between the mid-1990s and 2010, after which remaining forests became increasingly confined to steeper, less accessible terrain and protected areas.



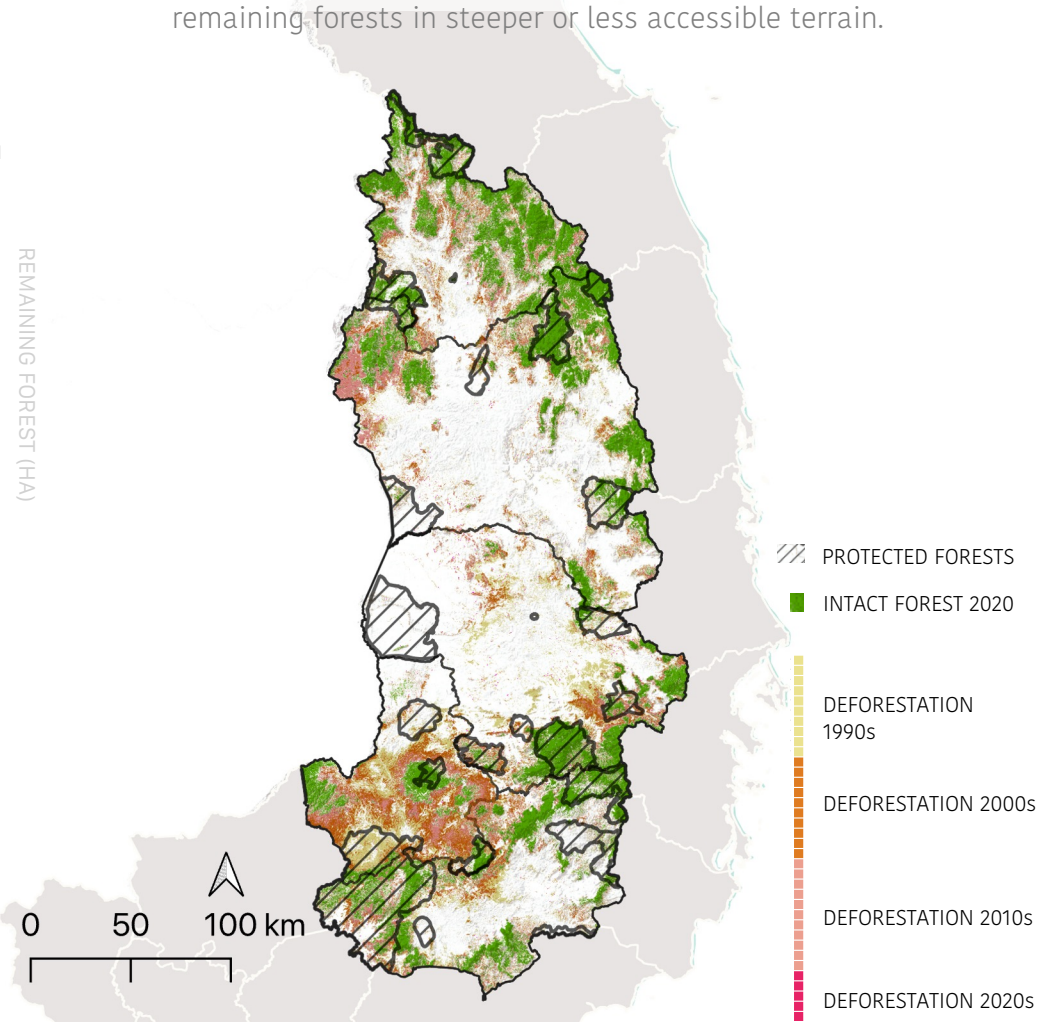
B. FOREST LOSS SLOWED AS FOREST AVAILABILITY DECLINED

Annual forest loss peaked during the frontier expansion phase between the mid-1990s and 2010 before falling sharply. This decline coincides with a substantial reduction in remaining forest area, indicating that deforestation slowed primarily because accessible forest was depleted, not because of improved protection or governance.



C. DEFORESTATION FOLLOWED A FRONTIER DYNAMIC SHAPED BY ACCESSIBILITY AND CONSTRAINT

Forest clearing expanded rapidly across accessible plateau areas, concentrating in core coffee-producing provinces such as Dak Lak and Dak Nong. Over time, deforestation became increasingly fragmented and spatially constrained, avoiding protected areas and remaining forests in steeper or less accessible terrain.



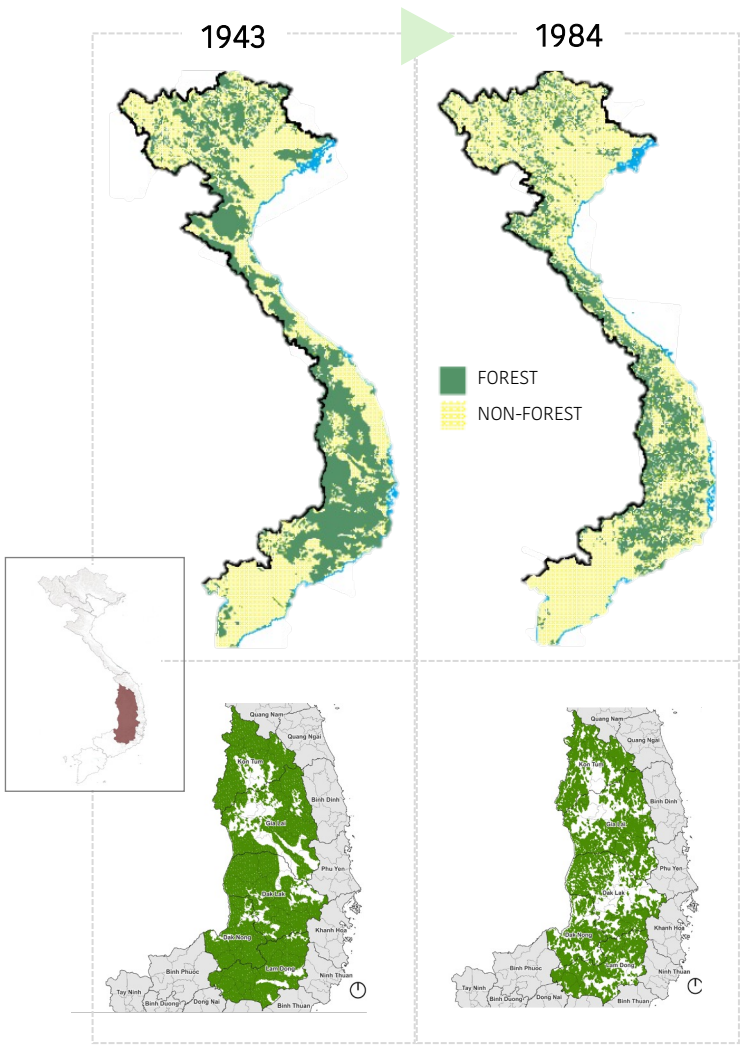
Forest loss in the Central Highlands has not been evenly distributed, but concentrated in specific provinces where forest, agriculture, and settlement pressures intersect most intensely. Visual analysis of the JRC TMF time-series maps shows the most extensive deforestation in Dak Nong and Dak Lak, followed by significant losses in southern Gia Lai and parts of Lam Dong. Early losses in the 1990s appear as large contiguous clearances, particularly in Dak Lak, while more recent disturbances are increasingly fragmented, forming a mosaic of smaller-scale degradation events. By contrast, northern Kon Tum retains relatively larger intact blocks, although even here disturbance footprints are visible along road corridors and settlement zones. The pattern that emerges is one of progressive encroachment from lower-elevation agricultural frontiers into remaining forest margins.

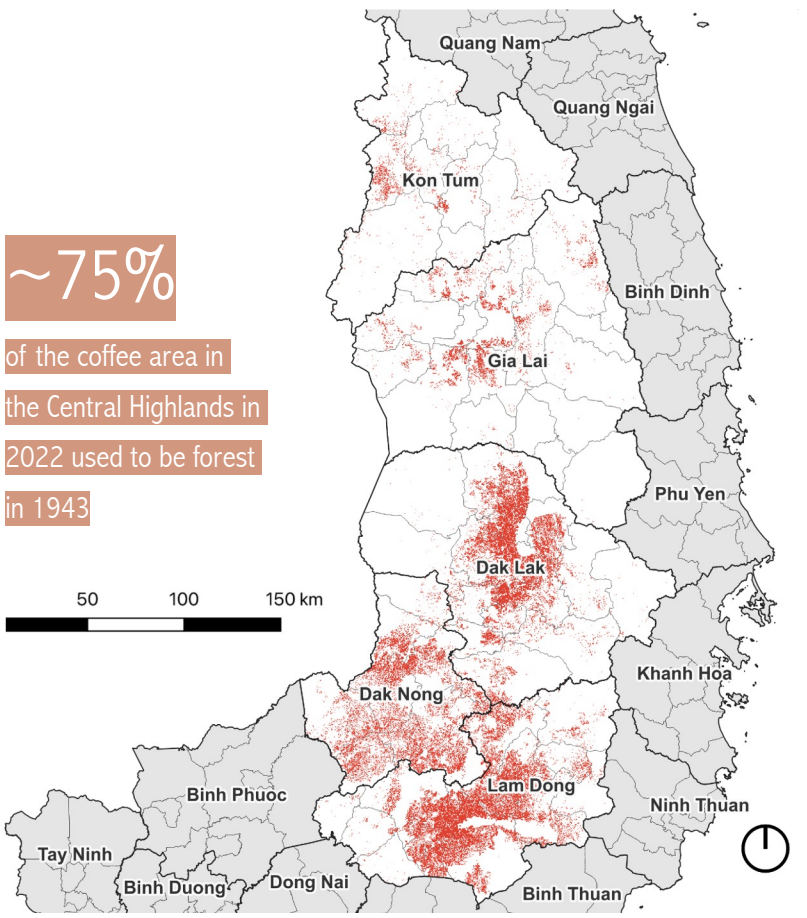
The consequence of three decades of forest contraction is not merely a reduction in area, but a transformation of the ecological structure of the highland landscape. What remains of the tropical moist forest is disproportionately located in steeper, less accessible terrain, often at higher elevations and within formally designated protected areas. The mature, lowland forests that historically regulated watershed hydrology, buffered rainfall variability, and sustained regional groundwater recharge have been very substantially reduced. The JRC dataset's distinction between short-duration degradation events and long-duration deforestation suggests that repeated disturbance - rather than single large clearances alone - has played a critical role in this transformation. The Central Highlands are therefore no longer a largely forested plateau with pockets of agricultural development; they are an agricultural landscape with remnant forest fragments.

FIGURE 2.4

THE LONGER ARC OF FOREST DECLINE: THE CENTRAL HIGHLANDS WAS MOSTLY TREES IN LIVING MEMORY

In 1943, the Central Highlands was still a largely continuous forest landscape. Over subsequent decades, frontier expansion, migration, and agricultural development transformed it into today's fragmented production system. Much of the land (~75%) now under coffee was once forest in living memory, reflecting a cumulative land-use trajectory rather than direct conversion. Coffee did not drive this transformation alone, but it now operates within and benefits from a landscape shaped by it, and therefore has a role in rebuilding the ecological functions that were lost.





BOX 1

THE LONGER ARC OF FOREST DECLINE (1943–1995)

Before we turn to attributing recent forest loss to specific land uses, it is worth recalling how forested this landscape once was. Long before the satellite record begins, the Central Highlands were predominantly forested.

The well-known 1943 "Maurand" forest map—widely used as a historical baseline in the region—indicates that nearly 80% of the Central Highlands remained under forest cover at that time, forming a largely continuous plateau of natural forest across what are now Dak Lak, Dak Nong, Gia Lai and Lam Dong (Wege et al., 1999; Meyfroidt and Lambin, 2008).

By 1985, forest cover had already fallen substantially, and by 1995 it had declined further to roughly 58%, reflecting decades of frontier expansion, logging, state-directed migration, and agricultural conversion.

The contemporary landscape of fragmented forest patches and agricultural mosaics is therefore not an ancient ecological baseline, but the product of rapid and relatively recent transformation. Notably, approximately three-quarters of the land currently under coffee cultivation was classified as forest in 1943.

This is a stark reminder that today's agricultural economy occupies terrain that, within living memory, was overwhelmingly forested.

D. COFFEE AT THE HEART OF CENTRAL HIGHLAND FOREST FRONTIER DESTRUCTION

The Central Highlands experienced simultaneous coffee expansion and forest decline over several decades. But temporal coincidence alone does not establish responsibility. The question is whether coffee ultimately occupies land that was once forest. To answer that, we move to spatial attribution. This section overlays high-resolution coffee land-use data with independent satellite-derived observations of forest loss to measure how much humid tropical forest (as defined by the JRC Tropical Moist Forest dataset) was cleared in areas that are now used for coffee cultivation, going as far back as the earliest available satellite maps.

The coffee layer used in this analysis is derived from the CIAT high-resolution coffee cultivation map, produced by the Alliance of Biodiversity International and CIAT (Centro Internacional de Agricultura Tropical or The International Center for Tropical Agriculture). This dataset combines remote sensing classification with ground validation and agronomic expertise to identify coffee-growing areas across the Central Highlands at fine spatial resolution (Raymondin et al. 2022). It is widely used in research and development contexts and provides one of the most reliable spatial baselines currently available for mapping coffee at scale.

The attribution method is straightforward. We take the European Commission's Tropical Moist Forest (TMF) disturbance record which maps where and when tropical forests have been cleared over time. We then overlay that with the mapped footprint of CIAT coffee cultivation data (circa 2022). Where a pixel was once humid tropical forest and is now coffee, we count that as forest loss occurring within today's coffee landscape. At its simplest, the method compares mapped forest clearing with today's coffee-growing areas to identify where coffee now occupies land that was recently forest.

This approach does not claim that every hectare now under coffee was directly converted from forest to coffee in a single step. Some plots may have passed through intermediate land uses before coffee establishment. But where coffee ultimately occupies land that was once forest within the satellite observation, it inherits part of that land-use trajectory, and contributes to making the deforestation model financially possible. Attribution in this report therefore reflects land responsibility rather than simplistic one-step causation.

Between 1990 and 2022, approximately 207,428 hectares of humid tropical forest were cleared within areas that are now mapped as coffee cultivation. This loss is not evenly distributed across the landscape. It clusters overwhelmingly in Dak Nong, Lam Dong and Dak Lak - the plateau provinces that retained the largest tracts of natural forest before becoming the epicentre of Vietnam's coffee boom.

This estimate is conservative. It captures forest loss within mapped coffee cultivation areas, but does not account for associated land-use changes such as coffee processing and storage facilities, roads, housing for coffee farmers or even land under other crops within coffee farms. In our Brazil report, these broader production landscapes were incorporated where data allowed (Coffee Watch, 2025); comparable datasets are not currently available for Vietnam, meaning the full footprint of coffee-related forest conversion is likely larger than captured here.

The timing of this loss follows a clear frontier trajectory within today's coffee landscapes. Annual forest loss inside areas that are now used for coffee cultivation surged to around 15,000–20,000 hectares per year in the late 1990s and early 2000s, coinciding with the coffee boom and rapid settlement of new frontiers in the Central Highlands. The maps show that Dak Nong, Lam Dong and Dak Lak saw large blocks of forest cleared early on, while more recent loss is fragmented and concentrated along remaining edges and highland margins, suggesting a shift from frontier opening to "chipping away" at residual forest in an increasingly saturated landscape. These temporal patterns are derived by applying a static 2022 coffee map retrospectively to the forest loss record and should therefore be interpreted as the timing of forest loss on land that now supports coffee, rather than as a precise attribution of annual deforestation directly to coffee.

FIGURE 2.5

HOW WE LINK COFFEE TO DEFORESTATION

A. HOW THE EU MAPS TROPICAL FOREST LOSS

1 COMPILE SATELLITE IMAGERY

Decades of Landsat satellite imagery are compiled to repeatedly observe tropical forest landscapes through time

2 IDENTIFY TROPICAL MOIST FOREST

The system identifies where humid tropical forests exist across the tropical belt

3 DETECT FOREST DISTURBANCE

Changes in satellite signals are analyzed to detect where forest canopy has been disturbed or removed

4 DISTINGUISH CHANGE TYPE

Dataset distinguishes between degradation, deforestation and forest regrowth over time

5 RECORD TIME OF CHANGE

Annual change records show when forest disturbance and deforestation occurred from 1990 onward

6 PRODUCE FINAL FOREST LOSS MAP

A high resolution wall-to-wall tropical forest change map (1990 to present) is produced for monitoring deforestation

Source: Vancutsem et al. (2020)

B. HOW CIAT MAPS COFFEE CULTIVATION

1 COMPILE SATELLITE & REFERENCE DATA

Sentinel 1 and 2 imagery (for 2022) are combined with geo-located coffee reference samples derived from high res imagery and field interpretation

2 GENERATE CLASSIFICATION FEATURES

Spatial, spectral and temporal features are calculated to distinguish coffee from other land covers

3 TRAIN AI CLASSIFICATION MODEL

A deep learning classification model is calibrated using known coffee locations

4 PRODUCE PRELIMINARY COFFEE MAP

The trained model is applied across the landscape to generate a wall-to-wall coffee cultivation map

5 VALIDATE RESULTS

Outputs are checked using independent sampling and human interpretation of high-res imagery

6 PUBLISH FINAL COFFEE DATASET

A validated high-res coffee cultivation map (2022) is produced for the Central Highlands, Vietnam

Source: Reymondin et al. (2022)

C. HOW DEFORESTATION IS ATTRIBUTED TO COFFEE

A We identify where humid tropical forests were disturbed or cleared within the TMF dataset

B We overlay this with the mapped footprint of coffee cultivation from the CIAT coffee dataset

C Where forest loss overlaps with areas now mapped as coffee, we attribute that loss to today's coffee landscape

WHAT THIS MEANS
We count forest loss that now occurs within today's coffee landscape – regardless of whether the conversion was direct or intermediate

WHAT THIS METHOD DOES AND DOES NOT CLAIM
This approach does not claim that every hectare now under coffee was directly converted from forest to coffee in a single step. Some plots may have passed through intermediate land uses before coffee establishment.

However, where coffee now occupies land that was once forest, it remains part of the broader land-use trajectory that made deforestation economically possible. Because coffee and a small number of other perennial crops dominate the landscape, much forest conversion that enables today's coffee economy ultimately goes back to these commodities.

This decline does not reflect a structural shift toward sustainability so much as the arithmetic of landscape exhaustion: by the 2010s, most accessible forest within suitable coffee zones had already been cleared. To put it simply: there was almost no accessible forest left to kill.

Independent research confirms that this overlap was not incidental. Landsat-based coffee mapping between 1995 and 2020 documents approximately 135,520 hectares of newly planted coffee area, concentrated in precisely those central plateau districts that still contained higher-quality forest cover into the 1990s (Son et al., 2023).

Earlier socioeconomic work in Dak Lak and Dak Nong further shows that coffee expansion operated both directly - through plantation establishment on forest land - and indirectly, through displacement of lower-intensity cultivators (often Indigenous people) toward forest margins, where they cut forests to both grow coffee and grow subsistence crops (Meyfroidt et al., 2013).

The measurable 207,428 hectares therefore captures only the forest now occupied by coffee; it does not fully reflect the induced clearing at the displaced frontier. Capturing all of the direct and indirect displacement of forests would require detailed ground-level tracking that was not feasible given field access and risk constraints, meaning the true deforestation footprint of Vietnamese coffee is likely considerably higher than reported here.

The mechanisms linking coffee expansion to deforestation involved an indirect but well-documented displacement chain. Research by Meyfroidt et al. (2013) show that in Dak Lak and Dak Nong, capital-endowed Kinh migrants acquired existing agricultural lands and converted them to coffee and other perennial cash crops, consolidating commodity production in lowland and valley areas.

Indigenous ethnic-minority farmers who had previously practiced lower-intensity rotational cultivation were then pushed toward remaining forest margins, where they cleared new plots for subsistence. Shifting cultivation thus appears as the proximate cause of forest loss, while coffee-led land consolidation is the underlying driver. Doutriaux and Geisler's (2008) analysis of "development-induced displacement" in the Central Highlands reinforces this picture, showing how coffee development policies and associated land acquisitions systematically marginalised ethnic-minority communities and relocated deforestation to new frontiers.

Government intervention itself signals the scale of the pressure. Prime Minister's Notice No. 191/TB-VPCP, issued on July 22, 2016, is a key policy document in Vietnam that imposed a moratorium on new clearing of natural forest, effectively freezing the remaining natural forest at the time (Kissinger, 2020). Such measures are typically introduced only after frontier expansion has already caused extensive loss.

In this case, the timing followed decades of rapid coffee and rubber expansion, much of it shaped by state policy and development priorities.

The moratorium therefore represents an implicit acknowledgement of the scale of forest loss that had already occurred. However, intent alone is not sufficient. Without consistent enforcement, land-use monitoring, and alignment with supply-chain accountability mechanisms such as the EUDR, such protections risk remaining partial and uneven, leaving remaining forests vulnerable to continued pressure from both formal and informal expansion.

Forest conversion had already removed much of the region's natural cover, making the protection of what remained both urgent and essential.

FIGURE 2.6

COFFEE AND THE FOREST FRONTIER: SPATIAL RESPONSIBILITY, TEMPORAL PEAK, AND LANDSCAPE EXHAUSTION

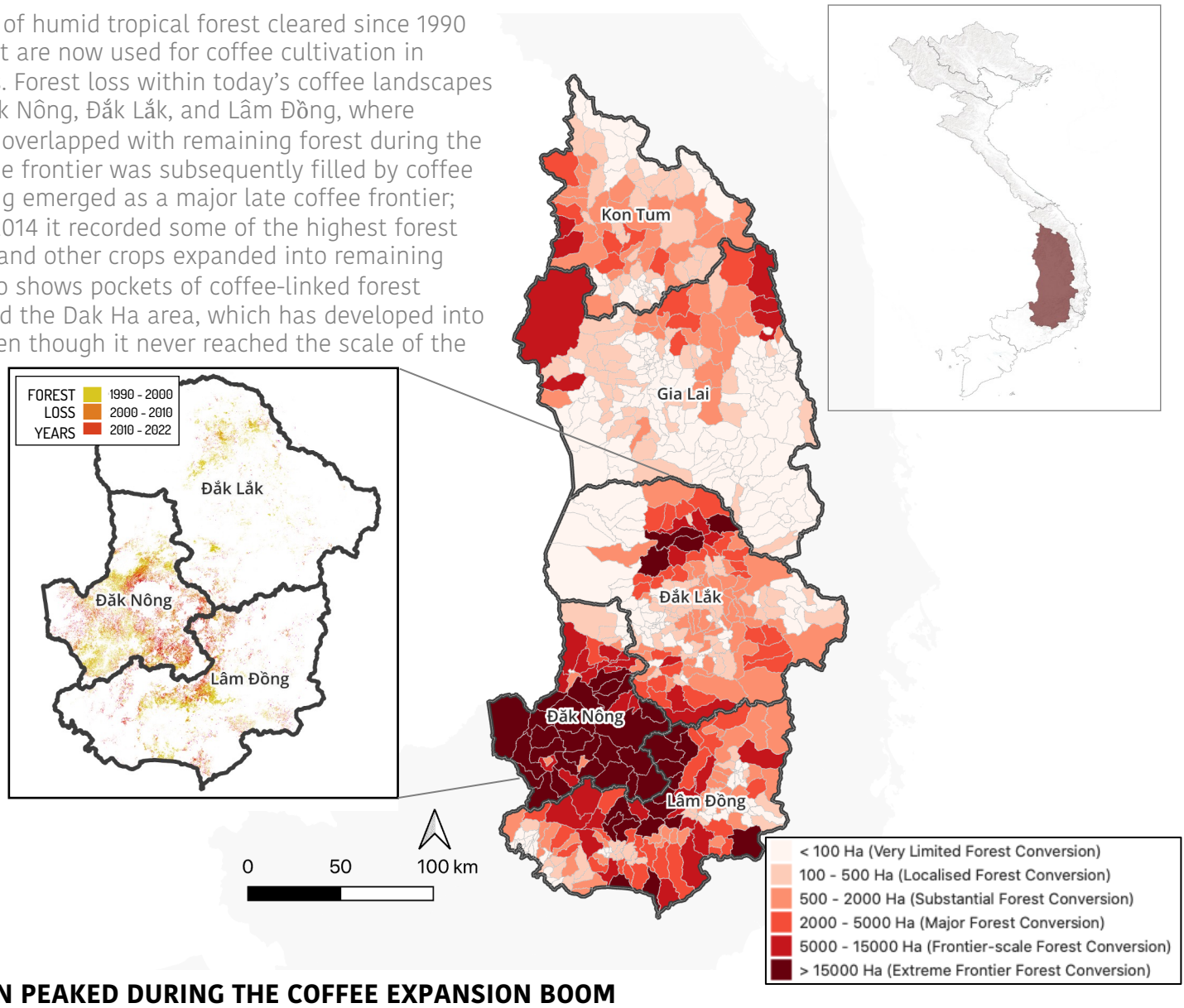
High-resolution coffee mapping combined with satellite forest loss data shows that over 207,000 hectares of humid tropical forest were cleared since 1990 on land that is now used for coffee cultivation. The pattern follows a classic frontier cycle: rapid expansion in the 1990s and early 2000s, followed by decline driven not by protection, but by the exhaustion of accessible forest and the displacement of clearing to remaining margins.

A. COFFEE LANDSCAPES OVERLAP WITH CONCENTRATED FOREST LOSS

More than 207,000 hectares of humid tropical forest cleared since 1990 are located within areas that are now used for coffee cultivation in Vietnam's Central Highlands. Forest loss within today's coffee landscapes is highly concentrated in Đắk Nông, Đắk Lắk, and Lâm Đồng, where suitable growing conditions overlapped with remaining forest during the coffee boom and much of the frontier was subsequently filled by coffee farms. In particular, Đắk Nông emerged as a major late coffee frontier; between roughly 2000 and 2014 it recorded some of the highest forest loss in the region as coffee and other crops expanded into remaining forest margins. Kon Tum also shows pockets of coffee-linked forest conversion, especially around the Dak Ha area, which has developed into a recognised coffee zone even though it never reached the scale of the southern provinces.

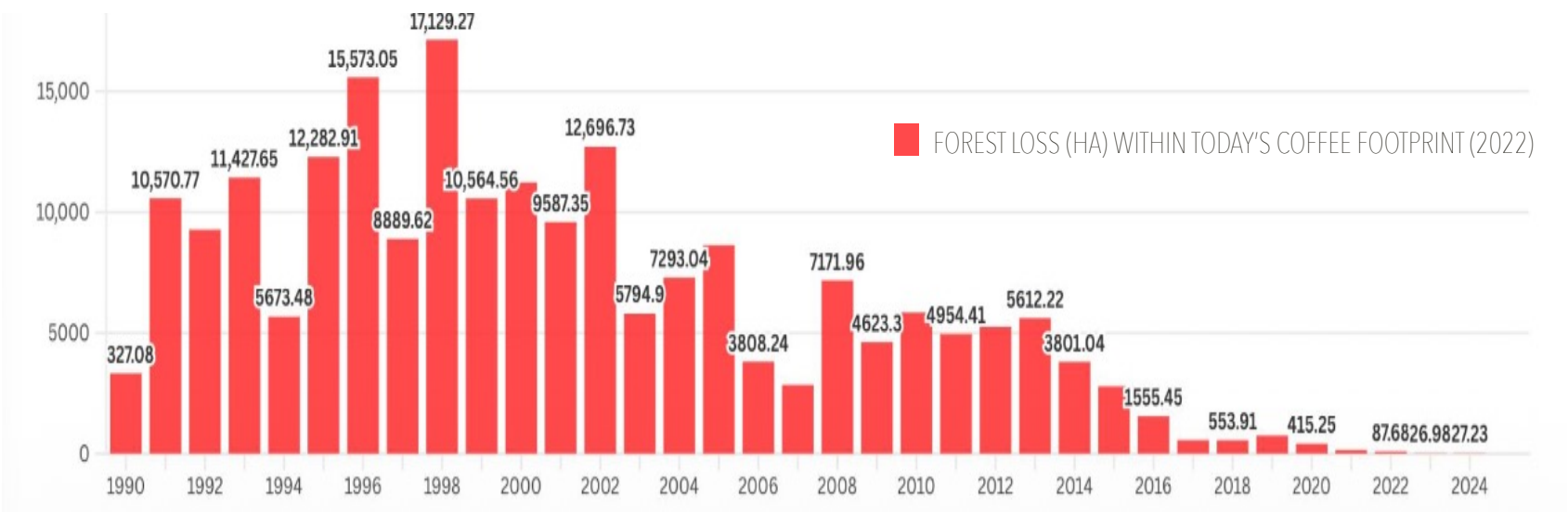
FOREST LOSS WAVES IN COFFEE FRONTIER

The inset map, which colors individual loss pixels by period (1990–2000, 2000–2010, 2010–2022), reveals that most forest loss within today's coffee areas in Đắk Lắk, Đắk Nông, and Lâm Đồng occurred during the 1990s and early 2000s, coinciding with the documented coffee boom and rapid settlement of new frontiers. In recent years, forest loss has become more fragmented and concentrated along remaining edges and highland margins, suggesting a shift from large-block conversion to "chipping away" at residual forest patches in an increasingly saturated landscape.



B. FOREST CONVERSION PEAKED DURING THE COFFEE EXPANSION BOOM

Annual forest loss within today's coffee landscapes surged to 15,000–20,000 hectares in the late 1990s and early 2000s, during a period of explosive coffee area expansion in the Central Highlands. As coffee prices fell and most suitable land had already been converted, both forest loss and the rate of new coffee area expansion declined sharply, indicating a maturing frontier driven more by land and forest exhaustion than by a structural shift toward sustainability.



BOX 2

DEFORESTATION LAUNDERING AND THE CASSAVA-COFFEE NEXUS

Deforestation due to coffee in the Central Highlands is not always direct. It often unfolds through sequential land uses that obscure the link between forest clearance and final commodity production. Cassava plays a key role in this dynamic, acting both as a driver of forest loss and as an enabler of longer-term crops such as coffee (Meyfroidt et al., 2013).

Cassava expansion typically follows a frontier pattern. Small, incremental incursions into forest areas establish short-cycle cassava plots, often on forestry land or recently cleared forestland. These are harder to detect and regulate. After a few years, the land is frequently transferred or converted to higher-value perennial crops like coffee (Van et al., 2016). In this way, cassava can effectively "launder" deforestation, separating the initial clearing from the coffee.

This process is closely linked to land consolidation and displacement. Capital-endowed households acquire land for perennial crops, while poorer ethnic minority households are pushed toward forest margins (Meyfroidt et al., 2013). Cassava itself is economically significant, with exports reaching around USD 1.03 billion in 2017, largely driven by demand from China (Viet Nam Customs, 2017). However, cassava rapidly depletes soil nutrients (MARD, 2017) and is used as a transition crop, turning short-term land expansion into long-term damage for coffee production.

These dynamics show that land-use pressure is systemic, not crop-specific. Coffee, cassava, rubber, and other commodities interact, expand, and displace one another over time. Even where coffee expansion slows, other crops may continue to drive forest conversion. Recent shifts away from coffee into crops such as black pepper, avocado, and passion fruit reinforce this pattern (Reed, 2018).

This has direct policy implications. Regulating a single commodity risks shifting pressure rather than reducing it. Effective deforestation-free supply chains require a broad approach across commodities, ensuring that gains in one sector are not offset by expansion in another.

There is a real need for vigilance in examining coffee alongside other crops driving deforestation, to understand and then address the complex interplay between them, if we hope to save forests before it is too late.

Coffee has not been the sole driver of deforestation in the Central Highlands. Yet during the most intense frontier years of the 1990s and early 2000s, coffee was a significant and geographically concentrated contributor to forest conversion, particularly in districts where suitable elevation, soils and rainfall overlapped with remaining natural forest. Timber extraction, rubber expansion, infrastructure development, and state-led resettlement policies all played important roles in reshaping the plateau landscape alongside coffee. The spatial clustering of loss within core coffee provinces indicates that forest clearance and coffee establishment were structurally intertwined during the boom years rather than coincidental processes unfolding in parallel.

The legacy of this frontier expansion remains embedded in the landscape. Today's coffee heartland sits largely on terrain that was forest within living memory, and the ecological consequences of that conversion - altered hydrology, biodiversity decline, soil degradation and heightened climate vulnerability - continue to shape the region's environmental trajectory. The reduction in new clearing does not erase the cumulative footprint; it simply marks the point at which the frontier reached its limits.

E. THE FOREST IS REDUCED, BUT THE RISK IS NOT

The slowdown in annual coffee-linked deforestation does not signal a structural transition to sustainability. It reflects, in large part, the depletion of the most accessible frontier forest, leaving only more limited and contested areas remaining. The basaltic plateau terrain most suitable for coffee has largely been converted over preceding decades. Research on frontier dynamics consistently finds that annual loss rates decline once accessible forest stocks are depleted, independently of whether governance has substantively improved (Lambin and Meyfroidt, 2011).

In the Central Highlands, both forces may be operating simultaneously: some policy effect from the 2016 moratorium, and a landscape where the "low-hanging" forest has already been taken.

Coffee area itself has not declined in tandem with reduced clearing. Official statistics show planted area increasing from approximately 555,000 hectares in 2010 to more than 715,000 hectares by 2023 (Dang et al., 2025). Growth has slowed relative to the rapid expansion of the 1990s and early 2000s, but the sector has not contracted. In a landscape where much of the most accessible natural forest has already been cleared, the remaining areas carry increasing ecological and economic importance.

Continued expansion raises a structural question: if new plantations are not replacing intact forest at previous rates, what land uses are being displaced, and where is ecological pressure being redirected?

What forest remains is not secure - it is simply more politically and economically contested. Provincial land use plans in Lâm Đồng project the conversion of more than 32,000 hectares of forest land between 2021 and 2030 for mining and infrastructure projects, with up to 70% classified as natural forest (Mulia et al., 2019; Le, 2024). Replacement forest requirements exist within the regulatory framework, yet the province has reportedly exhausted available land reserves for compensatory planting, exposing a structural weakness in the safeguard mechanism.

The remaining forest is therefore no longer threatened primarily by plantation expansion alone, but by a broader development trajectory that includes extractive industries and infrastructure corridors. The forest that survives coffee expansion is now in the path of the next wave of state-sanctioned development.

The indirect displacement mechanisms that accompanied the coffee boom also remain structurally unresolved. Meyfroidt et al. (2013) documented how capitalised commodity expansion consolidated lowland agricultural areas and displaced ethnic minority communities toward forest margins, where subsistence clearing persisted. That chain does not automatically terminate when coffee-specific clearing slows. The World Bank's 2019 Vietnam Country Forest Note identifies ongoing deforestation and degradation in the Central Highlands precisely in areas characterised by weak governance capacity and insecure ethnic minority land tenure. In such contexts, a decline in coffee-linked clearing may not represent ecological recovery, but a shift of deforestation into more remote and weakly governed areas, where it is less visible, less monitored, and more difficult to control.

The result is a more complex and opaque phase of forest risk that now threatens the coffee sector itself. The ecological system remains under stress from diversified pressures including infrastructure expansion, land reclassification, mining concessions, and continued smallholder displacement. The rate of coffee-driven clearing has fallen. The structural vulnerability of the Central Highlands ecosystem – and of the future of Vietnamese coffee – has not.

Coffee did not create every one of these pressures, but its decades-long expansion accelerated the exhaustion and fragmentation of the forest frontier, leaving a landscape less buffered against the next wave of extraction. The remaining forest now stands thinner, more fragmented and more hydrologically unstable. These conditions directly undermine the ecological functions on which coffee production depends.

F. THE FOREST THAT'S LEFT: DEGRADED, FRAGMENTED, EXPOSED

Aggregate forest cover statistics for the Central Highlands create an impression of stability that masks a deeper ecological decline. According to the World Bank's 2019 Country Forest Note, two-thirds of Vietnam's natural forests are classified as in poor condition or regenerating, while rich, closed-canopy forest accounts for just 5% of the national total. The Central Highlands - the region that has experienced the most sustained commodity-driven expansion - is disproportionately represented in this degraded category. What appears in national accounts as "forest" is increasingly not intact forest but diminished and recovering fragments.

The loss is both qualitative and structural. Forest volume in the Central Highlands fell by 25.5 million cubic metres, or nearly 8% of the country's total forest reserve, even during years when headline forest area figures appeared to stabilise (Hung et al., 2020). A landscape that has shed this share of its biomass is not ecologically intact, regardless of canopy cover statistics. What remains is thinner, more fragmented, and less capable of sustaining biodiversity, regulating hydrological cycles, or storing carbon at the levels characteristic of mature forest systems.

What has been lost in the Central Highlands is not interchangeable with what remains. The collapse of primary forest, the documented decline in biomass, and the fragmentation of remaining forest patches together signal a structural weakening of the ecosystem rather than a reversible fluctuation in land cover statistics (Meyfriodt and Lambin, 2018b; World Bank, 2019; Hung et al., 2020; Bourgoin et al., 2020).

BOX 3

THE VANISHING CORE: HOW THE CENTRAL HIGHLANDS LOST ITS OLD-GROWTH FORESTS

The Central Highlands has not just lost forest cover. It has significantly lost its ecological core.

Primary humid tropical forests are old-growth systems with the highest ecological integrity, supporting the greatest biodiversity, carbon storage, and water regulation functions. These forests are not easily replaced. Once cleared, they cannot be restored within meaningful human timescales.

Across Vietnam, forest cover statistics can give the impression of recovery. This reflects a well-documented "forest transition," where total forest area stabilises or increases over time, often through plantations or secondary regrowth (Meyfroidt and Lambin, 2009). However, this transition masks a critical distinction: the loss of natural forests continues even as overall forest cover appears stable.

In the Central Highlands, this dynamic is particularly stark. Since the coffee boom accelerated in the 1990s, remaining old-growth forests have been progressively reduced, fragmented, and pushed into isolated pockets (World Bank, 2019).

What remains is concentrated in remote and often weakly governed areas, where protection has been uneven and pressures from agriculture and development persist.

This is not just deforestation. It is the disappearance of irreplaceable ecosystems. While coffee was not the only driver, its rapid expansion during the frontier years coincided with the final contraction of these forests, contributing to the erosion of the region's ecological foundation.

Mature forest systems regulate watershed hydrology, buffer temperature extremes, sustain soil integrity, and store disproportionately high levels of carbon relative to regenerating or degraded stands. When these systems are reduced to smaller, isolated fragments, their ecological function declines nonlinearly: edge effects intensify, microclimates destabilise, and biodiversity resilience erodes. In such landscapes, the distinction between “forest present” and “forest functional” becomes critical.

The Central Highlands may still retain some forest cover on paper, but the ecological capacity of that forest to stabilise water systems and sustain agricultural productivity may already have been materially diminished. In a plateau economy built around climate-sensitive perennial crops, coffee stands at the frontline of this ecological weakening.

F. HOW TO FIX THINGS

The less forest we have left, the more important it becomes to protect what remains. What has been cleared cannot be restored overnight, but what remains can still be stabilised. The same sector that expanded across the plateau now has the capacity to reshape it. Agroforestry, shade restoration, soil regeneration, and improved water management are not peripheral cute environmental gestures to please tree-huggers; they are structural interventions that rebuild hydrological buffering, reduce pest vulnerability, and moderate microclimates to ensure farming can remain viable.

In a landscape where climate variability is intensifying and groundwater reserves are already strained, failure to invest in ecological repair is not neutral. It compounds risk. What began as a commodity frontier has become a systemic constraint. The next phase of Vietnam’s coffee story will not only be defined by how much more land is converted, but by whether the sector chooses to rebuild the ecological infrastructure that underpins its own survival.

This transition cannot be delivered by impoverished and often isolated rural coffee farmers alone. It will require coordinated investment from the government, the coffee industry, and the private sector of other major crops shaping the Central Highlands landscape including rubber, pepper, and cashew.

Landscape-scale programmes that support farmer-centred agroforestry should be actively supported and incentivised through EUDR implementation, linking compliance with investment in more resilient production systems. Such approaches can restore shade cover, improve soil organic carbon, stabilise water cycles, and diversify farm incomes through fruit, timber, and intercrops. Such systems simultaneously store carbon, rebuild biodiversity, and reduce the climate vulnerability of monoculture plantations.

In a region where coffee remains the economic backbone for hundreds of thousands of households, ecological restoration must therefore be designed not only as conservation policy but as a rural development strategy.

The coffee industry has a direct stake in protecting what remains of the region’s forests. Remaining forest fragments, national parks, and protected areas sustain the conditions for production by continuing to regulate rainfall patterns, sustain biodiversity, and stabilise watersheds across the plateau. Traders, roasters, and multinational buyers that benefited from decades of frontier expansion therefore have both the capacity and the responsibility to support stronger forest protection alongside the Vietnamese government.

Initiatives by industry should include investing in landscape monitoring, supporting protected area management, and ensuring that supply chains actively reinforce forest conservation – rather than merely avoiding illegal clearing.

BOX 4

BIODIVERSITY CRISIS AT THE EDGE OF THE COFFEE FRONTIER

The forests of Vietnam's Central Highlands once supported one of mainland Southeast Asia's richest assemblages of wildlife.

Species such as the red-shanked douc langur, often called the "costumed ape" for its striking coloration, the pygmy slow loris, and the critically endangered saola — sometimes referred to as the "Asian unicorn" — are emblematic of these ecosystems.

Larger mammals such as the Asian elephant and tiger once ranged widely across the plateau, while arboreal species including civets, flying squirrels, and the black-shanked douc langur occupied the forest canopy.

Today some of these are locally extinct, and many of these species survive only in fragmented pockets of remaining forest or protected areas, as decades of agricultural expansion have transformed the landscape.

This loss of biodiversity is a major conservation issue, but its significance goes beyond that. Forest wildlife plays an important ecological role in maintaining the stability of agricultural landscapes.

BOX 3

BIODIVERSITY CRISIS AT THE EDGE OF THE COFFEE FRONTIER (CONTD.)

Many small mammals, birds, and insects contribute to natural pest control, seed dispersal, and the regulation of ecological processes that keep neighboring plantation systems resilient.

When forests are cleared and wildlife disappears, these functions weaken. Pest outbreaks become more frequent, ecological imbalances intensify, and farming systems become increasingly dependent on chemical inputs to compensate for the missing biological controls.

The decline of biodiversity across the Central Highlands therefore reflects a deeper structural shift.

Coffee expansion did not simply remove trees; it hollowed out an entire ecosystem that once buffered farms against pests, disease, and climate volatility.

Urgently planting shade trees in coffee at scale, vigilantly protecting remaining forest fragments, and strategically reconnecting ecological corridors can help rebuild some of these natural support systems.

In this sense, biodiversity conservation is not separate from the future of Vietnam’s coffee sector. It is part of the ecological infrastructure on which the long-term viability of the industry depends.

Our findings on deforestation for coffee in Vietnam have direct implications for regulation. This is precisely why the EUDR matters and why its timely implementation is critical. Halting new deforestation is the first structural step toward rebuilding ecological resilience in the Central Highlands. The post-2020 cutoff establishes a clear boundary against renewed frontier expansion at a moment when climate volatility and hydrological stress are intensifying. But the regulation must function as a foundation, not an endpoint. A farm may be compliant with land-use legality and still operate within a degraded ecological system.

EUDR creates the floor from which deeper reform must proceed. It can anchor the promotion of agroforestry, soil regeneration, and improved water management practices that rebuild the ecological buffering capacity on which coffee production depends. Weakening or delaying the regulation risks locking in a fragile status quo.

We have lost a lot of forest. That is exactly why what remains matters more, and is harder to protect. As climate pressures intensify, the incentive to push into these remaining forests will only grow. This is why strong measures like the EUDR are essential, and urgent.

3 FROM FRONTIER TO FRAGILITY

ECOLOGICAL DEBT IN VIETNAM'S COFFEE HEARTLAND

Forest loss in the Central Highlands did more than clear land for coffee. It dismantled the ecological systems that regulate water, protect soils, buffer climate extremes and stabilise agricultural production. The plateau's transformation into a global robusta powerhouse replaced diverse forest ecosystems with irrigation-intensive monocultures dependent on groundwater and chemical inputs. Satellite imagery shows where trees disappeared. It does not show what disappeared with them: watershed regulation, groundwater recharge, soil carbon retention, and biodiversity-based pest control.

The environmental damage linked to coffee expansion extends well beyond the footprint of deforestation itself. It manifests in depleted aquifers, degraded soils, rising pest pressure and increasing production volatility. These are the long-term ecological consequences of removing forest infrastructure from a landscape now asked to sustain an export pesticide-soaked monoculture agriculture at scale.

A. FROM FOREST LOSS TO WATER FRAGILITY: A BREWING GROUNDWATER CRISIS

Deforestation has weakened the Central Highlands' water system, making coffee production increasingly dependent on stable rainfall—just as that stability is eroding. Intact forest cover performs critical hydrological functions. It intercepts rainfall, slows surface runoff, promotes infiltration, and sustains groundwater recharge through the dry season. When forest cover declines, those functions weaken.

Field research in communes of Dak Lak, a representative coffee-growing area, found that residents directly attributed deteriorating water availability to forest loss in upper catchment areas, with streams that had historically flowed through the dry season running dry for the first time in living memory during the 2015–2016 drought period (Tum et al., 2016). The removal of forest in upstream areas is a real, measurable driver of the water scarcity now affecting farms and households downstream.

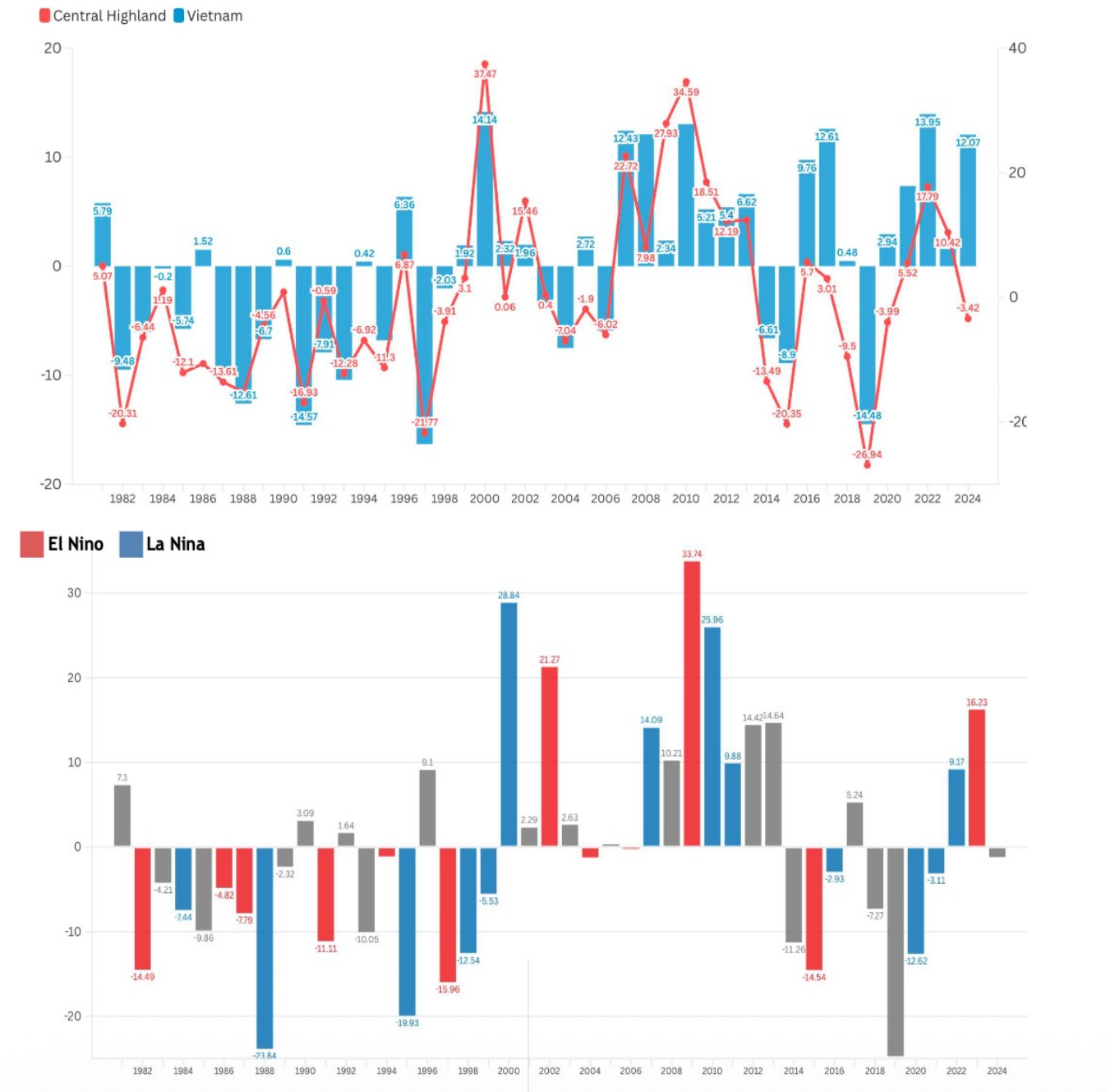
Rainfall is becoming more volatile in a landscape that has lost much of its capacity to absorb shocks. The anomaly series shows no clear monotonic decline in average precipitation, but it does reveal sharper swings between rainfall deficit and surplus conditions over time. Deep negative anomalies during the 1997–1998 and 2015–2016 El Niño events, and again around 2019–2020, are followed by abrupt reversals. Analysis of CHIRPS data (Climate Hazards Group InfraRed Precipitation with Station data or CHIRPS is a 35+ year quasi-global rainfall data set ranging from 1981 to near-present, that creates a gridded rainfall time series for trend analysis and seasonal drought monitoring) confirms that ENSO-linked dry shocks have become more pronounced in recent decades.

In an intact forested system, such variability would be buffered: rainfall would be intercepted, runoff slowed, infiltration enhanced, and wet years would gradually rebuild aquifers depleted during dry seasons.

FIGURE 3.1

RAINFALL VOLATILITY IN A DEGRADED SYSTEM: CLIMATE SHOCKS NOW HIT HARDER

Analysis of CHIRPS data show rainfall in the Central Highlands exhibiting increasing swings between deficit and surplus rather than a steady decline, with major global climate cycles such as El Niño driving severe droughts (notably in 1997–98 and 2015–16). In a landscape weakened by forest loss and groundwater dependence, these shocks now translate more directly into water stress, with slower recovery and growing hydrological instability.



The 2015–2016 El Niño drought made visible a vulnerability that had been accumulating for decades. As a strong ENSO event suppressed rainfall during the dry season, water reservoirs across the Central Highlands declined to between 10 and 50% of their designed capacity and major rivers' discharges fell by 20–90%, reflecting severe hydrological stress beyond normal variability. Approximately 152,000 hectares of agricultural land were affected, with direct economic losses estimated at around USD 269 million (Grosjean et al., 2016; Tum et al., 2016; Khoi and Nhi, 2021, Ninh and Hoang, 2022).

Coffee production in the worst-affected areas fell by up to 25% relative to average-rainfall years, mirroring declines in earlier droughts (Byrareddy et al., 2021). Assessments at the time also confirmed that groundwater aquifers were heavily depleted by the drought, with many wells running dry and deeper digging unable to restore supply; showing that each successive drought event leaves underlying aquifers in a more vulnerable state (Tum et al., 2016). The drought exposed a water system that had been structurally weakened simultaneously by decades of deforestation and over-extraction, largely for coffee irrigation.

Water stress in the Central Highlands has already translated from an environmental concern into measurable operational and supply-chain risks. Nestlé, which purchases roughly 20% of Vietnam's national robusta output and works with around 12,000 farmers in the region, has publicly acknowledged that recurrent drought has left irrigation and household wells running dry in recent years (Cole et al., 2023; CDP, 2019). In a production system that depends on several months of dry-season irrigation to remain economically viable, groundwater failure directly reduces yields, tightens supply, and generates price volatility.

The impacts are not just confined to farms. As wells dry, tensions emerge between agricultural extraction and household water needs, linking hydrological stress to social instability and market disruption. This illustrates the systemic nature of groundwater risk in the coffee heartland: depletion is not only an ecological issue but a structural vulnerability embedded in global supply chains. This vulnerability becomes more acute when recharge itself becomes unreliable. If drought events intensify and rainfall patterns grow more erratic, aquifers already weakened by over-extraction and forest loss cannot easily rebuild their reserves. The issue is therefore not only how much groundwater is withdrawn, but how stable and predictable the rainfall systems are that replenish it.

In a deforested and irrigation-intensive plateau landscape, rainfall deficits now translate more directly into groundwater stress. What's more, surplus years fail to restore aquifers at the same rate because infiltration capacity has been reduced and extraction continues. The result is structural asymmetry: drought years impose immediate depletion, but recovery years deliver only partial recharge. Climate variability alone does not explain rising water stress. Yet in a landscape stripped of hydrological buffers and heavily dependent on groundwater, each El Niño event now bites harder and recovery lags further behind, amplifying the fragility created by decades of forest loss and irrigation expansion in the coffee heartland.

Modelled groundwater data reinforce this picture of structural stress in Vietnam's coffee heartland. Global-scale MODFLOW simulations (GLOBGM v1.0) show sustained groundwater table declines across much of the Central Highlands between 1990 and 2025, with the most pronounced drawdowns concentrated in the very provinces that anchor Vietnam's coffee production (Verkaik et al., 2024. While such models do not attribute depletion to any single driver, their spatial overlap with the coffee heartland underscores the scale and persistence of aquifer pressure in the region.

Soil moisture patterns tell a complementary story. Provinces with high coffee intensity exhibit recurrent signs of surface moisture stress, suggesting that both shallow and deeper water reserves are operating under constraint. Taken together, these indicators point to a landscape where water scarcity is structural due to pressure from irrigation and current extractive practices.

B. CLIMATE VOLATILITY DEEPENS ECOLOGICAL FRAGILITY

Climate change is amplifying vulnerabilities created by deforestation and extractive land use in Vietnam's coffee heartland. In the Central Highlands, rainfall is becoming more extreme in a system that has already lost much of its ability to absorb rainfall, store water in soils and vegetation, and release it gradually during dry periods.

Vietnam's Ministry of Natural Resources and Environment documents a rise in extreme rainfall events in the South Central and Central Highlands regions, even as overall rainfall patterns remain variable (MONRE, 2022). The region now faces both more intense precipitation events and more severe dry seasons within the same annual cycle.

Climate projections indicate that this volatility will intensify rather than stabilise. CMIP6 (Coupled Model Intercomparison Project Phase 6 is a project of the World Climate Research Programme) modelling suggests maximum temperatures in Vietnam will rise by 1.5°C to 2.2°C under 2–3°C global warming scenarios, with a dramatic increase in the frequency of warm days (Tran-Anh et al., 2026). For coffee cultivation, the agronomically critical period is the dry season from January to April, when irrigation determines flowering and fruit set. Research using five CMIP6 climate models projects that coffee evapotranspiration - the crop's water demand - will increase by 20 to 120 mm annually under mid-century scenarios (Tran, 2024).

In a landscape already weakened by forest loss and increasingly dependent on groundwater, rising evapotranspiration directly intensifies pressure on aquifers at precisely the moment when natural recharge is becoming less reliable.

Extreme rainfall events further complicate this picture. Heavy precipitation falling on degraded soils and simplified landscapes increases runoff and erosion rather than replenishing aquifers, intensifying flood risk while doing little to restore groundwater reserves. Rather than stabilising the system, climate variability is widening the gap between water demand and water availability—deepening the structural imbalance already embedded in the coffee landscape.

Climate projections suggest that rising temperatures and increasing rainfall variability are long-term pressures, not temporary shocks. Multiple studies estimate that up to half of Vietnam's coffee-growing area could become unsuitable by mid-century without major shifts toward shade-based agroforestry and climate-resilient systems (Bunn et al., 2015; Läderach et al., 2017). Vietnam already experiences an estimated 179 days per year with temperatures harmful to coffee, with climate change contributing significantly to this burden (Climate Central, 2026), while average temperatures have risen by approximately 0.5–0.7°C over the past five decades and adding immense stress to plants (Bhattacharyya and Nair, 2014).

Furthermore, models run on Vietnam suggest that a 2°C temperature rise could render 50% of current robusta production areas unsuitable by 2050 - this represents a collapse from approximately 33,000 square miles of suitable land to just 18,000 square miles (Killeen and Harper, 2016). Under more severe climate scenarios (RCP 6.0), particularly when combined with current intensive farming practices, suitable areas could decline even further, approaching near-total loss in some projections (Ellison, 2023).

If Vietnam were to officially strive to maintain its coffee powerhouse status, this would almost inevitably require moving to deforest new lands, as existing coffee-producing lands become unviable because of climate change.

BOX 5

FLOODS AT THE OTHER EXTREME: WHEN RAINFALL BECOMES RISK

Floods are becoming more frequent, more intense, and more damaging across Vietnam. And coffee-growing regions are not insulated from this trend.

Recent years have seen a series of severe storm events and historic floods that caused billions of dollars in damage nationwide, overwhelming flood defences and disrupting agricultural production. Heavy rainfall has delayed harvesting in Dak Lak with farmers reporting crop damage and quality deterioration during peak harvest periods. Attribution studies increasingly link the growing intensity of extreme rainfall events to climate change, while national assessments note that deforestation and weakened natural drainage systems exacerbate flood impacts by accelerating runoff and reducing landscape absorption capacity.

In November 2025, catastrophic flooding hit Vietnam's coffee-growing regions, killing over 91 people, inundating 200,000 homes, and destroying 20% of the world's robusta supply, with robusta prices increasing 15-20%, whilst farmers lost livelihoods and the authorities estimated over $490mn in damage.

Satellite evidence reinforces the vulnerability of coffee landscapes to extreme precipitation. Sentinel-1 SAR imagery from recent flood events shows inundation within and around major coffee-producing districts in the Central Highlands, including areas of Dak Lak where coffee intensity is highest. In degraded and simplified agricultural systems, heavy rainfall does not translate into effective groundwater recharge; instead, it produces rapid runoff, soil erosion, and crop stress. As climate models project increasing rainfall variability and more intense precipitation events, flood risk becomes part of the same compounding cycle already affecting drought, groundwater depletion, and soil degradation.

The result is a production system exposed at both extremes: drought reduces yield potential, while floods damage crops, delay harvests, and undermine farm incomes - increasing the volatility facing smallholder households in Vietnam’s coffee heartland.

In the Central Highlands, this transition is already being shaped by water. The dry season is expected to lengthen by almost 3 months, imposing additional stress on a region where coffee farming already consumes up to 90% of available water (CIAT, 2017). In practice, this means that the future viability of coffee is less determined by temperature alone than by whether water can continue to be extracted at scale. Yet it is precisely this constraint that is being eroded. As climatic stress increases demand for irrigation, groundwater extraction intensifies in response. This further deepens the imbalance between withdrawal and recharge.

C. PUMPING BEYOND SUSTAINABLE LIMITS: WHEN IRRIGATION OUTPACES RECHARGE

As rainfall becomes more erratic, the growing reliance of coffee on groundwater is already visible across the Central Highlands. Surface water is insufficient, especially during the dry season when river flows can drop by up to 90%, so about 80% of coffee irrigation relies on groundwater from wells – overwhelmingly often unauthorized wells (Pham, 2023). As a result, groundwater levels have dropped significantly, forcing farmers to drill deeper—from 10–15 meters in the past to as much as 45 meters today—further depleting shared water resources and worsening inequality (the richest can afford to drill further than the poorest coffee farmers). It bears repeating that this would indicate as much as 35 meter drops in aquifer levels in some places.

Although more efficient methods like drip irrigation exist, only about 10% of farmers can afford them, leaving most trapped in unsustainable practices that threaten the future of coffee production in the region.

The Central Highlands is pumping groundwater faster than it can replenish. Vietnam's robusta industry relies on one of the most irrigation-intensive coffee systems globally, with extraction levels that have driven regional aquifers to the edge of sustainable yield. Between 57% and 95% of irrigation water used on coffee farms in the region is drawn from groundwater, with Dak Lak province alone operating an estimated 2,500 wells tapping basaltic aquifers (D'haeze et al., 2003; Amarasinghe and Smakhtin, 2014).

Research in the representative Ea Tul watershed found that at prevailing irrigation depths, groundwater would be depleted in dry years even in the absence of additional drought stress. The study concluded that maintaining aquifer balance during severe dry seasons would require both improved irrigation efficiency and a reduction of approximately 35% in coffee area (D'haeze et al., 2005).

The implication is stark: under current practices, the existing coffee footprint is not hydrologically sustainable even under average climatic conditions.

The persistence of over-extraction reflects not a lack of knowledge but a structural failure of governance and institutions. Smallholder farmers in the Central Highlands routinely apply more than twice the irrigation volume recommended by the Ministry of Agriculture and Rural Development. This is not because the correct advice is unavailable, but because water is effectively a free open-access resource with no pricing mechanism, no binding extraction limits, and insufficient enforcement of the nominal regulatory framework.

Research in Dak Lak documented average applications of roughly 800 litres per plant per irrigation event, compared with a recommended optimum of 400 litres - a systematic over-application that is individually rational but collectively destabilising (D'haeze, 2020). With coffee accounting for the lion's share of total regional water use, the sector's aggregate irrigation decisions now determine the fate of the aquifer itself.

Field reporting underscores how this dynamic unfolds on the ground - when water becomes scarce, the poorest farmers suffer the worst and resilience tracks with wealth. Prolonged drought in recent years has driven farmers to drill progressively deeper wells as shallow sources fail, with wealthier farmers able to invest in deeper boreholes while poorer households lose access to water for coffee irrigation and even for domestic use (Pham, 2023). Springs that once supplied communities have dried up, and competition for groundwater has intensified.

One study found that 47.4% (65 of 137) of surveyed farmers agreed that they had experienced soil erosion within the past year and 65.7% (90 of 137) of farmers said they experienced shortage of water for irrigation (Ho, 2018). What appears as individual risk management in drilling deeper to secure crops becomes collective aquifer decline. The deeper the well, the higher the cost of access, and the further the system is pushed beyond sustainable yield.

In a nutshell, as this problem deepens, water access will elude the poor, and push them into major financial and humanitarian crisis.

The International Water Management Institute has concluded that groundwater development in the region is approaching its limits. IWMI (2021) states plainly: "Levels of groundwater development are reaching their limits, and thus improving agricultural water use efficiency is the key to achieving sustainable management of groundwater resources in the region." This assessment from an institution dedicated to sustainable water management signals that the resource underpinning Vietnam's coffee export economy is no longer a stable renewable stock but a depleting asset. As climate change raises evapotranspiration demand and increases the frequency of drought years, the gap between sustainable aquifer recharge and actual extraction will widen further unless irrigation practices and the institutional framework governing them undergo rapid reform. Industry and government must urgently address the crisis, together, in consultation with local communities, and scientific experts.

D. WHEN INTENSIFICATION TURNS TOXIC: AGROCHEMICALS, WATER POLLUTION, AND BIODIVERSITY LOSS

Chemical intensification has become the defining ecological feature of Vietnam's coffee heartland. Decades of intensive monoculture cultivation have left the Central Highlands among the most chemically degraded agricultural landscapes in Vietnam, and indeed, in the world. Vietnam's Central Highlands exhibit severe soil degradation, characterized by strong acidification, declining cation exchange capacity (the soil's ability to hold and supply nutrients), and nutrient imbalances, while heavy and often imbalanced applications of synthetic fertilizers and pesticides increase the risk of leaching and contamination of underlying groundwater (Dinh, 2017; Van et al., 2025).

In Vietnam's Lam Ha district, soil samples revealed agrochemical residues at concentrations sufficient to harm soil life (Lam et al., 2024). As yields from aging coffee trees stagnate on exhausted soils, farmers increase fertiliser and pesticide use to protect output. Van et al. (2025) notes this as a self-reinforcing cycle: rising soil pathogen incidence drives higher chemical application, which further degrades soil health and intensifies pathogen pressure. The result is an agricultural debt spiral, where declining ecological resilience demands ever greater chemical input simply to maintain production.

The scale of this chemical escalation is national in magnitude and locally concentrated in coffee regions. Customs data indicate that pesticide imports surpassed USD 1 billion in 2017 and remained close to that level in 2018 (Wong, 2025). Field reporting also notes substantial inflows of unregulated pesticides across borders. In the coffee landscape, excessive agrochemical application combined with limited riparian buffer protection has contributed to widespread pollution of surface and groundwater systems.

Poor fertiliser management is often linked to limited access to soil testing services and results in nutrient over-application that leaches into streams and aquifers (Dinh, 2017; Byrareddy et al., 2020).

Spatial analysis reinforces this link: provinces with high coffee intensity in the Central Highlands show elevated biological oxygen demand (BOD) levels. BOD is a standard indicator of water pollution that measures how much oxygen is required to break down organic matter in water - higher BOD indicates poorer water quality and greater stress on aquatic ecosystems. Put simply, when BOD is high, there is less oxygen available for fish and other aquatic life. In coffee-growing areas, intensive use of fertilisers, pesticides, and the discharge of processing waste can wash into rivers and streams, increasing the organic and chemical load in the water and driving BOD levels higher.

These patterns are illustrated in Figure 3.2, which overlays provincial BOD levels with coffee intensity across the Central Highlands. The highest BOD values cluster within Dak Lak, Gia Lai, and Lam Dong, which also exhibit the highest concentration of coffee cultivation.

FIGURE 3.2

INTENSIVE COFFEE LANDSCAPES SHOW CONCENTRATED WATER POLLUTION STRESS

Across the Central Highlands, provinces and districts with dense coffee cultivation consistently exhibit elevated Biological Oxygen Demand (BOD) levels — a key indicator of water pollution associated with fertiliser runoff, pesticide use, and degraded watershed systems. The spatial clustering of pollution within coffee-growing landscapes suggests that water quality stress is increasingly concentrated to critical levels within the coffee heartland and extending into surrounding downstream districts.

COFFEE-INTENSIVE PROVINCES FACE ELEVATED WATER POLLUTION

The Central Highlands provinces with the highest concentration of coffee cultivation also exhibit elevated Biological Oxygen Demand (BOD) levels, indicating worsening water quality stress in intensive coffee-growing landscapes. Dak Lak and Lam Dong combine high coffee intensity with some of the highest pollution levels recorded. While multiple pollution sources exist, the spatial concentration of elevated BOD values within coffee-dominated provinces suggests that intensive coffee cultivation is a significant contributing pressure within these landscapes.

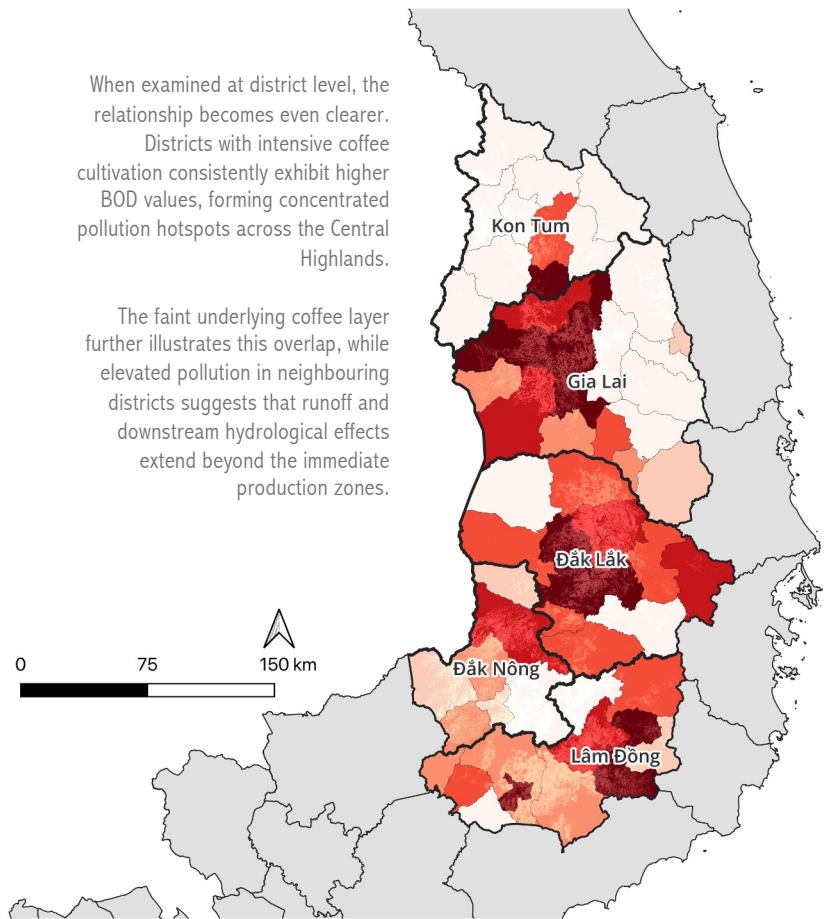
PROVINCE	COFFEE INTENSITY (% of provincial area)	BOD (mg/L) (provincial average)	POLLUTION LEVEL (based on BOD)
DAK LAK	18.4%	46.7	> 40 (Critically Polluted)
LAM DONG	15.7%	28.6	> 40 (Critically Polluted)
GIA LAI	10.8%	21.1	20 – 40 (Heavily Polluted)
DAK NONG	10.2%	10.7	10 – 20 (Polluted)
KON TUM	2.1%	7.0	6 – 10 (Moderately Polluted)

BOD POLLUTION LEVEL GUIDE: < 3 (Clean / Near-natural); 3 – 6 (Slightly Polluted); 6 – 10 (Moderately Polluted); 10 – 20 (Polluted); 20 – 40 (Heavily Polluted); > 40 (Critically Polluted)

BOD (Biological Oxygen Demand) measures the amount of oxygen required to break down organic matter in water; higher values indicate greater pollution stress.

When examined at district level, the relationship becomes even clearer. Districts with intensive coffee cultivation consistently exhibit higher BOD values, forming concentrated pollution hotspots across the Central Highlands.

The faint underlying coffee layer further illustrates this overlap, while elevated pollution in neighbouring districts suggests that runoff and downstream hydrological effects extend beyond the immediate production zones.



Source: Analysis based on DynQual Global Water Quality Model (Jones et al., 2023)

BOX 6

VIETNAM'S COFFEE CARRIES A HIDDEN CARBON BURDEN

Even without new deforestation, Vietnam's coffee system remains a major source of greenhouse gas emissions, driven primarily by chemical inputs rather than land use change.

An analysis based on five years of data from four major suppliers which collectively handle more than half of the country's annual output representing almost 15,000 farmers found calculated carbon emissions caused by coffee in the Central Highlands (Kuit et al., 2020). Between the 2015/16 and 2019/20 seasons, emissions intensity fell from 3.21 to 1.22 Mt CO_2e per Mt of green coffee, indicating some efficiency gains. Yet this apparent progress masks a deeper structural issue: over 83% of emissions are driven by fertilizer use, with nitrogen inputs as the dominant source.

This heavy reliance on synthetic inputs is closely tied to Vietnam's production model. Monocropped coffee systems consistently produce higher emissions per unit of output, while more diversified farms—with shade trees and mixed cropping—show significantly lower carbon footprints.

Despite improvements in efficiency, the sector still emits over 800,000 tonnes of CO_2e annually, underscoring the scale of its climate impact.

The implication is clear: Vietnam's coffee sector is not just land-intensive, but it is chemically intensive, and therefore emissions-intensive. While diversification offers partial mitigation, optimizing nitrogen fertilizer use is critical.

While multiple sources contribute to water pollution in the region, the consistent spatial alignment between coffee intensity and elevated BOD levels suggests that coffee production is a significant contributing factor within these landscapes.

Deforestation amplifies this chemical burden by weakening the soil and hydrological buffers that once absorbed it. Research across a 150 km² Central Highlands catchment found that replacing natural forest with coffee plantations reduced topsoil organic carbon by approximately 30% (Hai et al., 2025). Lower soil organic carbon reduces water and nutrient retention capacity, increasing runoff and accelerating nutrient leakage into waterways. Biodiversity loss deepens in parallel. Around 15% of Vietnam's species are considered endangered, with forest loss and agrichemicals emerging as primary drivers. Pesticide exposure in coffee landscapes affects pollinators and natural pest predators whose ecological function would otherwise reduce chemical dependence (Venzon, 2021).

Drought stress interacts directly with the degraded soil and biodiversity conditions documented above making coffee trees less resilient. Coffee trees already weakened by soil pathogen incidence and chemical fatigue become more susceptible to pest and disease outbreaks under heat and water stress. Research from CIAT in the Central Highlands notes increasing vulnerability of drought-stressed trees to nematodes, coffee berry borers, and mealybugs, and projects that as older tree stocks are replanted in degraded soils, these pressures will intensify (CIAT, 2017).

The ecological cascade becomes operational: hydrological decline increases irrigation dependence; irrigation dependence accelerates aquifer depletion; soil degradation reduces resilience; drought amplifies pest outbreaks; and pest outbreaks drive further chemical intensification.

The long-term consequence is biological decline within the plantations themselves. Studies report nematode and fungal infections in 36–43% of productive coffee plantations and 79% of replanted farms in the Central Highlands, leading to mortality in roughly 40% of replanted areas (Khoa et al., 2014; Dung et al., 2019). The production system is eroding the soil conditions on which it depends. In measurable terms, the sector is eroding its own ecological foundations. In Vietnam, the coffee sector is on a path of self-destruction, whether it recognises it or not.

This exposes a regulatory blind spot. The EUDR addresses forest conversion, but chemical intensity remains largely outside its scope, as does promotion of regenerative agroforestry. The EUDR is a critical and necessary starting point to halt further deforestation, but it cannot by itself address the full range of ecological pressures affecting coffee landscapes. A plantation established before the deforestation cutoff may be compliant in land-use terms while operating within a chemically degraded and hydrologically stressed monoculture system.

Once deforestation is effectively addressed, it will become essential to build on this foundation by tackling pesticide intensity, soil regeneration, and water protection. Without addressing these factors, sustainability efforts risk treating land clearance while leaving systemic ecological decline intact. If companies content themselves with focusing only on EUDR compliance, they risk undermining their own future supply.

All of the ecological pressures land on a social landscape that is already fragile and that fragility reflects and reinforces unsustainable practice. The Central Highlands remains the second-poorest region in Vietnam, with rural poverty rates significantly above the national average (28.8% versus 17.9%), and ethnic minority communities (comprising roughly 32% of the regional population) face disproportionately high poverty and land insecurity (Dang, 2022).

Smallholder farmers operating on narrow margins are structurally unable to absorb yield losses from drought or pest outbreaks without intensifying the very practices that deepen ecological stress: over-irrigation, excess chemical inputs, and expansion onto marginal lands. Social fragility converts climate volatility into further ecological degradation.

The result is a system in which ecological, climatic, and social pressures are no longer separable. Each reinforces the others. Under continued warming and increasing rainfall volatility, the cost of maintaining current production systems will rise faster than the landscape's capacity to sustain them.

As ecological buffers erode, it is smallholder households who suffer. Climate volatility becomes income volatility; aquifer decline becomes debt risk; pest outbreaks become livelihood insecurity. The following chapter turns to these human consequences.

4 THE HUMAN COST OF COFFEE

POVERTY, ETHNIC INEQUALITY, AND CHILD LABOR IN THE CENTRAL HIGHLANDS

Environmental pressures in the Central Highlands are rooted in its social structure. The ecological stress documented in the previous chapter do not fall on a neutral landscape. They play out across a region shaped by dispossession, migration, and structural inequality long before trees were cleared, groundwater tables fell, or rainfall patterns shifted. The Central Highlands' transformation into Vietnam's coffee heartland was driven by state-directed migration, forest clearance, and the incorporation of ethnic minority territories into an export-oriented agricultural economy (Meyfroidt et al., 2013). Over time, this reshaped land access, labor patterns, and local power structures. That political economy produced rapid production growth while embedding chronic social vulnerability into the system.

Inequality shapes how environmental risk is experienced and passed on. Understanding this social architecture is not an optional addendum to environmental analysis. It explains why market-based sustainability interventions have repeatedly underperformed. Inequality in the coffee system helps drive environmental damage, and vice versa. Environmental pressures play out across this unequal system, shaping who absorbs shocks, who adapts, and who is displaced (Ikemoto, 2004). Ignoring farmers' conditions and land security risks producing poverty alongside deforestation-free coffee.

Vietnam's coffee sector is overwhelmingly made up of smallholder farmers with limited bargaining power. Coffee covers more than 700,000 hectares and is cultivated by approximately 640,000 households, the vast majority farming less than one hectare. Production is fragmented across roughly 1.4 million plots, accounting for about 95% of national output (Dang et al., 2025). This creates a highly dispersed system: millions of trees, hundreds of thousands of households, thin margins, and limited bargaining power. In practice, this means most producers operate at small scales with limited ability to influence prices, access finance, or absorb shocks. As a result, environmental and economic risks are borne by smallholders, compliance must operate across dispersed and often informal plots, and ecological stress is ultimately absorbed where capacity is weakest.

Most of Vietnam's coffee farmers and seasonal farmworkers are poor, many extremely poor. As a result, coffee-farming families – perhaps as many as 90% (The Centre for Child Rights and Business, 2025) – appear to rely on child labor to make ends meet. While the actual number of children working in coffee production is unknown, official government statistics report approximately 34,000 children in 2014 (GSO et al., 2014). This is likely a significant undercount, with the true number potentially far higher, possibly around half a million. Most workers lack formal contracts and operate in highly precarious conditions. Poverty, informality, and weak labor protections reinforce one another across the sector.

Farmers and workers cannot organize to improve their conditions and bargaining power. It is illegal in Vietnam for smallholder coffee farmers or farmworkers to form independent unions. Penalties for organizing such unions are severe and can range from sacking and blacklisting to criminal prosecution, imprisonment, harassment, intimidation, surveillance, and violence. This further constrains collective action within an already fragmented system, reinforcing the weak position of smallholders and workers.

Independent field investigations into labor conditions are extremely difficult and often unsafe. The lack of independent unions and severe restrictions on freedom of association further limit visibility and accountability within the sector. Field investigations to directly verify labor abuses were not possible for this report due to the risks involved. Therefore, this section combines best available evidence on the social impacts of the coffee industry in Vietnam's coffee epicentre, the Central Highlands. What is clear from this evidence is that the sector must pay greater attention to hidden social risks in the world's second largest coffee producer.

A. POVERTY AND ETHNIC INEQUALITY IN THE COFFEE HEARTLAND

Vietnam's coffee heartland is also one of its most economically vulnerable. Poverty in Vietnam is geographically and historically uneven, much of it concentrated in the Central Highlands. Vietnam's economy was utterly devastated by French colonialism, the U.S. war in Vietnam and subsequent isolation from the world economy. While the Government has made substantial progress in reducing poverty over recent decades, these gains have not been evenly shared, with the Central Highlands continuing to lag behind. Coffee generates billions in export revenue (Dang et al., 2025), yet the region remains Vietnam's second-poorest.

Rural poverty rates in the Highlands are significantly higher than the national average. According to the General Statistics Office in 2023, the Central Highlands recorded the second highest Gini coefficient and the second highest poverty rate in Vietnam. National poverty mapping confirms district-level poverty rates are markedly higher across the Central Highlands relative to coastal and delta regions, and these same districts overlap substantially with the country's coffee production zone.

Most coffee farmers remain poor despite the sector's global success. A poverty assessment found that in the Central Highlands, 54% of coffee growers were living in poverty, with 29% classified as extremely poor (Mai, 2024). This disconnect between high export value and low household income reflects the structure of the sector: smallholder production, price exposure, and limited value capture at the farm level. For many households, coffee does not provide a stable pathway out of poverty.

This persistent poverty is closely tied to how value is distributed within the coffee supply chain. Studies show that many coffee farmers experience structural socioeconomic disadvantage (Nguyen and Yapwattanaphun, 2015). Historical data indicate that Vietnamese farmers have at times received as little as 31% of the final export price (Mai et al., 2018), reinforcing their position as price-takers exposed to commodity volatility. As a result, income instability is a defining feature of coffee livelihoods.

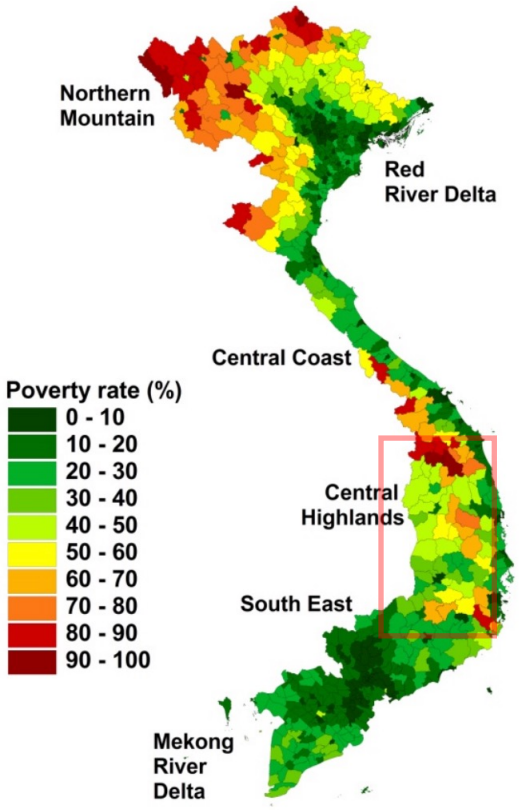
Survey evidence supports this: Nguyen and Sarker (2018) found that 88.3% of farmers relied primarily on coffee for income, while 82.5% reported having experienced poverty due to price fluctuations. Farmer perceptions are backed by independent assessments. Rainforest Alliance (2026) states that "many small-scale farmers struggle to make a living due to the overall low profitability of the sector."

FIGURE 4.1

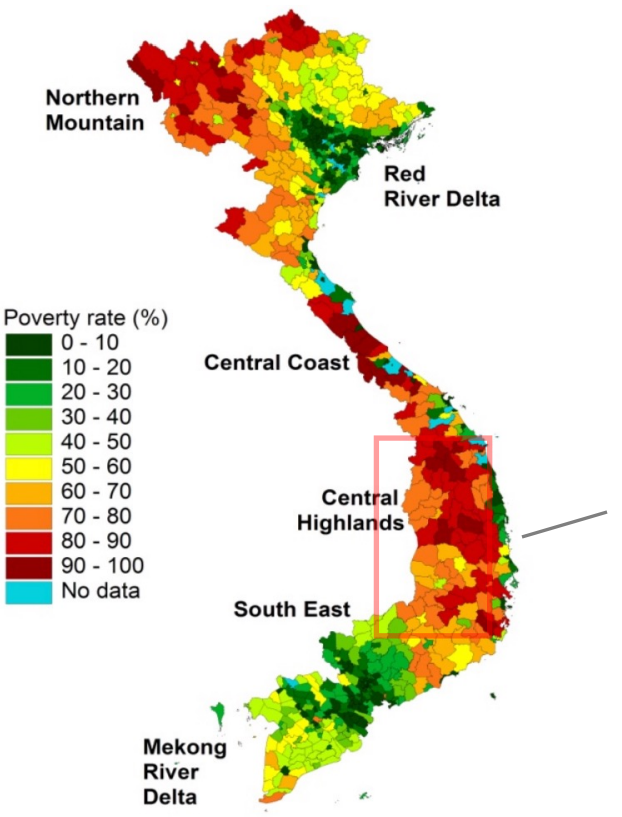
VIETNAM'S COFFEE HEARTLAND IS ALSO ONE OF ITS MAIN POVERTY HOTSPOTS

Poverty is spatially concentrated in the Central Highlands and disproportionately affects ethnic minority communities. Elevated inequality and wide income gaps in the same districts limit upward mobility, reinforcing structural disadvantage within the coffee economy.

A. POVERTY RATE (%)

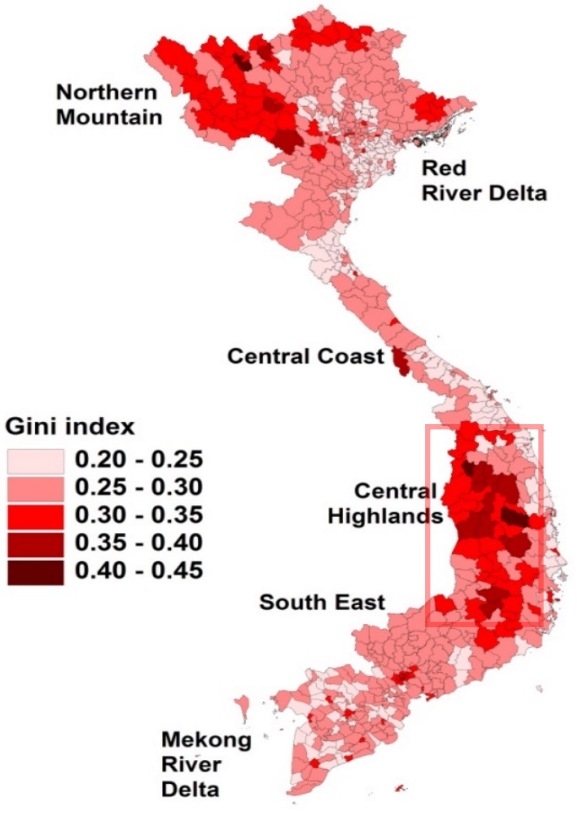


B. POVERTY RATE OF ETHNIC MINORITY (%)

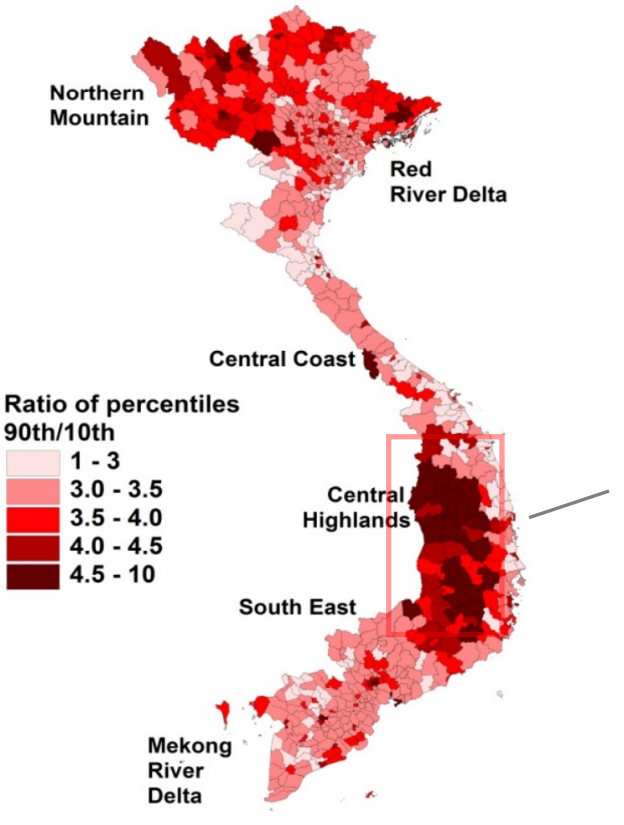


Poverty is concentrated in the Central Highlands, Vietnam's coffee heartland. Within these same districts, ethnic minority communities face substantially higher poverty rates, indicating that economic vulnerability is both geographically and socially concentrated. This overlap shows that the regions driving coffee production are also those where livelihoods are most fragile.

C. INEQUALITY: GINI INDEX



D. INEQUALITY: RATIO OF 90TH TO 10TH EXPENDITURE PERCENTILE



The Central Highlands also exhibit high inequality, reflected in elevated Gini levels (a measure of how unevenly income is distributed) and some of the widest income gaps in the country. Many districts combine high poverty with unequal distribution, meaning economic gains are not shared evenly and the poorest households remain highly exposed.

Source: Small-areas poverty estimation by the World Bank (2013) based on the 2009 Vietnam Population and Housing Census (VPHC) and 2010 Vietnam Household Living Standard Survey (VHLSS). While based on survey data from 2010s, the concentration of poverty and ethnic inequality in the Central Highlands is consistent with more recent evidence, including Burau and Nguyen (2025), which shows these spatial patterns persist, especially among ethnic minority communities.

Poverty is closely linked to ethnicity. Ethnic minority communities – who comprise roughly one-third of the Central Highland's population (Minority Rights Group International, 2018) – are disproportionately represented among the poor. They make up 34% of the region's coffee growers, and account for half of all poor coffee growers and two-thirds of those considered extremely poor (Mai, 2024). In the Central Highlands, according to Giang et al. (2014), "each year hundreds of thousands of ethnic minority households still suffer hunger." These disparities reflect entrenched ethnic inequalities shaped by historical patterns of land allocation, migration, and exclusion.

Ethnic inequality and insecure land rights directly constrain livelihoods and EUDR compliance. Many ethnic minority farmers face linguistic and cultural barriers, and often lack formal land-use rights certificates. An estimated 15–20% of coffee-growing land lacks formal land-use rights certificates (Mai, 2024). This impacts livelihood security in terms of constraining access to markets, finance, and state support. This also has direct implications on the ability to meet traceability requirements and EUDR compliance, and risk further marginalization and deeper poverty. Without addressing these underlying constraints, there is a risk that regulatory compliance will deepen existing inequalities rather than reduce them.

B. CHILD LABOR UNDERPINS VIETNAMESE COFFEE

Child labor in Vietnam's coffee sector is widespread and rooted in poverty. Poverty drives child labor in Vietnamese coffee (Beck et al., 2016). Child labor in coffee must be understood within a broader national context: an estimated 1.75 million Vietnamese children are engaged in labor, representing roughly 10% of the under-18 population (UNICEF, 2026).

The government of Vietnam's own National Child Labor Survey 2012, published in 2014, estimates that 34,131 child laborers grew coffee. An estimated 37% were under age 15 - the country's minimum employment age. Due to studies cited below, we believe these government statistics likely significantly underestimate the sheer number of children working in Vietnamese coffee.

Available evidence suggests that child labor in coffee is significantly underreported. An independent study indicated a likely much higher rate of child labor: 90% (The Centre for Child Rights and Business, 2025, citing an assessment by Save The Children). This percentage is closer to what research has uncovered regarding the rate of prevalence of child labor in other coffee-growing countries dominated by smallholder farms, like Ethiopia or Uganda.

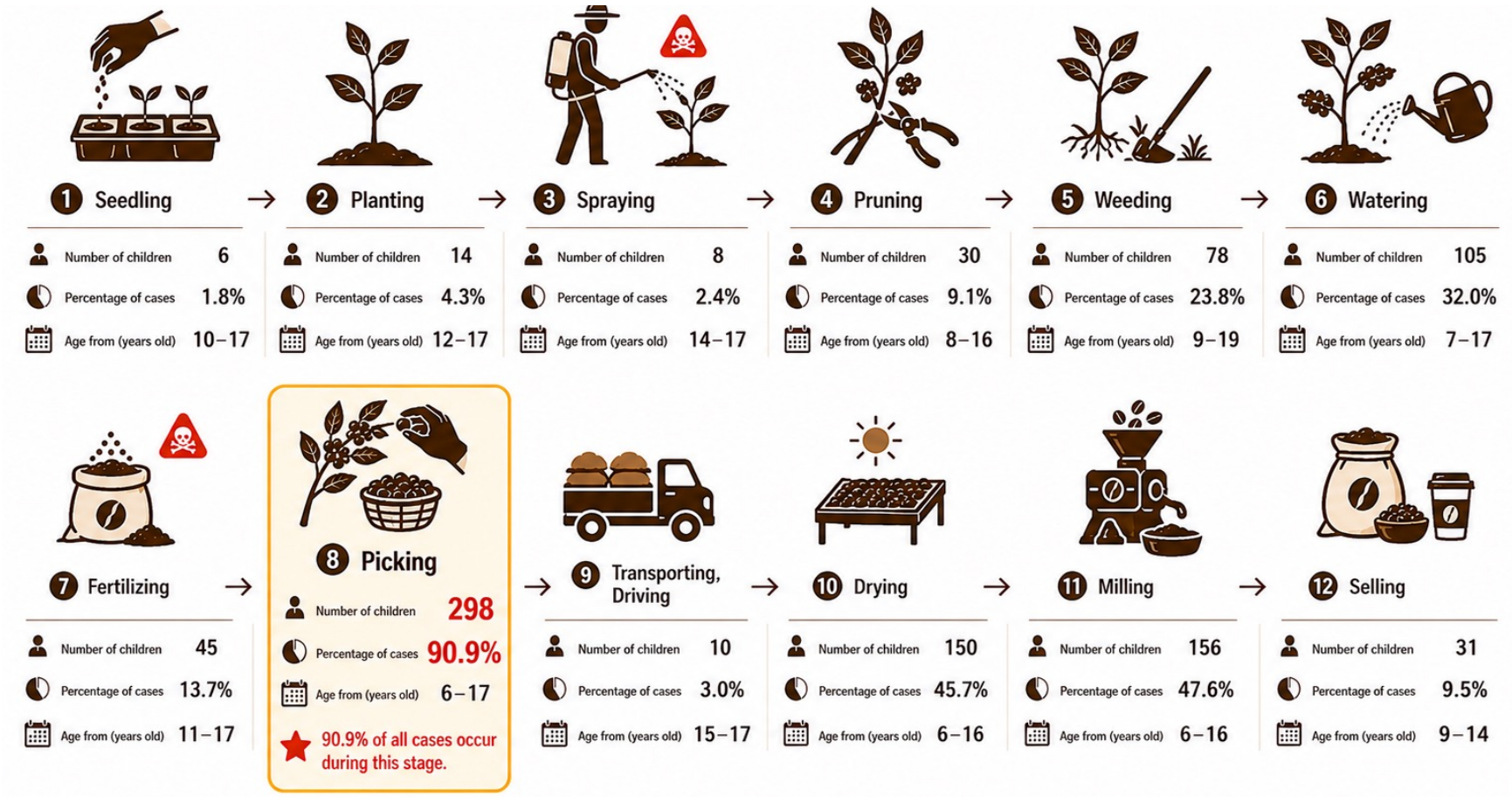
The 2018 impact assessment by Save The Children found that 90% of 328 children in sampled households were involved in picking, spraying, carrying, pruning, and drying coffee and other coffee-farming tasks, and 22% of those saw negative impacts on schooling including dropouts. Of these, 9% were aged 5–11, 28% were 12–14, and 63% were 15–17 (The Centre for Child Rights and Business, 2025). While this sample is not nationally representative, it suggests that official statistics may significantly underestimate the extent of child labor in the sector. If indeed 90% of coffee farming families rely to some extent on children, and there are over 600,000 coffee farming households (Dang et al., 2025), then the number of children contributing to the coffee sector is likely closer to 540,000 than to 34,131.

Children in Vietnamese coffee production are often exposed to hazardous and exploitative conditions. Some of the tasks children performed fall within categories the International Labor Organization would likely classify as hazardous. These include spraying pesticides, mixing chemicals, transporting heavy loads, and using sharp tools (in line with findings regarding child labor for coffee in other countries as well).

FIGURE 4.2

CHILD LABOR IS ENGAGED ACROSS ALL STAGES OF COFFEE PRODUCTION

Evidence from the 2018 National Child Labour Survey shows children involved at every stage of coffee production - from planting and spraying to harvesting and processing. The burden is concentrated in harvesting, where 90.9% of cases occur during picking. Many children are also involved in hazardous activities such as spraying chemicals. Shockingly, children as young as six are engaged in activities. This reflects a system shaped by poverty, unstable incomes, and weak labour protections that push children into the workforce.



Source: General Statistics Office of Viet Nam, & International Labour Organization. (2020). *Viet Nam national child labour survey 2018: Key findings*

Survey evidence indicates that children aged 14–17 applied pesticides without protective equipment, and the use of child-sized knives and hoes was documented. Household income has been shown to correlate with the number of hours children work, reinforcing the link between poverty and child labor. More broadly, data from the Central Highlands indicate that 8.7% of working children are exposed to hazardous conditions (GSO MICS, 2022; GSO and ILO, 2020).

Children as young as six are working in coffee, driven by poverty and price shocks. Beck et al. (2016) examined the relationship between coffee prices and the use of child labor. They found that when coffee prices fall, adults and adolescents who would normally work on the farm are pushed into wage labor elsewhere, leaving children to take on farm and household responsibilities in their place. This mechanism links global price fluctuations directly to child labor at the household level.

For many children, work replaces education and locks in poverty. Many children, particularly in Indigenous communities cannot afford to stay in school and work on family smallholder farms to support income generating activities for their families. There are also minimal opportunities for children to access higher education including vocational training, keeping them stuck in a cycle of poverty (Rainforest Alliance, 2026). In this context, child labor is not an isolated issue but part of a broader system of economic vulnerability and limited upward mobility, thus reinforcing intergenerational poverty – and vulnerability to climate shocks.

Current efforts to address child labor remain fragmented and insufficient. Some companies and other institutions have acknowledged the problem and tried to remedy the situation, which is a good start, though reform efforts remain largely insufficient.

The Japanese coffee company, Ajinomoto, conducted a human rights due diligence inspection and has been following up with the goal of reducing and preventing human rights risks such as child labor (Ajinomoto, 2021). The ILO's CLEAR Supply Chains programme has focused on training households to recognise and avoid hazardous work, while Rainforest Alliance initiatives have combined farmer training, education services, and child protection mechanisms (ILO, 2024; Rainforest Alliance, 2026).

Every effort to eradicate hazardous child labor, curb overall child labor, and combat the poverty that drives these problems, is welcome. However, the remediation in place today remains woefully inadequate.

C. UNION BUSTING AND RESTRICTED FREEDOM OF ASSOCIATION

Poor labor conditions persist in part because workers lack independent representation. Poverty, ethnic marginalisation, child labor, and other such abuses in Vietnamese coffee are rarely studied, poorly understood, and inadequately addressed. This is partly because there are no real unions to defend farmworkers or farmers. Without collective representation, coffee farmers and farmworkers have limited ability to raise concerns, negotiate conditions, or hold employers accountable.

Participation in independent unions is not permitted in Vietnam. Workers can only join the state-controlled Vietnam General Confederation of Labor (VGCL), which is linked to the Communist Party of Vietnam (Human Rights Watch, 2026). While new labor codes ostensibly allow for "independent worker organizations" at the enterprise level, these are tightly controlled in practice and face significant barriers to formation, making them essentially non-independent in practice.

Labor organizing is actively restricted. The government suppresses unauthorized labor activism through mechanisms such as Directive 24, which is used to monitor labor disputes and limit organising and activism. Labor activists have been arrested, and state-run media has described independent labor groups as "hostile forces" whose goal is to overthrow the regime (Human Rights Watch, 2024). Human Rights Watch reports that "independent, democratic unions are treated as illegal, and organizers can face prison." John Sifton, Asia advocacy director at Human Rights Watch, stated, "Not a single independent union exists in Vietnam and no working legal frameworks exist for unions to be created or for workers to enforce labor rights." He added "Vietnam is a closed society with an authoritarian government hostile to labor rights. Workers cannot openly organize, let alone bargain with management" (Human Rights Watch, 2024).

The Central Highlands has an especially long history of repression linked to land, ethnicity, and political control. If union suppression is the norm across Vietnam, it is particularly acute in the coffee-growing Central Highlands where militarization and repression are more pronounced. This reflects a troubled history of disputes over ancestral land, in-migration of settlers, religious freedom, and aspirations for political autonomy. Uprisings and state responses are embedded in a longer history of violence (Human Rights Watch, 2002) and ethnic discrimination, including the historical marginalisation of ethnic minority highlanders being referred to as 'savages' or 'Moi', which has made the human rights situation in the region especially complex.

Protests in the Central Highlands have repeatedly been met with brutal force. In February 2001, coordinated protests by large groups of indigenous minorities in Vietnam's Central Highlands erupted, unexpectedly blocking roads and targeting local Communist Party officials. Authorities responded with force, deploying military and security forces to suppress the uprising.

BOX 7

PRECARITY AND INFORMALIZATION DEFINE COFFEE LABOR

Seasonal migrant workers are essential to coffee production, but their conditions remain poorly understood.

What are the conditions for migrant seasonal pickers? Limited independent oversight makes this difficult to determine. However, available information does point to a risky environment for abuse. While the vast majority of coffee is grown on family-owned smallholder plots, seasonal workers are often hired during the harvest season.

The demand for labor far exceeds what farming households can supply, with family labor meeting only 40–50% of total needs (ILO, 2024b). This creates a large, largely undocumented workforce of seasonal pickers. With more than 600,000 coffee farms in Vietnam, this implies tens, if not hundreds of thousands, of seasonal workers engaged in the sector.

Despite their central role, there is limited visibility into their working conditions, rights, and protections, pointing to a potentially high-risk environment for abuse. Clearer information must be provided on their situation and their rights.

Coffee labor is characterised by informality, low wages, and limited social protection. A 2020 ILO report found that approximately a quarter of coffee farmworkers earned less than minimum wage (ILO, 2020). An estimated 68.5% of workers are in informal employment in Vietnam overall (GSO, 2023), and informality is a dominant characteristic of the coffee sector. As a result, many coffee workers lack formal contracts and regulatory protection.

While a forthcoming ILO study found high rates of access to health insurance for coffee farm workers, the study found many could not afford social insurance or pension coverage (ILO, 2024b). Moreover, informal workers tend to be paid less than formal counterparts.

The crackdown led to widespread fear, reports of torture and arrest, and displacement, with many Highlanders fleeing to Cambodia and the United States, drawing international attention and involvement from organizations such as the UNHCR (UNHCR, 2002).

The region continues to be marked by conflict and strong state oversight. The 2001 uprising was not an isolated event. As recently as June 2023, a fatal armed conflict in the Central Highlands resulted in nine deaths, including police officers, officials, and civilians (BTI, 2026), followed by the prosecution of 98 people (BBC, 2024) and renewed militarisation of the region. Travel advisories continue to warn of restricted access to parts of the Central Highlands (Government of Canada, 2026). In this repressive environment, advocating for labor rights and reform in the coffee sector is likely more dangerous than in other parts of the country.

Field-level documentation of social abuses in Vietnam is extremely dangerous and difficult. Vietnam's single-party governance structure places additional constraints on independent civil society monitoring, investigative journalism, and land-rights advocacy. REDD+ policy evaluations have documented implementation gaps in the Central Highlands, including weak alignment between stated objectives and on-the-ground outcomes (Ngo et al., 2020). Where independent oversight is limited, such gaps are harder to detect and correct.

Independent researchers and journalists face significant constraints, and security risks limit investigative access. As a result, many social conditions in the Central Highlands remain under-documented relative to their scale. Greater transparency would strengthen, not weaken, the sector's credibility. Allowing independent fact-finders - including relevant UN Special Rapporteurs on Indigenous rights, children's rights, the environment, and extreme poverty - to assess land tenure security, labor practices, and social protection gaps would provide a stronger evidentiary base for reform.

Until such scrutiny is possible, the social dimensions of Vietnam's coffee system will remain partially obscured even as its environmental consequences are increasingly visible from space.

A governance environment with limited independent scrutiny inevitably shapes how sustainability is measured and verified. Vietnam was reported as the world's largest producer of certified sustainable coffee in 2019–2020 (GCP, 2021). However, the ability to independently assess these claims is constrained. Human Rights Watch has stated, "Vietnamese authorities severely restrict the rights to freedom of expression, association, peaceful assembly, movement, and religion, and prohibit human rights organizations and independent labor unions, media, and political parties. Under the Communist Party-controlled judiciary, the courts routinely deny defendants their due process rights" (Human Rights Watch, 2026). Meanwhile, Amnesty International noted, "Human rights defenders, journalists and people detained for political reasons faced torture and inhumane prison conditions. The government used counterterror laws against activists and Montagnards from the Dak Lak region, resulting in arbitrary arrests and detentions. New laws were introduced to police social media and further silence dissent. High levels of pollution persisted. Death sentences continued to be imposed and there was heightened concern over an intensifying crackdown on civil society space" (Amnesty International, 2025).

This raises a fundamental question: who is able to verify sustainability in practice?

Where independent verification mechanisms are weak, voluntary sustainability frameworks risk becoming procedural rather than transformational. For example, most certification schemes promise to allow freedom to unionize, yet it remains illegal to unionize in Vietnam – and this is only one example of an issue where certifications' promises appear to conflict with realities on the ground in Vietnamese coffee.

Despite claims of sustainable coffee production, the environmental degradation, groundwater depletion, pesticide intensification, and labor vulnerabilities documented in earlier sections are deeply troubling. Certification measures compliance against specific criteria; it does not automatically resolve structural inequality or guarantee ecological recovery.

D. PESTICIDES DRIVE HUMAN HEALTH RISKS

Vietnamese coffee's excessive agrochemical use poses dangerous risks. This is especially so for children and adults who work on coffee farms, but also on wider coffee-growing communities who depend on the same aquifers. Vietnam has seen pesticide use in agriculture increase three- to five-fold over roughly 25 years. Coffee ranks second only to rice in the country's total pesticide consumption —a striking fact given that the sector accounts for only about 10% of land use compared to rice (Dinh, 2017). Data from Vietnam, consistent with other coffee-producing countries, show that fungicides can be sprayed up to 20 times per season, insecticides up to 19 times, and herbicides up to 10 times (Ecoffee, 2025).

Evidence suggests widespread pesticide exposure and underreported health impacts. A major study of pesticide exposure in Vietnam's agriculture sector provides rare clinical insight into the scale of harm: blood tests showed 35% of workers with pesticide poisoning, including 14% acute and 21% chronic cases (Dasgupta et al., 2007). These findings align with broader national concerns. Vietnam's Poison Control Center attributed 11% of all poisonings to pesticides in 1999, while the WHO estimated 7,170 pesticide poisoning cases in 2002 (Dasgupta et al., 2007).

Given that global estimates suggest significant underreporting, the true scale of exposure is likely far higher. Given the risks, it will be vital to properly study and understand impacts that pesticides are having on Vietnamese coffee farmworkers, farmers, their families, and their communities – and to assess how to curb the most egregious health harms.

Social vulnerability is the channel through which ecological pressures translate into risk. The ecological pressures described earlier—groundwater depletion, chemical intensification, forest loss, and climate volatility—are mediated through this unequal system. They are absorbed by smallholders with insecure tenure, limited bargaining power, and thin margins. In this context, social vulnerability accelerates ecological decline rather than existing separately from it.

These dynamics create systemic risks for both producers and global supply chains, underscoring the importance of effective regulatory frameworks such as the EUDR and why their urgent implementation is important.

5 WHY ACCOUNTABILITY MATTERS

THE COST OF EUDR DELAYS AND INACTION

The evidence assembled in this report is not a retrospective autopsy. It is a warning with a closing window. Forests are still being converted. More are at risk, as climate change intensifies. Aquifers are depleting in real time. Rivers are running dry. Farmers are in poverty. Children are working. Ethnic minority farmers have lost land rights to processes that benefit commodity exporters and their downstream buyers in European markets. And the primary legal mechanism designed to interrupt this chain of harm - the EU Deforestation Regulation - has already been delayed twice, diluted once, and is now subject to a further "simplification review", before it has applied to a single shipment.

Every delay in EUDR is not a neutral administrative act. It is a decision with ecological, hydrological, and human consequences that compound. This section sets out what is at stake in the near future, how the voluntary sustainability architecture that preceded EUDR has demonstrably failed, and what specific accountability measures this report demands of the EU, of the Vietnamese state, and of the coffee industry.

A. THE LIMITS OF SUSTAINABILITY: FROM VOLUNTARY PROMISES TO LEGAL OBLIGATION

The coffee sector in Vietnam has had more than two decades of voluntary sustainability standards, certification schemes, and corporate pledges. Yet the ecological trajectory of the Central Highlands did not bend toward recovery; it rather deepened into crisis as we showed.

According to the Global Coffee Platform's GCP Snapshot 2019–2020 (GCP, 2021), Vietnam was the leading origin by volume of reported certified sustainable coffee purchases in 2019 and 2020. During the same period, forest conversion continued, groundwater extraction accelerated to the point that IWMI declared development was "reaching its limits," and nematode infection rates approached 80% on replanted farms (IWMI, 2021). The certified label and the ecological crisis did not contradict one another, rather they coexisted.

The internal contradiction within Vietnam's certification record is instructive. Despite rapid growth in certified production, only about 29–30% of Vietnam's coffee area is under sustainability certification—far below the government's 80% target—and high certification costs, overlapping schemes, and limited price premiums mean that much of the sector still operates through conventional value chains (Dang et al., 2025).

Certification covered supply but not demand. Buyers could draw on certified chains when reputationally useful and revert to conventional sourcing when price incentives shifted. The market thus bifurcated into symbolic compliance and structural continuity.

A mandatory, universal traceability requirement, as embedded in EUDR, is the only mechanism capable of closing that arbitrage.

What we observe in Vietnam reflects a wider structural limitation of voluntary sustainability standards. A peer-reviewed analysis comparing voluntary sustainability standards with EUDR requirements found that corporate initiatives in coffee focus predominantly on socioeconomic practices, while deforestation and climate change remain among the least addressed dimensions, even within certified systems (Bager and Lambin, 2020).

A 2018 Centre for Global Development review concluded that the evidence base for voluntary standard's environmental impact is "relatively weak," with only a minority of studies able to attribute observed outcomes to certification rather than to pre-existing differences among producers (Elliott, 2018).

The difference between voluntary standards and the EUDR is whether sustainability is optional or enforceable. It determines whether structural pressures are managed or merely labelled. The problem is not primarily one of poor implementation. It is one of design. Voluntary standards reward producers who opt into compliance, but they cannot structurally resolve open-access resource pressures such as groundwater extraction, nor can they correct displacement dynamics, land tenure insecurity, or unequal bargaining power. They were not built to do so.

The EUDR is built differently. It shifts the burden of proof onto EU market actors, creates mandatory due diligence obligations, and establishes enforceable legal liability. This is the architecture that three decades of voluntary action did not construct. Weakening or further delaying it would not improve the system. It would return the sector to a model that has already demonstrated its limits.

B. THE NARROWING REGULATORY WINDOW: EUDR DELAY HAS CONSEQUENCES

The European Commission's own impact assessment, published alongside the original EUDR proposal, quantified what enforcement would deliver: a 29% reduction in EU-consumption-driven deforestation, 72,000 hectares of forest saved annually, and at least 32 million metric tonnes of CO_2 emissions prevented per year (EU, 2023). Each year of delay is a year in which those 72,000 hectares are lost. In the Central Highlands specifically, the losses are qualitatively different from simple area statistics: as documented in chapter 2, the remaining forest is predominantly degraded, fragmented, and climate-stressed. What is converted in the next decade cannot be easily replaced, if at all. The mature natural forest that regulates watershed hydrology, intercepts rainfall, and sustains the groundwater system on which 600,000 farm households depend took centuries to develop. When it is gone, the cascade - drying streams, depleted aquifers, collapsed microclimates, intensified flooding - follows inevitably, and it hits hardest the smallholder farmers who can least absorb the cost.

The EUDR's December 2020 deforestation cutoff date is simultaneously its greatest strength and its most significant limitation. It establishes a defensible, monitorable threshold against which satellite data can be interrogated. But it also means that the ecological damage documented in chapters 2 and 3 - most of which predates 2020 - falls outside the regulation's deforestation-free verification requirement. Coffee grown on land converted in 2018 is, under the current framework, compliant. The case for rapid, robust enforcement of the 2020 cutoff is therefore not that it fully addresses the Central Highlands crisis - it does not - but that it stops the frontier from advancing further while providing the institutional architecture for more comprehensive future requirements. A weakened or delayed EUDR does not even achieve this minimum function.

BOX 8

A VIABLE PATH FORWARD: SUSTAINABLE COFFEE AT SCALE IN VIETNAM

The IDH Central Highlands landscape program demonstrates that more sustainable coffee farming is both technically feasible and economically viable at scale.

Between 2015 and 2020, participating farmers adopted significant changes in production practices. Intercropping increased from 15% to 96%, helping restore on-farm biodiversity and improve microclimate stability. These changes contributed to a 20% reduction in water use and a 14% reduction in chemical fertilizer application, alongside the complete elimination of banned pesticides.

Crucially, these environmental gains did not come at the expense of livelihoods. Farmer incomes increased by approximately 20% across more than 10,000 hectares, reflecting both improved productivity and reduced input costs. The program also achieved a 60% reduction in carbon emissions, driven primarily by lower fertilizer use and more diversified farming systems.

This case illustrates that the trade-off between productivity, environmental sustainability, and farmer income is not inevitable.

With the right combination of incentives, training, and support, coffee systems can shift away from input-intensive monocultures toward more resilient, resource-efficient models.

The challenge now is whether it can be scaled rapidly enough to meet the environmental and regulatory pressures now facing the sector, and cover all coffee farmers, at scale (IDH, 2022).

The "simplification review" - mandated before enforcement has begun - creates exactly the political conditions under which industry lobbying can succeed in replacing the mandatory cutoff with a voluntary equivalent. ClientEarth's (2025) legal analysis of the December 2025 amendments is explicit: by concentrating due diligence obligations on first-placing operators and removing downstream shared responsibility, the revision has already created traceability blind spots that "undermine enforcement" and "increase the risk of illegal goods entering the EU market". Further simplification from this already-weakened baseline risks leaving the regulation as headline with no mechanism or teeth.

Even if implemented fully, however, the EUDR is only a first step. Industry and government must collaborate to halt ecosystem collapse and reverse ecological degradation, in order to save coffee as a business. Halting new deforestation does not by itself repair the ecological degradation that now characterises much of the Central Highlands landscape. The coffee sector depends on aquifers that are already approaching their sustainable limits, soils that have lost significant organic carbon, and a climate regime becoming more volatile with each passing decade. Stabilising this production system will therefore require more than regulatory compliance. The coffee industry must invest urgently in rebuilding the ecological foundations on which its supply depends, including agroforestry transitions, soil regeneration, and water management improvements.

At the same time, the Vietnamese government cannot treat EUDR compliance as an endpoint. Protecting remaining forests, strengthening watershed protection, and restoring degraded landscapes are essential not only for environmental reasons but to avoid a slow erosion of the economic viability of the region's most important export crop.

In other words, compliance may prevent further frontier expansion, but long-term stability will depend on whether the sector moves from extraction toward ecological repair.

C. BIFURCATED BEANS: THE RISK OF A TWO-TIER COFFEE ECONOMY IN VIETNAM

Vietnam's official development plan signals a shift from expansion toward consolidation. Official plans indicate a reduction of roughly 57,000 hectares in Central Highlands coffee area by 2030, with the largest cuts concentrated in Dak Lak, Dak Nong, and Lam Dong (Figure 5.1). At the same time, average yield improvements of 1.2 tonnes/ha are expected to sustain output, reflecting a strategy of intensification rather than further land expansion. However, this strategy assumes that current growing conditions remain stable – an assumption that is increasingly difficult to sustain.

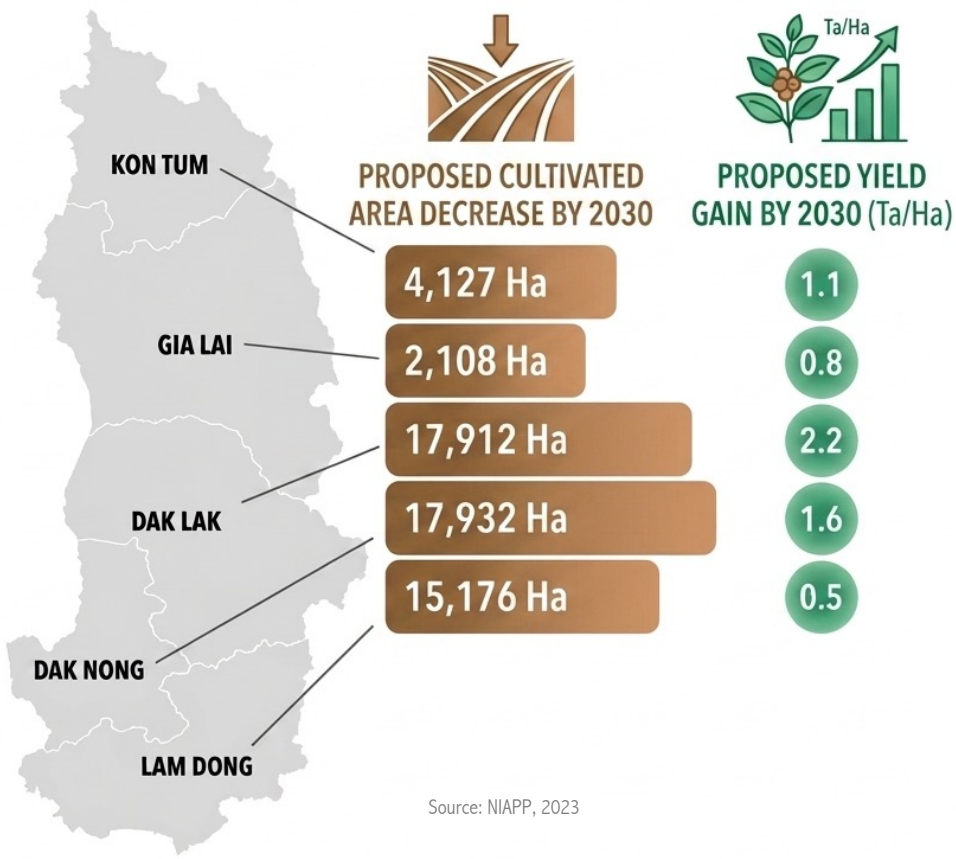
A growing body of evidence suggests that climate change is already reshaping the viability of coffee landscapes in Vietnam, with projections indicating that up to half of current growing areas could become unsuitable by mid-century without a shift toward shade-based agroforestry and more climate-resilient systems (Bunn et al., 2015; Läderach et al., 2017). Warmer and more humid conditions are also expected to favour fungal diseases such as coffee leaf rust (Hemileia vastatrix), adding to pest and disease pressures that are already increasing under climate change and compounding biophysical stress on already vulnerable plantations (Bhattacharya and Nair, 2024).

These environmental pressures are not abstract: climate-induced yield declines of 15–20% are already translating into income reductions of up to 30% for smallholder farmers, linking ecological instability directly to livelihood risk (Smail, 2025).

FIGURE 5.1

VIETNAM'S VISION 2030 COFFEE STRATEGY SHIFTS FROM EXPANSION TO INTENSIFICATION, WITHOUT REDUCING ECOLOGICAL PRESSURES

Official plans indicate a reduction of roughly 57,000 hectares in Central Highlands coffee area by 2030, with the largest cuts concentrated in Dak Lak, Dak Nong, and Lam Dong. At the same time, average yield improvements of 1.2 tonnes/ha are expected to sustain output. This marks a shift from expansion to intensification, but not a reduction in ecological pressure. Less land does not mean less pressure, it means more pressure per hectare. Higher input use — particularly fertilizers and pesticides — risks further deepening stress on water, soils, and ecosystems. The strategy also assumes stable growing conditions, despite evidence significant area could become unsuitable under climate change without major shifts toward agroforestry and climate-resilient practices.



Source: NIAPP, 2023

Government targets alone will not determine outcomes. Whether current government coffee targets translate into reduced deforestation pressure will depend less on stated area ceilings than on enforcement credibility, land-use monitoring, and supply-chain traceability. Without alignment between national planning and EUDR compliance systems, formal area targets alone may not prevent displacement into informal or frontier landscapes.

Vietnam has positioned itself, with strategic intent, as the model EUDR-compliant producing nation. Moving quickly, six weeks after the regulation came into force in June 2023, the Ministry of Agriculture launched a national compliance framework. In December 2024, MARD, IDH, and JDE Peet's jointly launched the Database System for Forest and Coffee Growing Areas - the first national-level coffee plantation traceability database of its kind (IDH, 2024). The EU has, on the basis of these institutional commitments, classified Vietnam as a "low risk" country for EUDR purposes, subject to inspection rates of just 1%, compared to Brazil's standard risk classification (Fastmarkets, 2025).

This classification deserves scrutiny, because the ground-level evidence complicates the headline and narrative on compliance. A survey of smallholder households in the Central Highlands found that more than half did not maintain consistent harvest records, and only around 10% kept plot-level data - the precise data layer that EUDR due diligence requires. The same survey found that 82% of Kinh ethnic households held legal land title (red books), but only 55% of ethnic minority households did (Hoang et al., 2026).

This is a gap that is not an administrative anomaly but the direct legacy of displacement dynamics. Ethnic minority farms are also, on average, 4.6 km from forest edges, compared to 9.9 km for Kinh farms - placing them in significantly higher EUDR risk categories even though the political economy of their proximity to forests reflects their dispossession, not their culpability (Meyfroidt et al., 2013; Dak Lak DoIT, 2025).

Dak Lak's Department of Industry and Trade acknowledged in 2025 that the main obstacles for smallholders are proving land use rights, documenting plot locations, and demonstrating that production does not occur on land classified as forestry land under Vietnamese planning codes - three requirements that the current database system is not yet equipped to resolve at the smallholder level (Dak Lak DoIT, 2025). Moreover, the EUDR covers legality that theoretically should ensure no child labor. Yet we know Vietnam's coffee rests on child labor. And that without the coffee industry paying a living income reference price for farmers, and a living wage for farm workers, child labor will be very hard to eradicate.

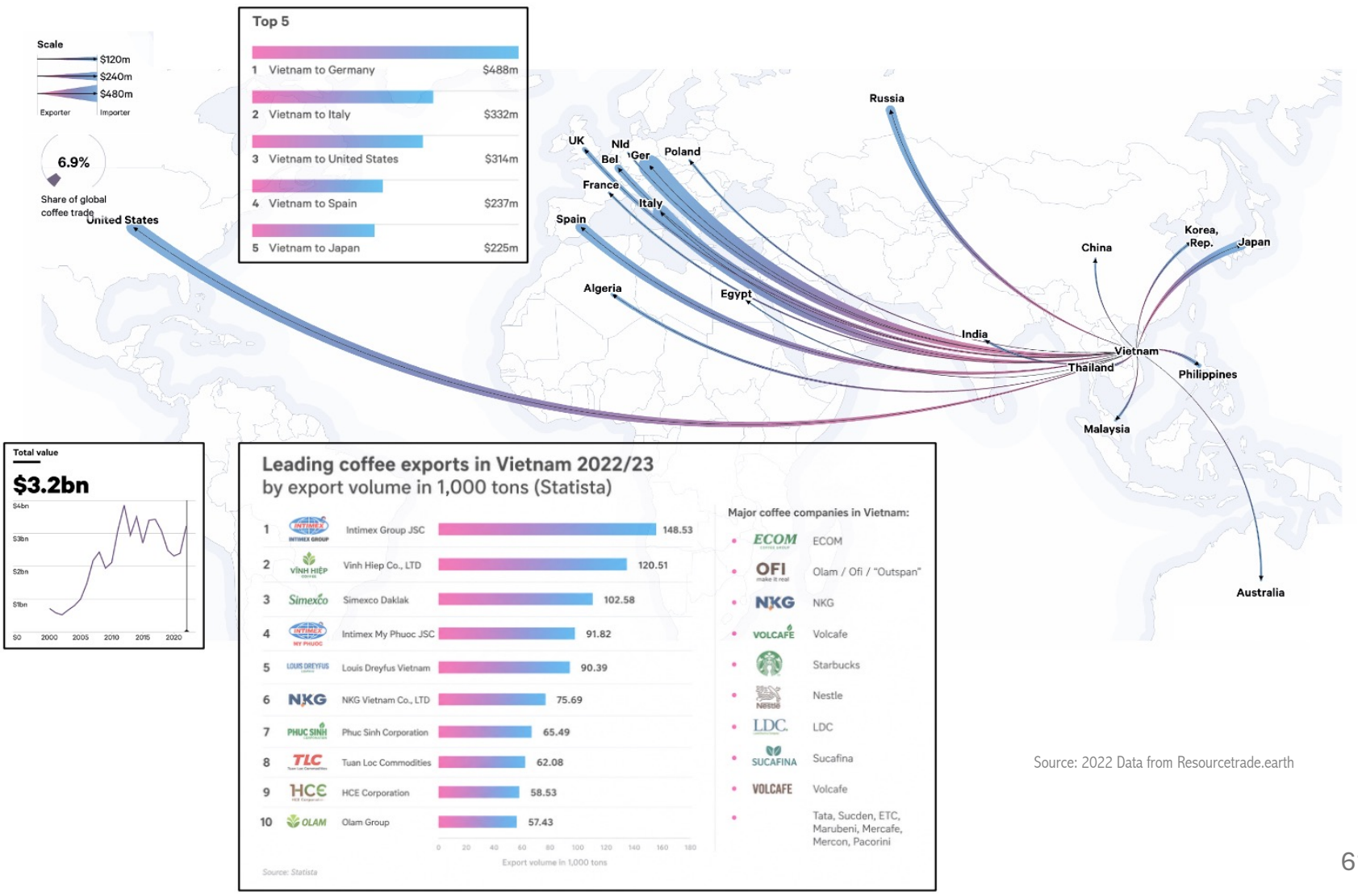
Vietnam exports coffee at a global scale, but EU markets remain central to its value structure. Germany, Italy, Spain, the United States, Japan, Belgium, the United Kingdom, and the Netherlands collectively account for a large share of export value, with Germany alone importing over $488 million worth of Vietnamese coffee in 2022, followed by Italy at $332 million and the United States at $314 million. This concentration underlines why EUDR compliance matters: the EU remains a core anchor market.

The structural risk is bifurcation of the coffee economy. EU markets remain central, but the EU is not the only destination. Besides the EU, the United States, China, Japan, Australia, Korea, the United Kingdom, and other non-EU markets collectively account for a majority of export value. In 2022, the United States alone imported $365 million worth of Vietnamese coffee (Chatham House, 2025). Vietnam's coffee therefore moves across multiple regulatory regimes with uneven standards. At the same time, exports are concentrated among a relatively small group of large traders — Intimex, Vinh Hiep, Simexco, Louis Dreyfus, NKG, Olam, and others — who possess the digital infrastructure and capital to build traceability systems at pace (IDH, 2024). The compliance trajectory therefore risks diverging along firm size and market destination. Large exporters with EU exposure are building verifiable traceability systems. But exporters serving non-EU markets may sustain parallel supply chains, creating a bifurcated flow of coffee — compliant for the EU, and less regulated elsewhere — particularly where smallholders are required to provide documentation they often do not possess, for land they may not hold legal title to, within timelines they cannot realistically meet (Dang et al., 2025).

FIGURE 5.2

GLOBAL DEMAND, CONCENTRATED POWER: VIETNAM'S COFFEE TRADE CONNECTS MANY MARKETS BUT RELIES ON FEW GATEKEEPERS

Vietnam exports coffee globally, but trade is dominated by a small group of large exporters. This creates a risk that EUDR compliance concentrates within a few firms, leaving smallholders behind and shifting rather than reducing pressure on forests and ecosystems.

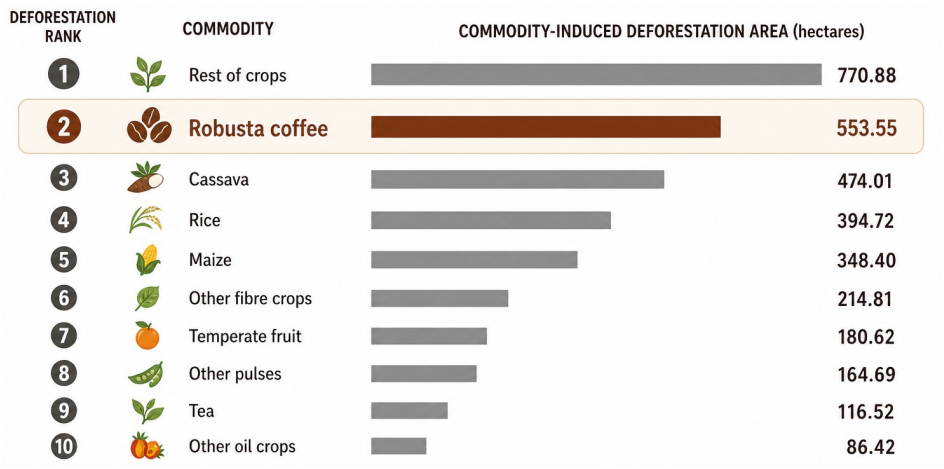


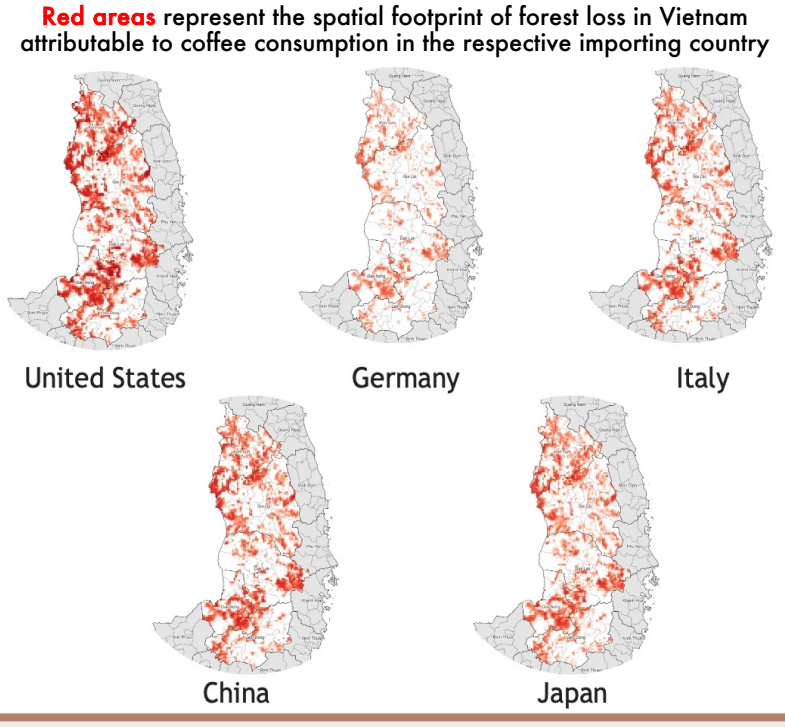
Source: 2022 Data from Resourcetrade.earth

FIGURE 5.3

GLOBAL DEMAND LEAVES A LOCAL FOOTPRINT: VIETNAM'S COFFEE-DRIVEN DEFORESTATION IS EMBEDDED IN INTERNATIONAL CONSUMPTION

Consumption-based analysis identifies robusta coffee as the second-largest driver of commodity-linked deforestation in Vietnam between 2006 and 2015, with impacts concentrated in the Central Highlands. The footprint is closely tied to demand from major consuming markets including the United States, China, Japan, Germany, and Italy. Crucially, the footprint is not diffuse but concentrated in the same districts where water stress, soil degradation, and land tenure insecurity are already highest. These hotspots are shared across multiple consuming markets, underscoring that deforestation pressures do not respect market boundaries but are jointly driven by global demand.





Source: Hoang and Kanemoto (2021)

The forest loss in the Central Highlands is not simply a domestic governance issue. It is the spatial footprint of international demand. A global consumption-based assessment of deforestation footprints by Hoang and Kanemoto (2021) provides a spatially explicit confirmation of this dynamic. Using a multi-regional input–output model, SPAM crop allocation data, and Hansen forest loss, the authors identify robusta coffee as the second-largest commodity driver of commodity-induced deforestation in Vietnam between 2006 and 2015 (we note that deforestation for coffee in Vietnam was even more intense in the 1990s and early 2000s, making this research all the more shocking).

Crucially, the spatial maps show that this footprint is not diffuse. It is concentrated in the very districts of the Central Highlands where aquifers are stressed, soils degraded, and ethnic minority land tenure insecurity is highest. The dominant consuming markets linked to this deforestation footprint are the United States, China, Japan, and not just the EU countries of Germany and Italy.

In other words, the ecological pressures documented in this report are structurally tied to external demand from both EU and non EU coffee consuming countries, not only domestic land-use policy.

If enforcement fragments by destination market, forests will not be protected. They will be reallocated. The spatial pattern in Hoang and Kanemoto's analysis also exposes the limits of a geographically narrow compliance regime. If EU-bound supply chains tighten traceability while equivalent volumes flow to markets with weaker regulatory oversight, the deforestation pressure does not disappear. It shifts. The maps illustrate that the same forest frontiers supplying Germany and Italy also supply the United States, China, and Japan. The watershed does not differentiate by destination port. A bifurcated compliance architecture risks certifying documentation rather than reducing landscape-level pressure. This underscores the importance of strong and consistent EUDR implementation across Vietnam's jurisdiction, ensuring that compliance reflects real conditions on the ground rather than uneven application.

It also highlights the need for alignment across major importing economies, so that efforts to reduce deforestation are reinforced rather than undermined by shifting trade flows. In practice, this requires alignment across major consuming markets. The UK should include coffee under its deforestation regulation (Schedule 17 of the Environment Act 2021) and expedite the publication of implementing regulations, which remain pending. China, Japan, and the United States must also move to regulate coffee imports. In the United States, this includes strengthening the proposed FOREST Act to explicitly cover coffee.

This bifurcation risk deserves sharper treatment than it typically receives in EUDR debates. The standard framing presents supply chain consolidation toward EU-compliant exporters as a compliance problem for smallholders, which it is. But the more fundamental problem is ecological. Vietnam's aquifers, soils, and remaining forest do not segment by export destination.

A coffee farm supplying a non-EU market extracts groundwater from the same depleted aquifer, applies the same chemical load to the same degraded soil, and sits in proximity to the same fragmented forest as a farm supplying a certified EU buyer. EUDR compliance that produces a two-tier supply chain - rigorous traceability for EU-bound coffee, no questions asked for coffee destined for US, Asian, or other markets - would generate certified export documentation without generating systemic change in the producing landscape (Verhaeghe and Ramcilovic-Suominen, 2024; Mowbray, 2025).

This is not a hypothetical risk: it is the historical pattern as seen with palm oil. Palm oil certification in Indonesia and Malaysia produced exactly this bifurcation through the 2010s, with RSPO-certified volumes flowing to European buyers while equivalent volumes, from the same expanding frontier, supplied Asian markets outside certification scope (Carlson et al., 2018). Deforestation continued. Forest loss in certified regions did not differ significantly from loss in uncertified regions and spilled over into surrounding regions (Heilmayr et al., 2020).
The divergence only appeared after national-level moratoria were implemented. Voluntary certification and split supply chain compliance systems did not achieve this outcome.

The lesson for Vietnam is direct. EUDR preparation must be designed as whole-of-sector transformation, not documentation for EU-facing supply chains. Traceability, land tenure regularisation, and ecological safeguards must apply to all coffee produced in this jurisdiction, regardless of final destination. Without that integration, compliance becomes a channel filter rather than a landscape solution.

Delay makes this bifurcation more likely, not less. Each year of postponed enforcement widens the gap between well-capitalised exporters building compliant systems and smallholders struggling to meet documentation thresholds. It entrenches consolidation before safeguards are universalised. It allows ecological pressures to continue across non-EU markets without corrective leverage.

If implementation drifts, the result will not be a smoother transition. It will be a structurally divided coffee economy that is harder to reform and more environmentally fragile.

OUR CORE DEMANDS

The evidence in this report points to a simple reality. The next decade in the Central Highlands will not change by itself. It will change only if the EU, the Vietnamese state, and the coffee industry make choices that close today's loopholes and redistribute today's burdens.

TO THE EUROPEAN UNION:

ENFORCE, TIGHTEN, AND EXTEND ACCOUNTABILITY

OUR 7 CALLS FOR A STRONGER EUDR

1 ENFORCE EUDR ON SCHEDULE AND DO NOT WEAKEN IT

No delays, no carveouts: Implement at the December 2026 deadline.

Do not use the 2026 "simplification review" to dilute traceability, reduce accountability, or extend timelines.

2 ADD INSTANT COFFEE TO THE SCOPE OF EUDR

3 TREAT VIETNAM'S "LOW-RISK" LABEL AS CONDITIONAL AND EVIDENCE-BASED

Tie low-risk status to verified, on-the-ground smallholder readiness, not only to institutional commitments.

Use robust, independent baselines: Rely on high quality satellite datasets to assess deforestation risk and guide enforcement.

Monitor social abuses that fall under 'legality' such as child labor and illegal union-busting.

4 CLOSE THE ECOLOGICAL BLIND SPOTS THAT A POST-2020 CUTOFF CANNOT SEE

Keep the 2020 cutoff as a minimum floor.

Commit to a clear roadmap to expand future due diligence to land degradation, water stress, and soil depletion, aligned with EU biodiversity and Green Deal objectives.

5 PAIR STRICT RULES WITH JUST TRANSITION SUPPORT, AND HELP VIETNAMESE SMALLHOLDERS COMPLY

Engage Vietnam and IFIs on a Central Highlands transition compact: co-develop a forest-water-agroforestry roadmap linked to EUDR; align EU finance and trade with rights-respecting, regenerative production; and reward farms delivering living wages, tree cover, riparian protection, and reduced inputs—not just 'no new deforestation.'

Require proof that plot-level traceability and tenure work for smallholders (including ethnic minorities), and that legality definitions do not entrench discrimination against Indigenous Peoples.

Recognize that hazardous child labor and other illegal human rights abuses should be considered through the legality lens.

Build safeguards so compliance is not achieved by paper legality while structural drivers of harm remain intact.

6 STRENGTHEN RESPONSIBILITY ACROSS THE CHAIN

Restore and protect shared responsibility beyond "first-placing" operators.

Do not recreate traceability blind spots by design.

Ensure enforcement architecture matches the reality of complex, multi-actor supply chains.

7 SET A GLOBAL BENCHMARK FOR DEFORESTATION-FREE AND RIGHTS-BASED SUPPLY CHAINS

Encourage alignment with similar legislation in other jurisdictions (e.g., the UK)

Prevent regulatory fragmentation and market leakage across regions

TO THE COFFEE INDUSTRY:

STOP OUTSOURCING COSTS TO THE WEAKEST LINK

1

ENSURE FAIR PAY ACROSS THE COFFEE VALUE CHAIN

- Pay a living income price to coffee farmers.
- Guarantee minimum wages for farmworkers to reduce risks of child labour and other labour abuses.

2

COMMIT TO SMALLHOLDER INCLUSION AS AN EUDR COMPLIANCE REQUIREMENT, NOT A CSR ADD-ON

- Publish auditable timelines for extending traceability infrastructure to smallholders.
- Do not use “supplier consolidation” as the main compliance strategy. Consolidation is not compliance. It is displacement.

3

STOP LOBBYING TO WEAKEN ACCOUNTABILITY, ESPECIALLY LOBBYING AGAINST THE EUDR

- End efforts that shift responsibility upstream and strip downstream actors of obligation.
- Shared responsibility is what closes blind spots in fragmented supply chains.

4

FUND THE MISSING CAPACITY THAT EUDR COMPLIANCE REQUIRES

- Pay for the basics that smallholders are being asked to produce: plot GPS mapping, harvest records, land tenure documentation support, farmer-facing data tools and training.
- Do this through structures that are independently governed and transparently audited.

5

TREAT ECOLOGICAL STABILITY AS A SUPPLY-CHAIN OBLIGATION, NOT A LOCAL EXTERNALITY

- **No sourcing from post cut off deforestation:** Adopt and enforce a clear cut off date (at least aligned with EUDR) for all suppliers worldwide; exclude any coffee linked to forest conversion after that date.
- **“Deforestation-free” cannot be the endpoint** when production landscapes are already failing hydrologically and biologically. Redesign contracts and pricing to incentivize shade systems and restoration rather than maximum yields at any cost. Offer price premiums and long term contracts to farmers who protect forest, reduce water stress, and adopt agroecological practices.
- **Commit to measurable action on groundwater stress, chemical dependence, and soil degradation** in sourcing regions; support farmers to meet the new commitments. Commit to eliminating the most harmful pesticides and fertilizers from supply chains; co fund training and alternatives.
- **Respect Indigenous and local rights:** Require proof of legitimate land tenure and FPIC for any new sourcing areas; avoid suppliers implicated in land grabs or displacement.
- **Support diversification and safety nets:** Co finance income diversification, climate insurance pilots, and social protection linkages for smallholders.
- **Radical transparency:** Publicly disclose sourcing footprints: Publish origin breakdowns (province/district), deforestation risk assessments, and progress toward zero deforestation and water risk targets.
- **Independent verification:** Use credible third party audits and civil society partnerships, not only in house or commercial consultants.

TO THE VIETNAMESE GOVERNMENT:

MAKE COMPLIANCE PRO-ECOSYSTEM AND PRO-SMALLHOLDER

1

ACT NOW TO PREVENT ECOLOGICAL DAMAGE FROM DESTROYING THE FOUNDATIONS OF VIETNAM'S COFFEE SUCCESS

Enforce and deepen the natural forest moratorium: Strengthen implementation of the 2016 moratorium on natural forest conversion, with clear sanctions, transparent monitoring, and public reporting at province and district level

Legally protect remaining high value forest in the Central Highlands: Upgrade remaining intact and near intact forest to strict protection status; prioritize lowland and mid elevation forests critical for hydrology and biodiversity.

Launch a Central Highlands restoration plan: Set time bound targets to restore degraded forest and riparian buffers in coffee landscapes, focusing on water recharge zones and steep slopes.

Redirect public finance: Phase out any subsidies or credit that incentivize expansion into forest risk areas; redirect support to the restoration plan.

Create soil health standards: Promote mulching, shade, organic matter restoration, and contour planting; restrict practices that accelerate erosion and carbon loss.

Reduce chemical dependency through soil testing, integrated pest management, and incentives for lower fertiliser and pesticide use. Build on the success of Vietnam's glyphosate ban to ban the other most hazardous active ingredients in coffee; enforce safe use rules.

Promote farmer-centred agroforestry systems that restore shade cover, rebuild soil health, improve water retention, improve farmers' food security, and diversify farm income.

Regulate groundwater extraction: Introduce basin level water budgets; license and meter large wells; phase out illegal boreholes; incentivize drip and deficit irrigation and other water-efficient irrigation systems.

Lead new ICO processes to ensure a living income reference price is paid to coffee farmers, and that coffee farmworkers earn a living wage.

Protect farmer and farmworker rights and improved labor protections.

2

FIX THE LAND TENURE DEFICIT THAT MAKES COMPLIANCE IMPOSSIBLE FOR MANY FARMERS

Treat the ethnic minority "red book" gap as a governance failure, not a technical glitch. Secure land and resource rights for Indigenous communities.

Provide legal support for title regularisation and dispute resolution.

Prevent enforcement or market exclusion that punishes farmers before tenure issues are resolved.

Halt Indigenous dispossession linked to coffee expansion; ensure free, prior, and informed consent (FPIC) for any land use change.

Design specific restitution and support programs for largely Indigenous communities pushed to forest margins by past coffee expansion.

3

PREVENT EUDR COMPLIANCE FROM BECOMING CONSOLIDATION-BY-DEFAULT

Make it explicit that the goal is whole-of-sector readiness, not a fast lane for a handful of exporters.

Ensure traceability systems are designed for dispersed smallholder plots, not only large, well-documented suppliers.

4

OPEN SPACE FOR INDEPENDENT VERIFICATION

Enable credible third-party scrutiny of land tenure, labor conditions, and environmental compliance.

Invite UN Special Rapporteurs relevant to indigenous rights, children's rights, extreme poverty, environment, and adequate working and living conditions to assess Central Highlands conditions.

Publish plantation database outputs at provincial level in formats that can be audited independently, while protecting farmer privacy.

5

ALIGN LAND-USE CODES, FOREST CLASSIFICATION, AND FARM LEGALITY IN WAYS FARMERS CAN ACTUALLY MEET

Resolve contradictions where production areas are treated as "forestry land" under planning codes.

Provide clear, accessible pathways for farmers to prove legality and plot location.

CLOSE THE GLOBAL GOVERNANCE GAPS

THAT ALLOW DEFORESTATION-LINKED COFFEE TO SHIFT ACROSS MARKETS AND STANDARDS

TO THE UK GOVERNMENT: STRENGTHEN AND ALIGN UK DUE DILIGENCE LAW

- Expand UK Environment Act Schedule 17 forest risk rules to coffee: Ensure coffee is explicitly covered.
- Align cut off dates and definitions with EUDR level ambition: Avoid creating a weaker parallel regime that undercuts EU standards.
- Publish implementing regulation from DEFRA as a matter of urgency.

TO MAJOR CONSUMER MARKETS: ADOPT OR STRENGTHEN DEFORESTATION FREE IMPORT RULES FOR FOREST RISK COMMODITIES, INCLUDING COFFEE, TO AVOID BECOMING "DUMPING GROUNDS" FOR DEFORESTATION LINKED SUPPLY

USA · JAPAN · SWITZERLAND · AUSTRALIA · CHINA · SOUTH KOREA

TO THE CERTIFICATION SCHEMES OPERATING IN VIETNAM: RAISE THE BAR

- **Guarantee a living income reference price** for coffee and ensure farmworkers earn a living wage
- **Embed FPIC and land rights safeguards:** Require evidence of legitimate land tenure and FPIC where Indigenous or local communities are affected.
- **Align with EUDR and go further on deforestation:** Integrate robust, satellite based deforestation checks; adopt cut off dates at least as strict as the EUDR; include indirect land use change where possible.
- **Ensure smallholder accessibility:** Simplify procedures and reduce costs so that smallholders, not just large estates, can participate and benefit.
- **Include water and soil criteria:** Make groundwater extraction, irrigation efficiency, and soil organic carbon part of core standards, not optional extras.
- **Publish maps and impact data for transparency and accountability:** Disclose certified area locations (at least to district level), forest cover trends, and water risk indicators.
- **Reward restoration and shade:** Create higher tier labels or premiums for farms that restore forest patches, riparian buffers, and tree cover.
- **Independent grievance mechanisms:** Provide accessible channels for communities and workers to report abuses or greenwashing, with clear timelines for response and remedy.

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