SWEET NOTHINGS

How the Chocolate Industry has Failed to Honor Promises to End Deforestation for Cocoa in Cote d'Ivoire and Ghana

MIGHTY EARTH

EXECUTIVE SUMMARY

For many years, the world's leading chocolate manufacturers were hiding a shocking truth. The main ingredient in their products, cocoa, was wreaking havoc in the forests of West Africa, destroying the habitats of critically endangered chimpanzees, forest elephants and rare pygmy hippos. In September 2017, Mighty Earth lifted the lid on this scandal, exposing Chocolate's Dark Secret in a major investigation that revealed the scale of this devastation.

At the November 2017 UN Climate Change Conference, the governments of the world's two main cocoa-producing countries, Côte d'Ivoire and Ghana – along with big cocoa traders and leading chocolate manufacturers including Nestlé, Hershey's, Mondalez, and Mars – signed the Cocoa & Forests Initiative Framework for Action[1]. This was followed in early 2019 by the publication of detailed action plans, raising hopes that companies across the cocoa supply chain would, at last, take decisive measures to end deforestation caused by the expansion of cocoa plantations in West Africa.

But four years later, the promise of the Cocoa & Forests Initiative (CFI) remains largely unfulfilled. Through a combination of supply chain mapping, satellite data analysis, and on-the-ground field investigations, Mighty Earth has again uncovered evidence of ongoing tropical forest destruction in the key cocoa-growing regions of both Ghana and Côte d'Ivoire. This includes deforestation in designated protected areas that provide vital habitats for endangered wildlife and critical carbon sinks, as well as being home to Indigenous and local communities.

Photo: iStock.com/CraigRJD

Mighty Earth's findings in this report reveal:

- Overall levels of forest clearance remain near record highs.

- Average countrywide, historical tree cover loss in Côte d'Ivoire has been 2.3 times higher in the period since January 2019 than it was between 2001-2017, and 3.4 times higher than the average loss during the 2000s.

- In Ghana, 2020 historical tree cover loss countrywide was 3.7 times higher since January 2019 than it was between 2001-2010, and 1.5 times higher than the average tree cover loss between 2011-2019.

- **Within cocoa growing regions, since the CFI action plans were published in January 2019, Côte d'Ivoire and Ghana together have lost an area of tropical forest equivalent to the size of the cities of Madrid or Seoul or Chicago. Côte d'Ivoire is estimated to have lost 19,421 hectares (ha) of forest – an additional 2% loss of its remaining forest cover in the last three years. Over the same period, Ghana is estimated to have lost an astonishing 39,497 ha of forest, which amounts to a staggeringly high rate of 4% forest cover loss.**

- Canopy loss is still found throughout protected areas in Côte d'Ivoire and Ghana, with satellite data analysis and observations from our field investigation in Côte d'Ivoire revealing that cocoa expansion is playing a major role in this encroachment.

What's worse is that this devastation is entirely preventable. The cocoa industry could be collectively monitoring and responding to tree cover loss in cocoa-growing areas using the same tools as Mighty Earth's Cocoa Accountability Map - and they have a lot more resources. Yet, for the past four years, the world's leading chocolate companies and brands have done little to change their ways, continuing to peddle false promises to consumers. Meanwhile, forests continue to disappear, wildlife dies, and local and Indigenous communities suffer.

Enough is enough. There is an urgent need for cocoa traders, buyers, manufacturers, and retailers to stop hiding behind hollow excuses and deliver the transparent public monitoring systems that have been promised since the launch of the CFI. **Mighty Earth is calling on cocoa traders and chocolate companies to develop a publicly available joint monitoring system through the CFI, combining their supply chain information and overlaying it with freely available satellite data showing recent deforestation hotspots.** They then need to redouble their efforts to work with government officials to develop appropriate interventions with cocoa farmers and local communities to prevent further land clearances.

West Africa's farmers and forests cannot take more sweet nothings from chocolate companies. When it comes to honoring commitments, actions speak louder than words.

NATIONAL FINDINGS

ASSESSING NEW COCOA-DRIVEN DEFORESTATION IN WEST AFRICA

Côte d'Ivoire and Ghana are the largest producers of cocoa in the world. The West African nations are such heavy hitters in the commodity that, together, they account for nearly 60% of all cocoa in chocolate products consumed around the world.[2] Unfortunately, that chocolate comes at a high price: Ghana is estimated to have lost 65% of its forest cover, while Côte d'Ivoire has lost as much as 90% of its forests over the last thirty years.[3]

Mighty Earth produced the new analysis in this report to determine if these high rates of deforestation have ceased or slowed since the CFI action plans were published in 2019. Our assessment is based upon two different sources of high-resolution satellite data, as well as the findings from a field investigation conducted in Côte d'Ivoire during August 2021 to complement and "ground truth" the GIS imagery. We drew on the work of researchers at Wageningen University in The Netherlands to capture new, high-resolution forest disturbance alerts. The researchers' publicly-available "Radar for Detecting Deforestation" (RADD) alerts draw on remote sensing radar data from the European Space Agency's Sentinel-1 Satellites to detect changes in canopy height every six to 12 days.

In addition to the RADD alerts, for Cote d'Ivoire, Mighty Earth drew on the Forest Disturbance Early Warning System (FDEWS), developed by Vivid Economics, to summarize high resolution satellite radar data gathered every 12 days to create land-use change alerts. Through the platform referred to as IMAGES, imagery from each satellite pass-over is compared with a forest base map, compiled in January 2019, to pinpoint disturbances within an original forest area.

The RADD and FDEWS alert systems signify a new benchmark for deforestation monitoring: alerts are available at a much finer (10mx10m) spatial resolution than historical monitoring systems have allowed (i.e. 30mx30m), and the use of radar (as opposed to satellite imagery) allows monitoring systems to detect land cover change even during inclement weather.

Photo: iStock.com/ANDREYGUDKOV

The recent satellite imagery data provided by both the RADD Alerts and FDEWS system has revealed a bleak statistical picture. **While the two different methodologies provide slightly different figures, the common truth revealed by the data is that deforestation rates remain stubbornly high in both Côte d'Ivoire and Ghana.** This data was corroborated by the observations of our field research team in Côte d'Ivoire in August 2021.

In Côte d'Ivoire deforestation has been ticking slightly upwards since 2019, spelling disaster for native wildlife. In Ghana, deforestation doubled from 2019 to 2020 and has not seen a significant decline in 2021. A more detailed analysis from each country is provided below.

Table 1: RADD Alerts (ha) in Cocoa Growing Regions of Côte d'Ivoire and Ghana

	2019	2020	2021
CÔTE D'IVOIRE	6,171	6,374	6,876
GHANA	7,479	16,082	15,935

SOURCE: DATA COMPILED FROM WUR, ANALYZED WITH GOOGLE EARTH ENGINE

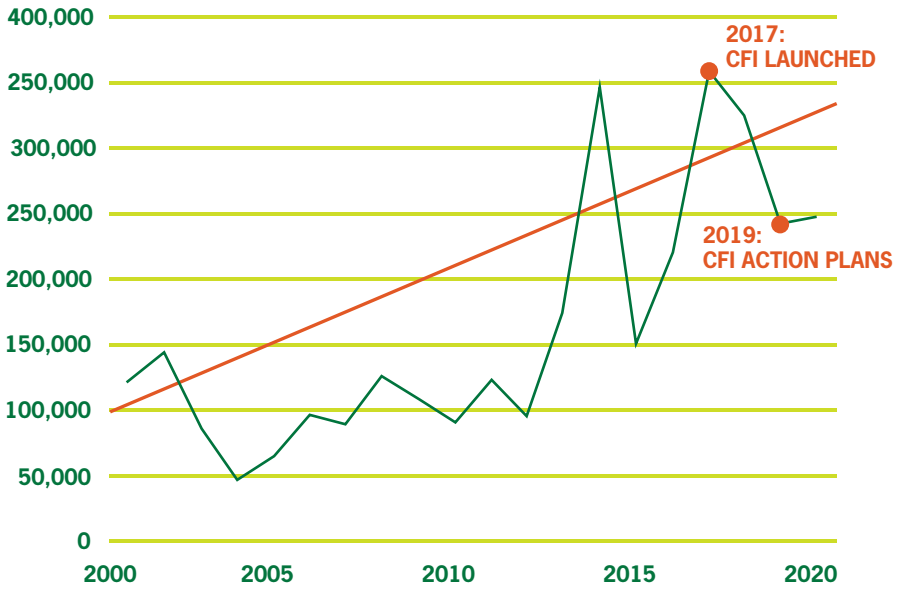
CÔTE D'IVOIRE

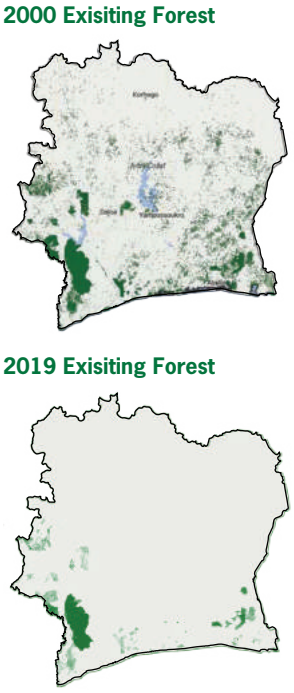
Since 2001, the World Resources Institute (WRI) through it's Global Forest Watch platform has published historical tree cover loss data based on multispectral satellite imagery for Côte d'Ivoire.[4] The methodology used to calculate tree cover loss data has evolved over time. "Tree cover loss" has historically been used as a stand in for deforestation. The WRI data is useful to show trends, but the RADD Alerts and FDEWS data offer a much clearer and more accurate picture of forest loss in real time. In 2020, tree cover loss in the country was 252% higher than in the first decade of the 21st century, and 109% more than the average tree cover loss from 2011-2019.

Among the commitments made by the Government of Côte d'Ivoire following the launch of the CFI in 2019 was a ban on Since CFI was signed, overall tree cover loss across the country between 2018 and 2020 was 276% higher than average loss during the 2000s. establishing new cocoa plantations. If implemented, this moratorium could have substantially limited any new incidents of deforestation caused by cocoa production. **But within cocoa growing regions, our analysis of RADD data found 19,421 ha of forest disturbances since 2019.** In the heart of the cocoa belt, in Guémon, the rate of deforestation has been a shocking 14% since 2019, while in some neighboring areas there is little to no deforestation because almost all the forest has already been cleared.

Over the past government has used the online IMAGEStwo years, the Ivorian

Figure 1: Historical Tree Cover Loss (ha) in Côte d'Ivoire — 2000-2020





SOURCE: TREE COVER LOSS (HANSEN/UMD/GOOGLE/USGS/NASA).
HISTORICAL TREE COVER LOSS WAS CALCULATED USING AN OLDER METHODOLOGY.

platform, built by Vivid Economics, to undertake natural capital valuation in Côte d'Ivoire. Although the IMAGES data, which uses FDEWS, only goes back for the whole country to the beginning of 2020, the picture it paints is of alarmingly high forest coverage loss, with a large share of this (31%-41%) coming from cocoa growing regions (see Table 2).

The picture for protected areas in Côte d'Ivoire is also troubling. Despite differences in national-level tallies overall, the RADD system and FDEWS found almost exactly the same area of deforestation within Côte d'Ivoire's natural reserves and protected areas in 2020 – approximately 2,200 ha of forest loss. All of the major cocoa traders including Cargill, Barry Callebaut, Olam, Sucden, Touton, and Ecom have supplier relationships with smallholder cocoa-growing

Table 2: IMAGES Forest Disturbance Alert Summaries

FDEWS ALERTS (HA)	COTE D'IVOIRE (TOTAL) HA	% FOREST COVERAGE LOST	COCOA REGIONS
2020	53,419	2.9%	20,791
2021	43,530	2.4%	13,777

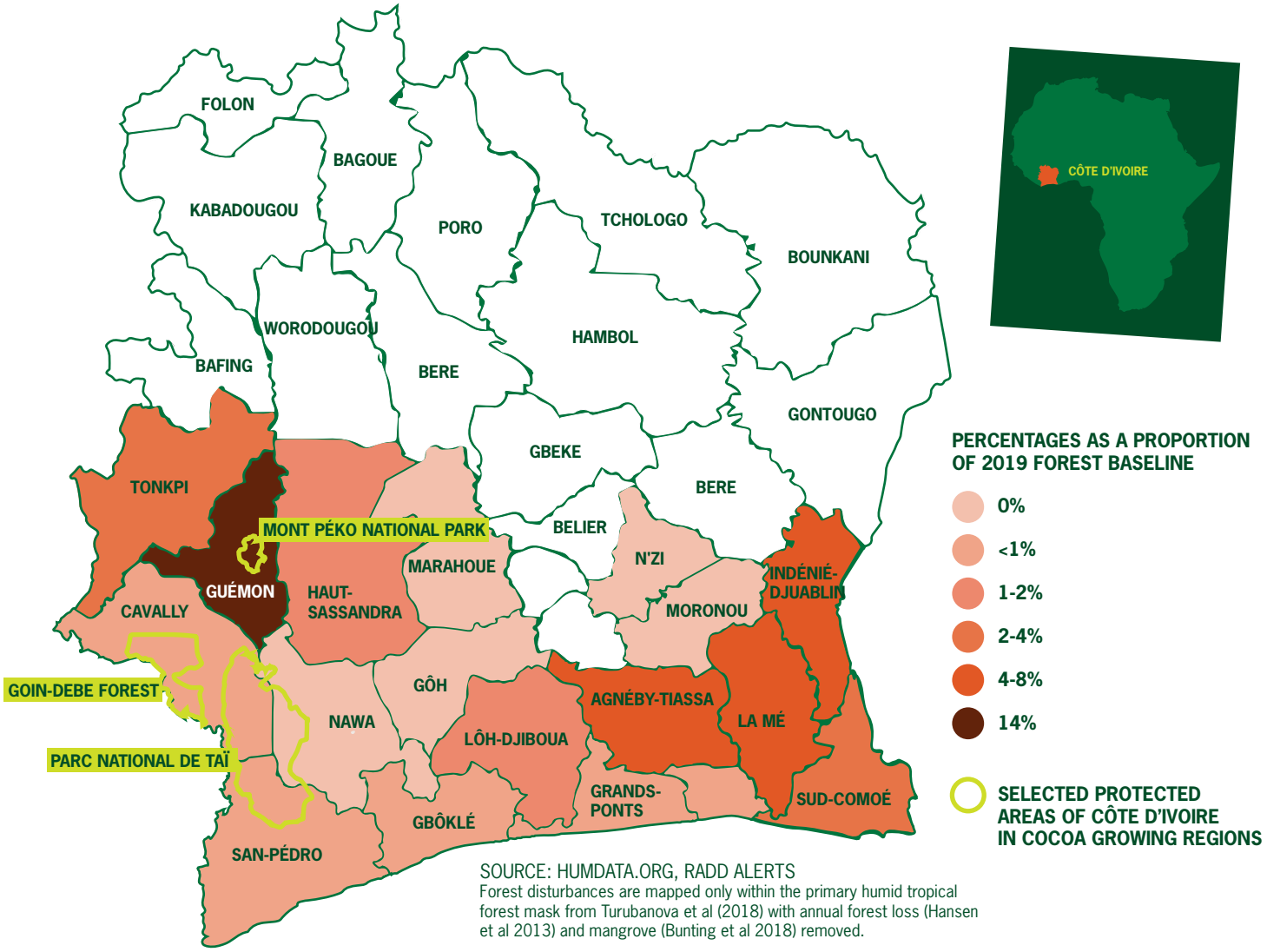
SOURCE: AVAILABLE BY REQUEST AT HTTPS://IMAGES-CDI.VIVID-EARTH.COM/LOGIN

cooperatives near protected areas – exposing them to enormous risk that their cocoa is sourced from deforestation inside the national parks and protected areas.

The forests in Côte d'Ivoire's national parks and other protected areas are often the last refuge for endangered wildlife, and are essential for maintaining rainfall and mitigating the severe impacts of climate change in the country. The scant 8.9% forest cover remaining in 2020 (according to the World Bank), means there are only roughly 1,000 chimpanzees, and just 200 forest elephants left in a country, Ivory Coast, named for their tusks. This rate of forest loss threatens to completely eradicate what still exists of these endangered species.[5,6]

In addition to the analysis of radar and satellite data, Mighty Earth researchers spent two weeks in the field during August 2021 to ground-truth our analysis from Côte d'Ivoire. Our team visited some of the same places featured in our 2019 investigation, Behind the Wrapper. To our dismay, the research team found that widespread deforestation is still present in these regions.

Figure 2: Côte d'Ivoire Forest Loss in Cocoa Growing Areas



SOURCE: HUMDATA.ORG, RADD ALERTS
Forest disturbances are mapped only within the primary humid tropical forest mask from Turubanova et al (2018) with annual forest loss (Hansen et al 2013) and mangrove (Bunting et al 2018) removed.

In the main production areas, the entire local economy revolves around cocoa: rural household income, banks, businesses, transport, and even civil society organizations (CSOs). Yet, despite its importance to the economy, local communities interviewed by our research team expressed sadness and powerlessness at the ecological devastation wrought by deforestation for cocoa. People interviewed felt that they do not sufficiently benefit from the money derived from cocoa, and expressed concern that the increasing pressure it places on their lands sparks regular social conflict.

In Mont Péko National Park, which was ruled by warlords who remained after the civil war, and had been the site of eviction of illegal cocoa farms from 2013- 2016, Mighty Earth's satellite data analysis revealed how little forest is left due to many years of clear-cutting for timber and cocoa farms.

In 2020 alone, over 350 ha of forest were lost, leaving only 9,330 ha of forest in the park. This was verified in interviews with members of the surrounding local communities, who told us about the devastation inside the park.

Photo: Mighty Earth

However, it is within the less protected forest landscapes where cocoa-driven deforestation has been most rampant. Within Côte d'Ivoire, forests are given different classifications – from national parks, to 'scientific reserves', to classified forests - which include so-called agricultural reserves, in which farming may be allowed with a government-issued permit. A classified forest is less protected than a national park. An example of this is the Goin-Debe classified forest, which covers 133,170 ha. Unfortunately, the forest in this area is now more than 90% destroyed, according to official figures.[7] To safeguard what can be saved, the Ivorian Government has decided to give 20,000 ha to the local population to implement agroforestry programs to help restore some tree cover to the area.

Our team also witnessed patches of recent clearing in the vicinity of the Gahabli village located near the Cavally Forest and Parc National de Taï.

Cavally is less protected because it's classified as a forest, rather than as a national park or reserve. Forests are overseen by the Ministry of Water and Forests, which is generally under-resourced. National parks and reserves are overseen by the Office for the Protection of Parks and Reserves (OIPR), which receives more support from the government and funders like the World Bank and is hence better equipped and staffed.

The inability of officials to adequately patrol forests like Cavally means they are vulnerable to illegal land clearing. One of the field research team recalled the following encounter:

"In the Cavally classified forest, we came across an area where there had been recent forest clearing and planting of young cocoa seedlings. We saw big trees on the ground. We saw chemicals and burnt trees. And as we were going deeper in the forest, we started to hear dogs barking and people's voices. We were very deep in the forest at that point. We did not go to meet with these people. It could have been dangerous, because their activities are illegal. Sometimes they have arms and it's not safe to talk to them. So once we started to hear their voices, we stopped and went back."

Of course, forests are not only important because of the incredible tree and plant species within them, they are also home to an abundance of wildlife. Alarming rates of deforestation and forest fragmentation in Côte d'Ivoire over recent years have seen the populations of many forest species crash – one recent study found no primates left in more than half of the protected areas surveyed.[8]

One bright spot in Côte d'Ivoire is Parc National de Taï, which is the largest remaining intact forest in West Africa. Though Taï has experienced some deforestation, as a percentage of its size, the numbers are relatively small and do not follow the pattern of agricultural incursions, despite being surrounded by cocoa farms. The successful efforts to protect Parc National de Taï show that limiting deforestation is possible.

Photo: Mighty Earth

GHANA

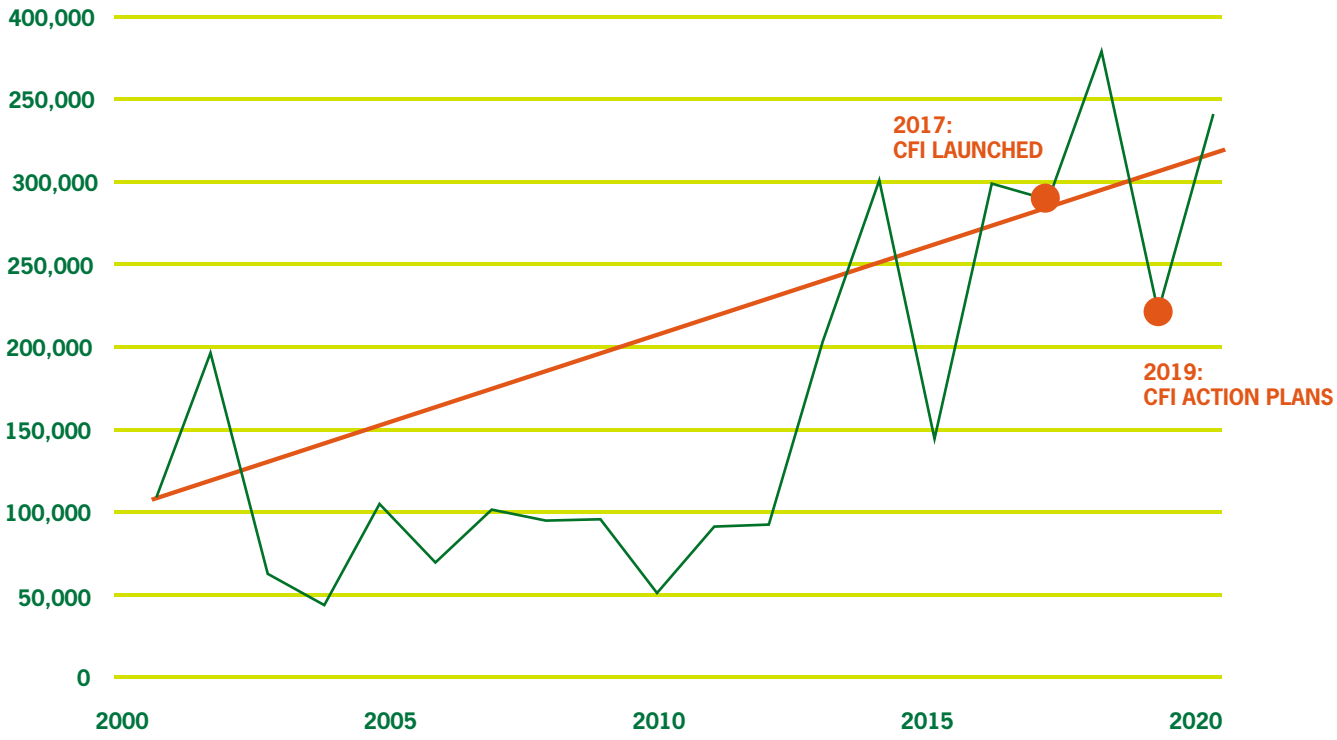
In Ghana, parties to the Cocoa & Forests Initiative promised that "There will be no further conversion of any forest land (as defined under national regulations and using methodologies such as High Carbon Stock and High Conservation Value approach) for cocoa production".[9]

Yet according to our analysis of WRI's Global Forest Watch's tree cover loss dataset, in 2020 tree cover loss countrywide was 370% higher between 2011 and 2019. These data sources confirmed on going deforestation within protected areas in Ghana. The RADD data showed canopy cover has continued to decline since the CFI action plans were announced, with a particularly strong spike in 2020. Within cocoa growing regions, the RADD data paints a disastrous picture, with 39,497 ha of forest lost since the CFI action plans were published, with a staggeringly high rate of deforestation of 3.9%.

While our team was not able to conduct a field investigation in Ghana during 2021, we undertook detailed satellite data analysis of changes in tree canopy cover within forest reserves and national parks, as well as consulting with local civil society partners, and reviewing recent literature.

These data sources confirmed ongoing deforestation within protected areas in Ghana, with satellite images canopy cover has continued to decline since the CFI action plans were announced, with a particularly strong spike in 2020.

Figure 3: Historical Tree Cover Loss (ha) in Ghana — 2000-2020



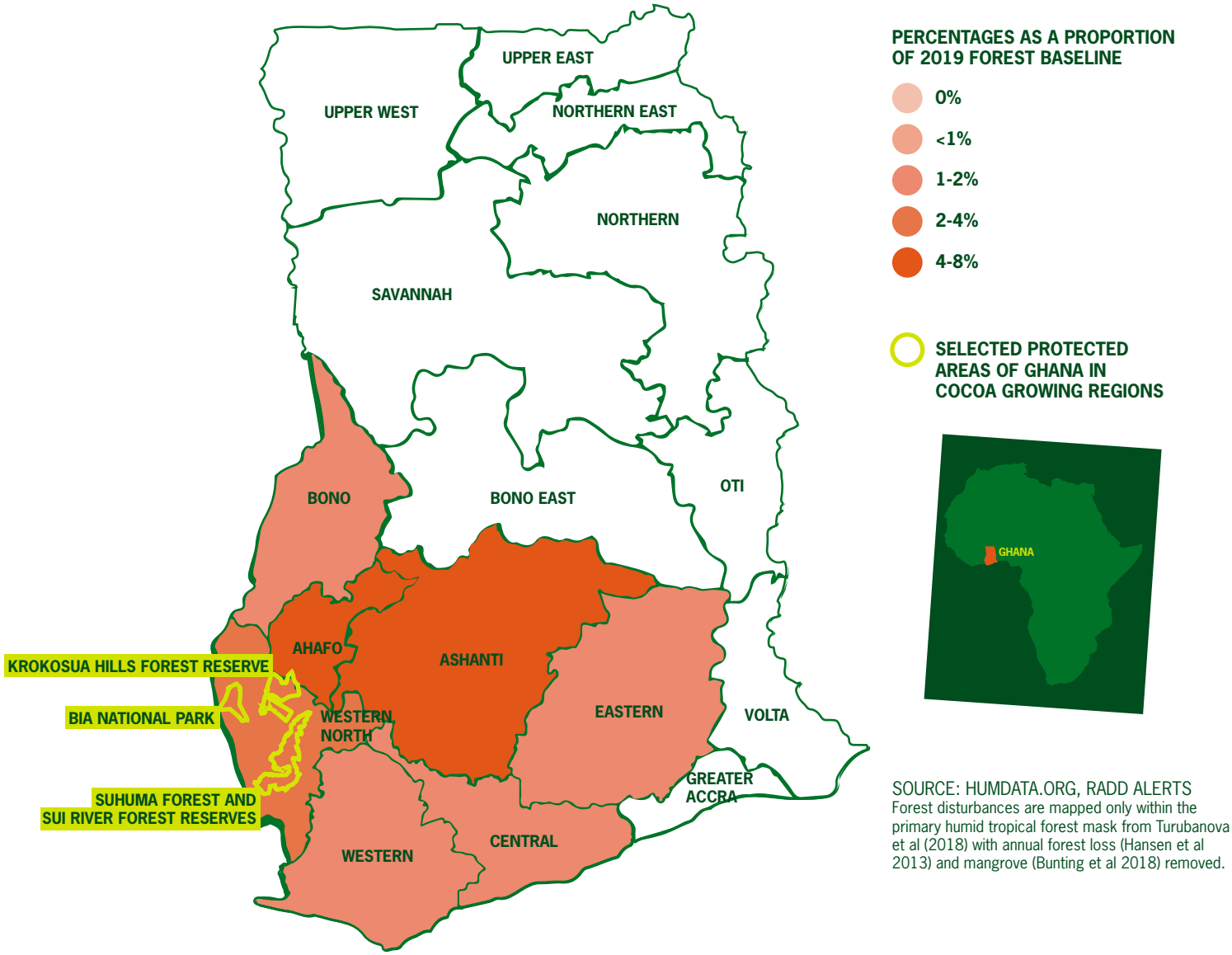
SOURCE: SOURCE: TREE COVER LOSS (HANSEN/UMD/GOOGLE/USGS/NASA).
HISTORICAL TREE COVER LOSS WAS CALCULATED USING AN OLDER METHODOLOGY.

Within cocoa growing regions, the the RADD data paints an equally disastrous picture, with 39,497 ha of forest lost since the CFI action plans were published, with a staggeringly high rate of deforestation of 3.9%.

The forest reserves and national parks outlined in Figure 4 below are all located in areas of high cocoa production in Ghana. Forest reserves are held in trust and managed by the state on behalf of the people, and therefore communities maintain their use rights and access to the forest for non-commercial purposes. They are also part of the Hotspots Interventions Areas (HIAs), identified by the Government's REDD+ program for priority measures to stop deforestation.[10] Along with cocoa there is a significant amount of logging and mining even in these protected areas and forest reserves.

The Suhuma Forest and Sui River Forest Reserves both fall within a larger area that is supposed to be monitored by two

Figure 4: Ghana Forest Loss in Cocoa Growing Areas



SOURCE: HUMDATA.ORG, RADD ALERTS
Forest disturbances are mapped only within the primary humid tropical forest mask from Turubanova et al (2018) with annual forest loss (Hansen et al 2013) and mangrove (Bunting et al 2018) removed.

Landscape Management Boards (LMBs), one set up by Rainforest Alliance and Olam Ghana, and the other set up by the cocoa trader Touton and its partners. LMBs are natural resource structures set up to mobilize local community support for forest protection.[11]

Our research found Suhuma Forest has seen significant encroachment along the edges of the reserve and patchy deforestation within its boundaries, amounting to 507 ha of forest canopy loss since early 2019. In Sui Reserve, 1,328 ha has been lost since 2019. A look at satellite imagery from the areas surrounding the reserve demonstrates a grim potential future for the land if the boundaries are not protected, as forest coverage in these surrounding areas has been decimated.

On paper, LMBs appear to offer a positive model. They derive from a paradigm of community forest management, often touted by government and CSOs as a method of involving communities in addressing deforestation. But in reality, most of the work often falls to volunteers, who may not have the resources to fulfil the organization's stated function. As such, the mere existence of LMBs alone will not protect these places from continuous incursions. What is needed to make it happen is an incentive regime that makes intact forests valuable for farmers and local communities.

Krokosua Hills Forest Reserve has also seen significant deforestation over the past three years. While the forest is managed by the state, some community members claim to hold reserved rights to farm in specific areas of the forest. This is because the government of Ghana does not allow farms to be established within designated protected areas (in contrast to the designated "agricultural forest reserves" areas in Côte D'Ivoire, where farms may be established with a permit). The government must address these competing claims as a fundamental first step towards protecting the integrity of the Reserve.

Bia National Park, like Parc National de Taï in neighboring Côte d'Ivoire, is a relative bright spot in this story. Here the deforestation is limited, with just a few isolated cases of land clearance, compared to the situation prior to 2019. Because it is a national park, there are more, better trained, and better equipped personnel to protect both the park's boundaries and the resources within.

Sui River Forest Reserve Deforestation Alerts

SOURCE:©2022 IMAGERY ©2022 TERRAMETRICS
UNEP-WCMC (2022). PROTECTED AREA PROFILE FOR SUI RIVER FROM THE WORLD DATABASE OF PROTECTED AREAS, FEBRUARY 2022. AVAILABLE AT: WWW.PROTECTEDPLANET.NET

ANALYSIS

LIMITED MONITORING = LIMITED PROGRESS

On paper, both Côte d'Ivoire and Ghana have made strong commitments to implement joint monitoring traceability systems by the end of 2019.

- Côte d'Ivoire pledged the "…development and implementation of the national cocoa traceability system by the end of 2019." This did not materialize. Although the Ivorian Ministry of Forests pledged to adopt a National Satellite Monitoring System to track deforestation in January 2021, it is not clear what stage of implementation this system has reached.

- Ghana committed to "…improve supply chain mapping, with 100% of cocoa sourcing traceable from farm to first purchase point by 31 December 2019", while it also highlighted that "Signatory companies are putting in place verifiable monitoring systems for traceability from farm to first purchase point, operational policies and control systems that effectively monitor the associated risks, including high quality verification, by 31 December 2019". Yet to date these systems have also not been established.[12]

Yet despite these promises, and the stated intentions of the CFI, our research finds extensive forest loss in cocoa-growing regions is still occurring in Côte d'Ivoire and Ghana – alarmingly, even in protected areas. This represents a failure by the industry and regional governments.

In May 2021, CFI released its 2020 progress reports touting tree and seedling distribution, improvements in traceability of direct supply chains, provision of finance to smallholder farmers, and some forward momentum in adopting satellite monitoring systems. But noticeably, while the reports focused on reforestation, they did not attempt to quantify deforestation, other than in the vaguest of terms.

This lack of openness and transparency is a crucial part of the problem, and contributes to the failure of the cocoa sector to adequately respond to ongoing deforestation. Key players in the cocoa sector, such as the Ghana Cocoa Board (COCOBOD) and Le Conseil du Café-Cacao (CCC) in Côte d'Ivoire, which within their respective countries regulate the cocoa sector, work in ways that are highly opaque. A recent report by the CCC in Côte d'Ivoire maintains that the mapping of all cocoa farms in rural areas and classified forests has been carried out, but none of this information has been made publicly available. And whilst many chocolate companies and commodity traders have made notable efforts to disclose where their direct purchases come from, much of the cocoa supply chain remains murky. **With indirect sourcing accounting for more than 50% of the supply, transparency and full traceability must go hand in hand for cocoa-driven deforestation to end, as laid out in the CFI agreement.**

CONCLUSION & RECOMMENDATIONS

More than four years after high profile government and industry commitments under the Cocoa & Forests Initiative, new satellite analysis and field research by Mighty Earth finds that forests in Côte d'Ivoire and Ghana in West Africa continue to be devastated for the creation of new cocoa farms. These forests are a precious resource, home to Indigenous and local communities, and an array of magnificent trees, rare plants, and endangered wildlife. They are also a vital asset in the fight against climate change.

The destruction of West Africa's forests to feed the insatiable appetite of cocoa traders and chocolate manufacturers is an ongoing stain on the industry. In addition, this deforestation is inextricably tied to other problems plaguing the sector, such as the overuse of harmful pesticides that are dangerous to humans and nature, as well as poor working conditions and low incomes for cocoa farmers, and farm laborers. Indeed, the chocolate industry's failed commitments with regards to forest protection sadly echo similar promises to eradicate the worst forms of child labor and forced labor from cocoa supply chains – made via a joint declaration between governments and cocoa and chocolate companies in 2010 – which recent reports revealed have also failed to be kept.

The time for excuses, empty promises and "sweet nothings" is over. Traders, chocolate companies and governments must begin working together effectively to monitor both direct and indirect cocoa supply chains, act to prevent forest encroachment from cocoa expansion, and provide decent livelihoods for smallholder farmers. Mighty Earth calls for:

Photo: Rod Ward

Joint Monitoring

Companies and governments within the CFI should stop finger-pointing, end their disjointed approach to tracking cocoa-related deforestation, and work together to establish an effective, open, multi-stakeholder joint monitoring mechanism in 2022. This means collecting and sharing supply chain data on the sources of cocoa purchases and overlaying that information with satellite analysis of deforestation "hot spots" to address areas at immediate risk. This joint monitoring system must be publicly available and transparent so that stakeholders can both contribute to and draw from the analysis.

Transparency

The CFI should publicly report progress on reducing deforestation, with the aim of achieving zero new deforestation for cocoa within two years.

Support Agroforestry

The industry must accelerate efforts to restore degraded forests and biodiversity by investing in agroforestry systems to replace pesticide-heavy cocoa monoculture landscapes in Ghana and Côte d'Ivoire. This requires a joint effort between growers, industry actors, governments, and civil society, and crucially, must adopt a farmer-centric approach that responds to their needs and priorities with the appropriate mixture of tree, crop, and livestock systems on their land. Simply handing out tree seedlings is woefully insufficient. Leading chocolate companies should commit to sourcing at least 50% of their cocoa from agroforestry by 2025.

Côte d'Ivoire & Ghana

The Government of Côte d'Ivoire should work quickly to clearly demarcate the boundaries of protected areas and stop any new deforestation by involving communities and civil society organizations in their monitoring. It must also take vigorous measures to prevent any recolonization of these areas and undertake reforestation

Photo: Mighty Earth

Photo: Mighty Earth

without delay, using endemic species as a priority and using proven modern restoration techniques.

Also in Côte d'Ivoire, the Le Conseil du Café-Cacao should publish in full the results of the "Census of Coffee-Cocoa Producers and their orchards," which was conducted between April 2019 and December 2020, with the intention of developing a better understanding of the sector and informing the provision of services to smallholder producers.

In Ghana, the government and multilateral donors – including the World Bank and African Development Bank – should ensure stronger cooperation between the Forestry Commission, the Ghana Cocoa Board (COCOBOD) and cocoa traders to deliver an effective national forest monitoring system and robust grievance mechanisms for addressing social and environmental problems in the sector. These actors must also ensure the emerging Cocoa Management System (CMS), which is intended to trace the cocoa supply chain, is designed in a transparent manner, so that stakeholders will have trust and confidence in the data that will be produced.

While the Ghanaian government has made steps toward reforming tree tenure regulations, the process has stalled over recent months, meaning that farmers do not have incentives to keep naturally occurring trees on their farms. Finishing this work must be a government priority.

Due Diligence

Authorities in the European Union, Japan, and the United States should introduce legislation that requires companies to conduct thorough due diligence checks to prevent cocoa or cocoa-derived products linked to deforestation from being imported into their consumer markets.

A NOTE ON METHODOLOGY

A number of different methodologies exist to calculate forest cover and deforestation, with various data sources available for canopy change alerts and forest base-maps. For this report, we summarized and analyzed GLAD, FDEWS, and RADD alerts. While loss estimates differ, all point to significant forest loss/disturbance across West Africa over the last few years.

We primarily relied on RADD for our final analysis as their data is state-of-the-art, open-source (so that any interested analysts can replicate our findings), and up-to-date. RADD alerts monitor a modified version of the Primary Humid Forest Baseline map created by Turbanova et al. (2018). Our analyst projected open-source shapefiles of country, regional, and park boundaries into Google Earth Engine, and summed RADD alerts within area boundaries to arrive at summary statistics for each region. To see our analysis, check out our Earth Engine Script.

For our calculations related to Côte d'Ivoire, we added data from the Forest Disturbance Early Warning System (FDEWS). The application and forest classification was developed by Vivid Economics and adopted by the government of Cote D'Ivoire as the primary tool for forest monitoring. FDEWS releases monthly statistics on Forest Disturbances based on a machine learning algorithm that compares passes of Sentinel-1 satellites with a 2019 forest base-map. We include summaries of some statistics in this report to support our findings with RADD alerts.

To arrive at our calculations for Ghana, we determined the intersection of RADD alerts and key Ghanaian Protected Areas. We also focused on seven administrative regions of Ghana. We chose each region due to its economic prominence as a cocoa-producing region, as demonstrated in Ghana's official National Map of Forests and Land Use (2021).

To determine the deforestation specifically within cocoa-growing regions, we drew on Abu et al (2021)'s paper-- "Detecting cocoa plantations in Côte d'Ivoire and Ghana and their implications on protected areas" – which outlines the climatic regions suitable for cocoa production in both countries. We used their datasets, overlain with open-source regional administrative boundaries for each country to calculate the percentage of land coverage that is classified as cocoa within each region. Some regions showed, that by 2021, as much as 40% of land had been converted to cocoa farms.

Note: in a previous press release, Mighty Earth reported on data from the IMAGES platform indicating 47,000ha of clearance within cocoa-growing regions in Côte d'Ivoire. For that calcuation we relied on Zoumana et al. (2016) paper "Antécédents culturaux et identification de quelques pratiques paysannes en replantation cacaoyère en Côte d'Ivoire." Abu et al.'s map with finer resolution of cocoa farms, allowed us to narrow the study area and remove some insignificant cocoa growing regions.

Next, we summed RADD alert forest disturbances across each key cocoa-producing regions to gain a sense of deforestation that may be related to cocoa farm expansion. Forest disturbance "is defined as the complete or partial removal of tree cover within a 10 m Sentinel-1 pixel." We incorporated both confirmed/high confidence alerts (97.5% probability) and unconfirmed/low confidence alerts (85% probability) into our summaries in order to conduct the analysis over time.

Finally, we added these statistics across regions to get a clearer picture of how much canopy loss has occurred within key cocoa-producing regions. We then calculated alerts as a proportion of forest basemaps to determine the rate of deforestation. It is important to note that RADD alerts do not guarantee the forest loss occurred due to cocoa—there are also other drivers of deforestation in the region, including clearance for rubber (especially in Côte d'Ivoire) and timber, mining and infrastructure projects in both countries. In other parts of Côte d'Ivoire, we're also seeing increasing land clearing for cashews.

END NOTES

1. See: https://www.worldcocoafoundation.org/initiative/cocoa-forests-initiative/

2. Confectionary Production (September 2, 2020) "Ghana and Ivory Coast governments join forces with new body for the cocoa sector" https://www.confectioneryproduction.com/news/31124/ghana-and-ivory-coast-governments-join-forces-with-new-body-for-the-cocoa-sector/

3. World Bank trend data on remaining forest cover in Côte d'Ivoire can be found here: https://data.worldbank.org/indicator/AG.LND.FRST.ZS?locations=CI World Bank data on remaining forest cover in Ghana can be accessed here: https://data.worldbank.org/indicator/AG.LND.FRST.ZS?locations=GH

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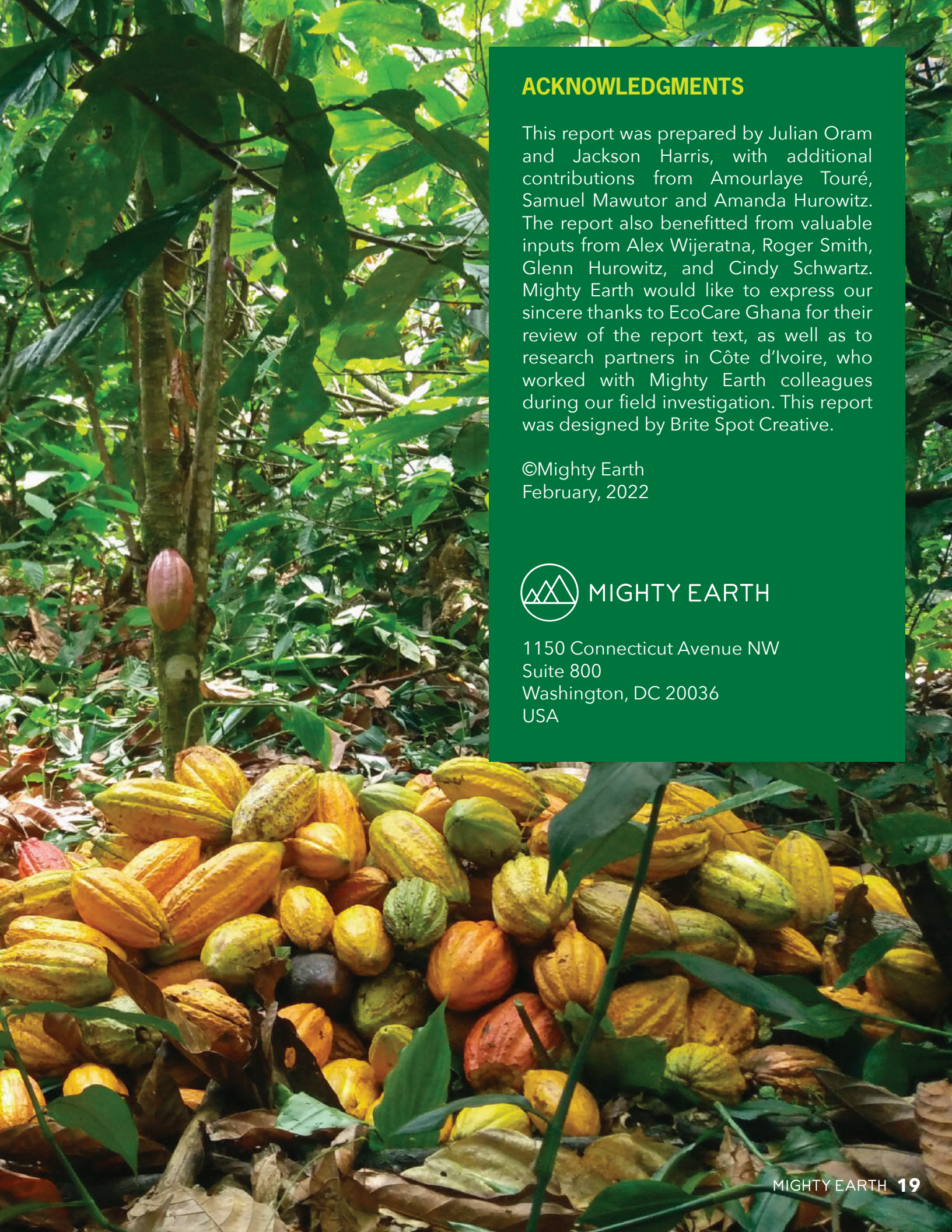
Photo: Mighty Earth



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