Sustainability initiatives in Ivorian and Ghanaian cocoa supply chains: benchmarking and analysis

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Introduction

In the cocoa sector these days it seems that everyone is talking about sustainability: Companies are committing to sustainable sourcing, states are developing policies to stop imports of cocoa linked to deforestation, researchers are highlighting solutions or criticising existing approaches, and certification bodies keep improving the standards against which they assess the sustainability of cocoa production.

Meanwhile, companies have invested millions of euros into West African supply chains in efforts to support hundreds of thousands of farmers by improving living conditions, increasing yields, professionalising cooperatives and halting child labour.

But despite some progress, tremendous challenges remain. Civil society reports that sustainability objectives have not been reached, that some forests are under high risk of deforestation, that there is still child labour in the supply chain, and that the living conditions of cocoa farmers remain poor. So, when a company states that 100% of its cocoa sourcing is, or will be, 'sustainable', what does it actually mean?

This report investigates sustainability initiatives that shape the West African cocoa sector in order to examine what each initiative implies and to assess the relevance of the tools they use. The report:

- Assesses sustainability challenges related to cocoa in West Africa (Part 1)
- Explains ongoing initiatives in the cocoa sector (Part 2.1)
- Analyses the evolution of sustainability paradigms, the stakeholders they mobilise and the levers they adopt (Part 2.2)
- Identifies technical challenges to monitoring deforestation caused by cocoa production (Part 3)
- Proposes indicators for monitoring sustainability at the territorial level (Part 4)
- Reflects on pathways for thinking about sustainability beyond plots and cocoa supply chains (Conclusion)

1. Cocoa sustainability challenges in West Africa

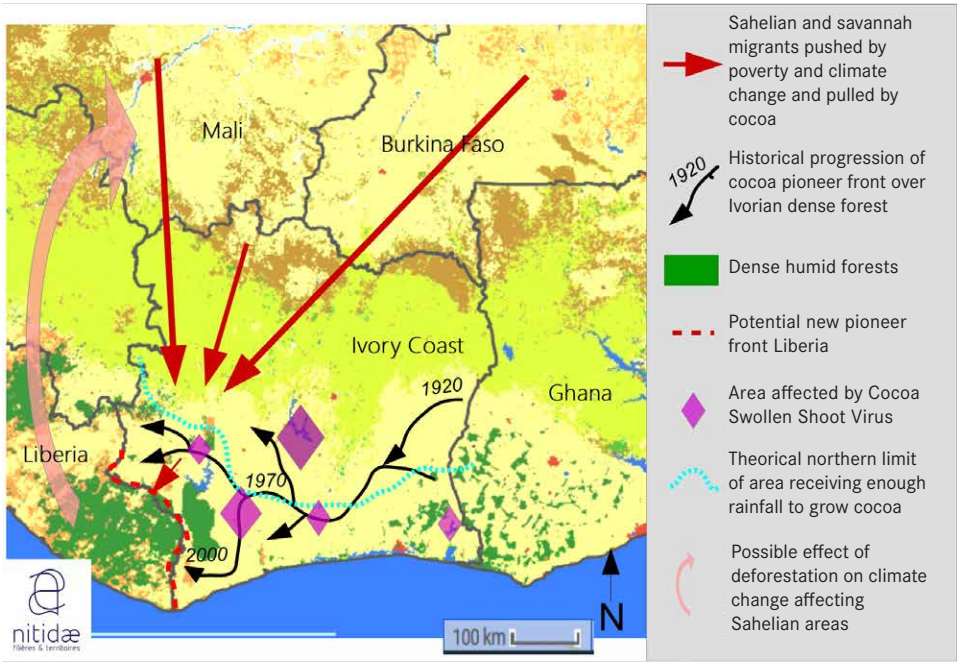
1.1. High deforestation risk

Between 1986 and 2013, cocoa expanded into forested areas in Africa at an average rate of 82 762 hectares per year. This took place mainly in Côte d'Ivoire, and secondarily in Ghana. Between 2000 and 2013, this deforestation accelerated to reach 132 376 hectares per year (Ordway et al., 2017). In Côte d'Ivoire, deforestation has slowed in the past few years, but this is because of near-total forest depletion. Apart from the Taï National Park, almost all "rural domain" forests and classified forests have been encroached or fully converted to agricultural land, especially cocoa fields. In Ghana, protected forests have been slightly better conserved than in Côte d'Ivoire, where political crises and civil war between 2000 and 2010 led to a lack of enforcement of forest policies and rapid conversion of the remaining forests.

Such deforestation is inherent to cocoa production and has occurred almost everywhere in the world where cocoa is grown, from Central America to Indonesia. Rural migrations, the presence of forested land in areas with relatively few people, and the high value of cocoa (compared to other crops and activities) have combined to drive a pioneer conquest of tropical forest. But a cocoa boom is usually followed by a bust, once the first cycle of cocoa ends and prices fall due to over-production. As environmental conditions degrade, farmers start looking beyond their plots, in search of new forests to clear. The histories of cocoa production in Côte d'Ivoire and Ghana exemplify this (Ruf, 1987).

In West Africa, the cocoa frontier is moving westward (Figure 1). In this context, the main threat is not to Ivorian nor Ghanaian forests (as they are mostly already gone) but to Liberian forests. In recent years, researchers at the border area have confirmed that new migrants are settling in Liberia, after coming directly from their homelands in northern Côte d'Ivoire, Mali or Burkina Faso, or being chased from national parks and classified forests in Côte d'Ivoire.

Figure 1. The westward progression of cocoa: a new frontier in Liberia? Source: base map from ESA Land Cover CCI 2018; symbols and trends by Nitidae



Issues related to deforestation:

- How to preserve remaining forests in Ghana and Côte d'Ivoire?
- How to prevent a wide pioneer front in Liberia?
- How to keep cocoa farming in existing cocoa zones?
- How to address the situation of farmers settled in classified forests whilst respecting human rights and giving them decent living conditions?

1.2 Cocoa production practices

During cocoa booms in Ghana and Côte d'Ivoire, farmers mainly established plots using 'full sun' methods, in which they felled most forest trees and intercropped their cocoa with only a few fruit trees (such as avocado, mango or kola). Although most of these full sun systems are now under transition to agroforestry (Sanial, 2019a), they have highly impacted forest biodiversity (including trees, herbaceous plants, creepers, fauna and microfauna) and the provision of forest environmental services (Blaser et al., 2018). Crucial issues for cocoa sustainability include:

- Preserving rare dense and complex agroforestry systems, through economic valuation of agroforestry practices, as with payments for environmental services (PES). Examples include the La Mé REDD+ project, with its payment of an agroforestry premium based on the basal area of shade trees in cocoa plots,[1] and the Ivorian PES pilots described by the EU REDD Facility (EU REDD Facility, 2020).

[1] Nitidae presentation on *'A new Payment for Ecosystem Services in organic cocoa agroforestry systems in Ivory Coast'*. World Agroforestry Congress, Montpellier, France (May 2019).

- Finding ways of promoting adoption of agroforestry in areas where farmers do not yet feel the need for trees, such as the young cocoa plots of the wettest areas of the extreme West of Côte d'Ivoire (Ruf 2011; Sanial 2019b).
- Accompanying these agroforestry transitions, relying on farmers' innovations to manage trade-offs between cocoa production, labour productivity and environmental services (Blaser et al., 2018). Only 20% of the tree species found in dense humid forest in Côte d'Ivoire have been found in cocoa farms of the country's western, central and eastern cocoa production zones (Smith Dumont et al., 2014; Sanial, 2019a). There is a wide scope for boosting the diversity of these systems.

Agroforestry is, however, only one aspect of the sustainability of cocoa production. Indeed, in Côte d'Ivoire and Ghana, the use of pesticides and fertilisers by cocoa farmers has increased during recent years. For example, Sadhu et al., (2020) reported a 20% increase in the number of households using pesticides and a 10% increase in households using mineral fertiliser between 2013/2014 and 2018/2019. These agrochemical products are used to protect cocoa against increasing threats from pests and diseases, and to improve soil mineral content after several cocoa cycles. However, they can pollute water and harm insects and other species. Other aspects of agrochemicals use also impact sustainability:

- The health of farmers is at risk, due to inadequate protective equipment. This is especially the case for children, who are often in charge of applying these products or are present in the field when this happens. This could affect their healthy development. Greater use of agrochemicals could lead to worse forms of child labour (Sadhu et al., 2020).
- The manufacture of mineral fertiliser has a strong greenhouse gas emission potential. It was observed that 55% of the total carbon footprint of chocolate made from Indonesian cocoa beans is related to emissions of the greenhouse gas nitrous oxide (N_2O) derived from nitrogen fertiliser (Akrofi-Atitianti et al., 2018).
- Increased use of pesticide and fertiliser increases the fixed costs of production, reducing farmers' net incomes and the resilience of cocoa farms to price variations.

Cocoa farmers undoubtedly need to improve soil fertility and to limit the impacts of pests and diseases on bean production. More diversified landscapes and agroforestry practices (Babin et al., 2010) can lessen these impacts, but more research is still needed on organic practices. The use of organic manure (from chickens, cows or sheep when available) is developing in Côte d'Ivoire (Ruf et al., 2015; Sanial, 2019a) but it is not available to all farmers. Furthermore, the impacts of using manure are still uncertain and there are concerns about antibiotics in chicken manure. For this reason, in organic agriculture standards, manure should not come from industrial farms.

Finally, climate change is creating less favourable conditions for cocoa growing (Laderach et al., 2013). In 2050, almost 50% of the current cocoa growing areas may no longer be suitable for this crop because of longer droughts, higher temperatures and less rainfall. Farming practices must adapt. Increasing tree cover is a key response. For example, De Frenne et al., (2019) showed in a global meta-analysis that for each 1 °C increase of maximum air temperature, forest canopies provide 0.32 °C cooling and hence climate buffering. Using the West African data alone, this gives 0.57 °C cooling per 1 °C increase of maximum air temperature. The effect of canopy cover on water availability for cocoa trees is, however, far less clear (van Vliet et al., 2015). There is limited reliable published data, and a link with soil water-holding capacity is often not made (Boeckx et al., 2020).

Issues related to environmentally-friendly farming:

- How to promote environmentally-friendly practices without constraining farmers' choices, creativity and innovation?
- How to remunerate/compensate for environmentally-friendly practices that diminish yields?
- What are acceptable trade-offs?
- How to support the local production of organic manure without increasing pressure on land?

1.3 Farmer impoverishment

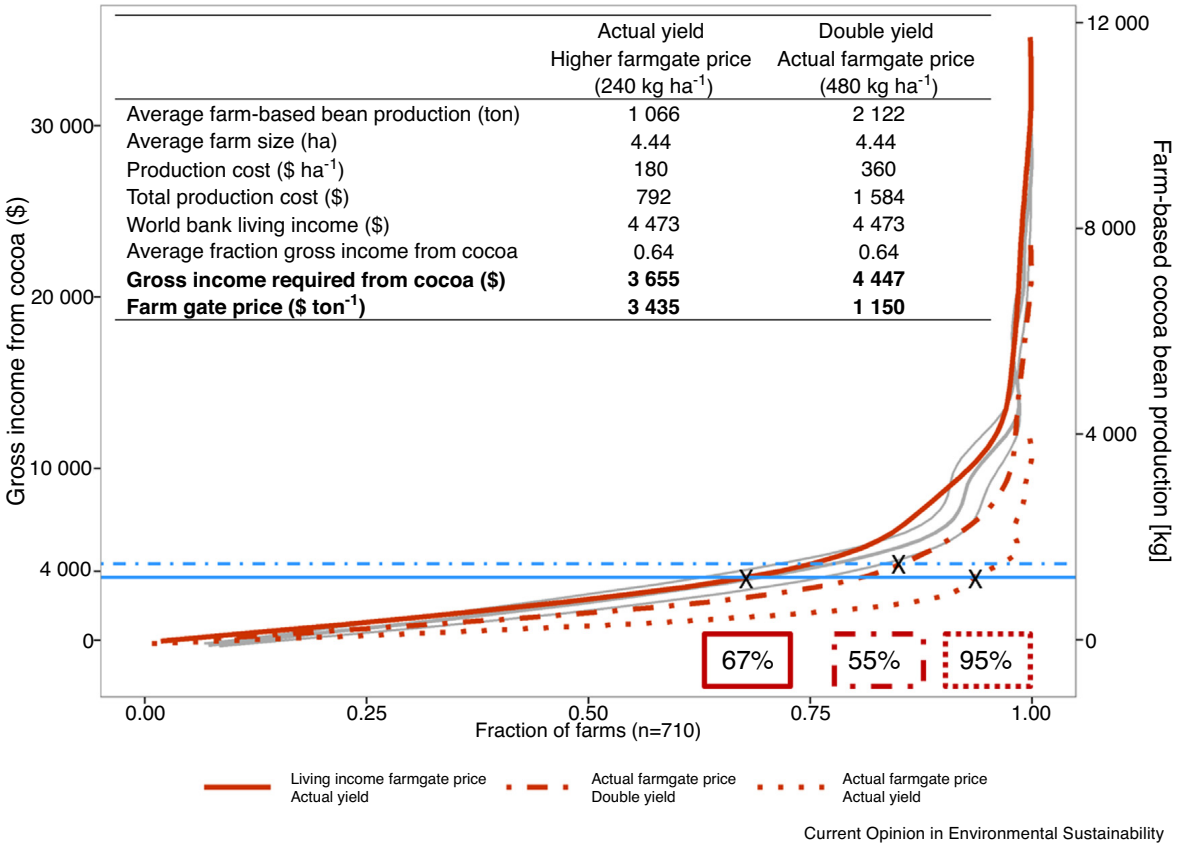
Although cocoa farmers are among the wealthiest smallholders in West Africa, their economic situation is deteriorating and they are becoming impoverished (Balineau et al., 2016; Rusman et al., 2018). A recent study for Fairtrade found that 58% of Ivorian households growing cocoa have income below the threshold of extreme poverty (460 FCFA/day/person, or 1 350 000 FCFA/year/family) (Rusman et al., 2018).

In a recent paper, Boeckx et al., 2020 explored three scenarios of cocoa farm gate prices and yields (Figure 2):

- Business as usual (current farmgate price of 1 150 USD/ton and yields of 240 ± 195 kg/hectare)
- Living income farmgate price and current yield (3 435 USD/ton and 240 ±195 kg/hectare)
- Current farmgate price and doubled yields (1 150 USD/ton and 480 kg/hectare).

According to data collected in 710 households in Ghana, under each scenario, respectively, only 5%, 15% and 33% of households can achieve a decent living income as defined by the World Bank (Boeckx et al., 2020). According to the authors, 'achieving a "living income" is hampered by low yields and prices, but this cannot lift the majority of cocoa farmers out of extreme poverty. [...] Farmgate price and yield increases alone do not necessarily improve overall wellbeing. It should, therefore, be questioned if adequate living standards are achieved under these 'living income' assumptions. Complementary public or private interventions such as provision of services and infrastructures, land tenure systems, local governance and social relations that shape poverty alleviation and human rights are therefore required' (Boeckx et al., 2020: 108). Indeed, most cocoa households lack access to social services and infrastructure (such as water, schools, power and roads).

Figure 2. Cocoa cannot provide a decent living income for all in Ghana. Source: Boeckx et al., 2020



Average farm-based cocoa bean production with standard deviation (2011–2014) (gray curves) and gross income from cocoa (red curves) for scenario 1: living income farmgate price (3 435 $ t^{-1}) and actual yields, scenario 2: real farmgate price (1 150 $ t^{-1}) and double yields, and a business as usual scenario: actual farmgate price and yields; the blue lines represent gross income required from cocoa to achieve living income for scenario 1 (full line) and 2 (dashed line); when red gross income curves cross their respective blue lines, living income is achieved; inserted table shows data calculation for scenario 1 and 2.

The impoverishment of farmers is linked to structural challenges:

- Inheritance and division of plots (leading to less area per farmer).
- Ageing of cocoa orchards (leading to fewer beans per hectare), and increased pressure from pests and diseases in landscapes with low vegetation diversity.
- Replantation difficulties (low density of cocoa stands because of high mortality during replanting, replantation being twice as expensive as converting forest into a cocoa plot; Ruf and Zadi, 1998).
- Forest depletion.
- Increased production costs: between 2013-2014 and 2018-2019, Ivorian and Ghanaian households significantly increased their annual costs per ton of beans produced – from 556 to 1 254 USD for fertiliser, from 267 to 745 USD for pesticides and from 230 to 481 USD for herbicide (Sadhu et al., 2020).

It should be noted that farmers capture very little of the value added to cocoa and there is little local processing (although that is improving). Farmers receive around 6% of the value of a chocolate bar sold in Europe (BASIC, 2016; Fountain and Huetz-Adams, 2018). Cocoa-producing states are heavily taxing exports (the equivalent of 28% of the gross income of farmers in Côte d'Ivoire) and the supply chain is concentrated in the hand of few multinationals (six companies control over 75% of the total international trade/grinding of cocoa beans[2]).

[2] https://www.iisd.org/system/files/publications/ssi-global-market-report-cocoa.pdf

In these conditions, child labour persists. Some progress has been achieved in recent years. The school attendance rate increased from 58% to 80% in Côte d'Ivoire and from 89% to 96% in Ghana between 2013-2014 and 2018-2019. Dangerous forms of child labour (particularly the use of agrochemicals products) concern 39% of Ivorian households and 55% of Ghanaian households.

Finally, farmers have to bear alone the risks linked to cocoa production, especially risks due to climate change, diseases like swollen shoot and price volatility. Outside of given projects, farmers have no access to credit, there is no widespread farmers' banking system or insurance to absorb risks.

Issues related to poverty alleviation:

- How to improve farmers' living conditions without creating an incentive to deforest land?
- How to increase public investment in rural infrastructure and services?
- How to protect farmers from risks and provide them with a safety net?
- How to work beyond the cocoa sector on systemic issues such as child labour, schooling and land tenure?
- How to end child labour?

1.4 Governance: power asymmetries along the supply chain

Although the cocoa supply chain is more organised and regulated than other supply chains in West Africa, it remains complex and opaque, especially in Côte d'Ivoire. The inner workings of cooperatives unknown, there are cases of smuggling to/from Liberia and Ghana in response to price differences between countries, and there is no financial traceability at the producers' level
as most payments are made in cash.

Two recent papers (Ruf et al., 2019; Uribe Leitz and Ruf 2019) highlighted that 80% of cooperatives are in fact not proper farmers' cooperatives, but have been created by former middlemen or individual buyers. According to the researchers, the main reason to create a cocoa cooperative is to capture the additional income provided by certification premiums. Therefore, this premium is often not fairly redistributed among farmers. There is a very strong informational asymmetry between farmers and the managers of cooperatives. There is still a low schooling rate among farmers, and they have low access to information, limiting their ability to negotiate with and hold cooperatives' management accountable.

There are also power asymmetries between cocoa exporters and certified cocoa cooperatives. Indeed, the industry alone decides the quotas for certified cocoa and sets a deadline for certified beans sales (Ruf et al., 2019). If these quotas are small, cooperatives are not always able to sell all of their certified cocoa as certified. As the deadline is often early, cooperatives try to find as much cocoa as possible at the start of the campaign. This leads cooperatives to buy cocoa from non-members in remote villages and 'convert' it into certified cocoa. In this case, the cooperative management can keep all the premium.

Despite an apparent diversity of stakeholders along the cocoa supply chain, just six international corporations (Barry Callebaut, Olam, Cargill, Ecom, Touton and SUCDEN) control over 75% of the international cocoa trade and grinding. While the chocolate confectionery industry is less concentrated, its six main manufacturers (Mars, Ferrero, Mondelez, Meiji, Hershey and Nestlé) have more than 55% of the total chocolate confectionery sales.[3]

This concentration often limits the ambitions of certification organisations in terms of requirements and controls, as auditing bodies can be put under pressure by companies. It can also limit attempts at market regulation by cocoa-producing states. And it leaves little room for innovation in farmer organisations, trade practices or social and environmental actions to propose new ways to produce or market cocoa and chocolate.

An illustration of how the concentration of the market reduces ambition in the cocoa sector is that each time the chocolate industry was pressured to improve its sustainability, the top trading and processing companies adopted newly-created standards with lower ambitions than existing ones.

The first case was in 2009 with the implementation of UTZ in Côte d'Ivoire after the publication of a Global Witness report[4] denouncing the way cocoa fuelled the civil war. UTZ was well adapted to the traders' needs and quickly adopted. The second case was in 2014, when the Fairtrade Label Organisation (FLO), under pressure from the cocoa sector in particular, created a new standard allowing a product to be certified if only some of its ingredients were certified. More recently, in 2020, the norm ISO 34101 defined sustainable chocolate with even lower specification than the new UTZ/ Rainforest merged certification.

Governance issues:

- How to set financial traceability up to producers, especially for premium payments?
- How to ensure that farmers have access to reliable information?
- How to find trustworthy partners in a supply chain composed of thousands of smallholders?
- How to better share power among stakeholders in a very concentrated supply chain?

[3] https://www.t4.ai/industry/chocolate-industry-market-share

[4] https://www.globalwitness.org/en/archive/hot-chocolate-how-cocoa-fuelled-conflict-cte-divoire

2. Benchmark of sustainability initiatives: from plots to landscapes

2.1 Sustainability initiatives in Ivorian and Ghanaian cocoa sectors

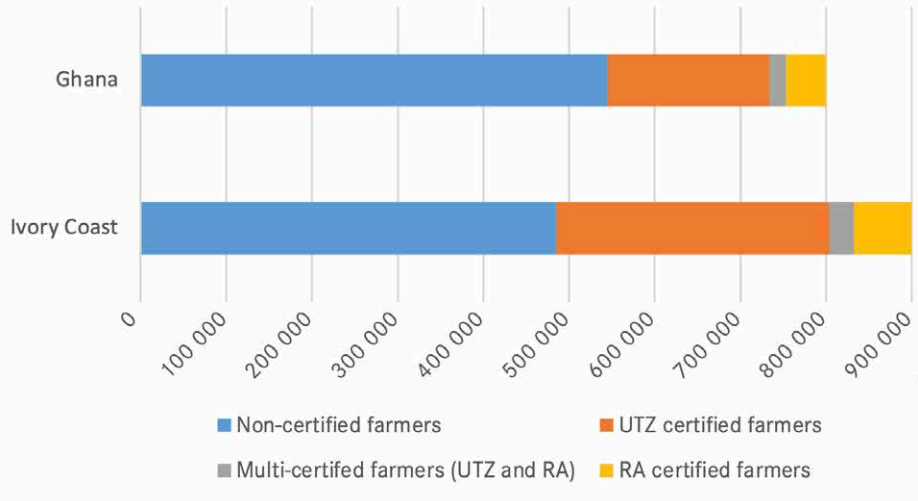
2.1.1 Certification standards

Certification standards (UTZ, Rainforest Alliance, Fairtrade and, to a lesser extent, Organic) are major tools that companies chose to use to improve sustainability within their supply chains. Fairtrade certified an Ivorian cocoa cooperative for the first time in 2004 and was followed by Rainforest Alliance, in 2005, and UTZ in 2009. Certification is granted to cocoa farmers' organisations which, according to an independent audit, are complying with a certain share of the standard's criteria.[5] These standards include requirements on cocoa production, farm management, environment, cooperative governance, waste management, traceability, labour conditions and child labour.

A study from the International Trade Centre estimates that 22.8% of the world's cocoa fields are certified by at least one of these standards (Lernoud et al., 2018). UTZ is the top label (in terms of volume sold and number of farmers certified) in Ghana and Côte d'Ivoire. In Côte d'Ivoire, among the estimated 900 000 cocoa farmers, 330 000 are UTZ certified, more than 100 000 are Rainforest Alliance certified and almost 130 000 are Fairtrade certified (Rainforest Alliance and UTZ 2020; Fairtrade International, 2018). In Ghana, of the 800 000 cocoa farmers, 208 000 are UTZ certified, more than 75 000 are Rainforest Alliance certified and more than 90 000 are Fairtrade certified.

These numbers cannot be simply added to derive the total number of certified farmers in each country, as some of them hold multiple certificates. According to Rainforest Alliance and UTZ (2020), for example, 29% of Rainforest Alliance farmers are also certified by another label (see Figure 3).

Figure 3. Numbers of farmers in Côte d'Ivoire and Ghana certified by UTZ, by Rainforest Alliance (RA), by both, or who are non-certified (2019 data). Source: Rainforest Alliance and UTZ (2020)



[5] It is important to note that some criteria are compulsory.

As Figure 4 shows, only a proportion of beans that could be sold as certified by either of the two main labels (UTZ and Rainforest Alliance) are sold as such. This is because the buyers set quotas for certified beans each year, so buy some of the production as 'ordinary' beans, despite them coming from certified fields. This gap is important. In Côte d'Ivoire, for example, almost half of the Rainforest Alliance certified production is sold as ordinary or under another label. Once again, there is an overlap between labels. Table 1 presents the share of each country's national production that is actually sold as certified.

Figure 4. Cocoa bean sales in Côte d'Ivoire and Ghana in 2019 showing the relative proportions of certified production sold as certified, certified production sold as ordinary or under another label, and the rest of the production (metric tons). Sources: Calculated by the authors from data in Rainforest Alliance and UTZ (2020)

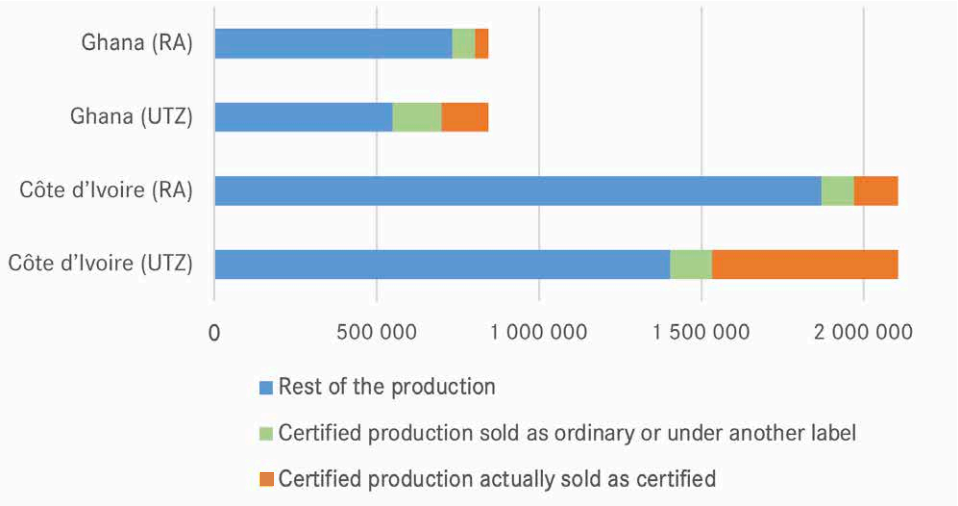


Table 1. Cocoa beans sales in metric tons (MT) for each certification label. Source: Lernoud et al, (2018)

	Rainforest Alliance	UTZ	Fairtrade	Organic (deduced from certified area)	Share of RA and UTZ certified production sold as ordinary	Share of national production actually sold as certified
Côte d'Ivoire	136 900 MT	573 000 MT	150 436 MT	1 500 MT	25.6%	41%
Ghana	42 500 MT	147 300 MT	23 652 MT	9 000 MT	54.6%	25%

Rainforest Alliance, UTZ and Fairtrade are voluntary standards managed by organisations and are mostly funded by cocoa traders or chocolate manufacturers. On the contrary, organic agriculture labels are generally (but not always) official public labels designed by farmer organisations and managed by states or regional unions (Carimentrand, 2020). Examples include the European Union's European Organic Standard and the US Department of Agriculture's National Organic Program. The organic certificate is given to producers' groups that are regularly audited by an independent third-party auditor.

UTZ, Rainforest Alliance and Fairtrade certifications were initially adopted by private companies on a large scale to reinforce their supply chain sustainability and communicate about their commitments. And during the past decade, these labels have grown quickly alongside companies' commitments (such as in the New York Declaration on Forests, in 2014). According to Lernoud et al., (2018), between 2013 and 2017, the area of UTZ certified cocoa increased by +125% worldwide, while the Fairtrade certified cocoa area grew by 174% and area with certified Organic agriculture increased by 74%. After cotton, cocoa is the crop for which the total area certified has increased the most since 2013 (Willer et al., 2019).

Fairtrade is the label that is growing fastest in terms of numbers of members. A change of labelling rules has driven this increase. Indeed, since 2014 it is possible to label as "Fairtrade" a product containing only one Fairtrade ingredient.[6] This has considerably increased the volumes sold. This change is echoed in the strategies adopted by producer cooperatives. Ruf et al., (2019) explain that 80% of cooperatives recently certified as Fairtrade in Côte d'Ivoire were already UTZ or Rainforest Alliance certified. The cooperatives are interested in having a supplementary certificate so they can be less dependent on a single exporter and a single label. As cooperatives rarely give information to their members about this new certification, it leaves them a margin to use and distribute premium as they wish (Ruf et al., 2019).

Before describing the standards of each certification, it is important to mention that UTZ and Rainforest Alliance merged in 2018 under the common name of 'Rainforest Alliance'. The Rainforest Alliance and UTZ certification programmes continue to operate in parallel until a new certification programme is published. In 2020, they presented a common standard but, as of the time of writing, it has not yet been applied.

UTZ

To become certified, all UTZ producers follow a code of conduct that offers expert guidance on better farming methods, farm management and social issues, such as working conditions and care for nature. UTZ supports its farmers by providing training and supporting them on several aspects of sustainability. UTZ also invests in evaluating and measuring impact. It is one of the few sustainability standards to track multiple certifications. UTZ has developed measurement and traceability systems that other standards have adopted. For example, the Roundtable on Sustainable Palm Oil uses the e-trace system developed and managed by UTZ for enhanced traceability in its palm oil supply chains. UTZ certified 3.4 million hectares worldwide in 2017, representing 0.07% of the global agricultural area. Cocoa was the main UTZ-certified product, with more than 2.7 million hectares certified, representing 23% of the global cocoa area and nearly 80% of the total UTZ certified area. Côte d'Ivoire has the largest UTZ area (1.4 million hectares), followed by Ghana (more than 567 000 hectares) and Nigeria (over 195 000 hectares). (Willer et al., 2019).

[6] In such cases, the labels are slightly different (white instead of black) and they specify which ingredient is Fairtrade. The difference between the labels may, however, not be obvious to uninformed consumers.

Rainforest alliance

Rainforest Alliance is an international non-profit organisation aiming to create a 'better future for people and nature'. Its sustainability standards cover agricultural commodities (coffee, tea, cocoa, palm oil, cattle, bananas and cut flowers) and focus on promoting 'good agricultural practices' to preserve the environment and improve yields. Since it merged with UTZ, the Rainforest Alliance's Sustainable Agriculture standard has replaced the Sustainable Assistance Network standard. Authorised certification bodies will continue to audit participating farmers against the standard, which will be combined with the UTZ Codes into a new certification programme. Rainforest Alliance owns the trademark and manages the traceability, labelling and marketing of Rainforest Alliance certified products. Farms meeting the requirements of the standard can sell their products as Rainforest Alliance-certified and use the Rainforest Alliance trademark. These functions will be maintained and will evolve as the Rainforest Alliance and UTZ merge advances (Rainforest Alliance and UTZ, 2020). In 2017, Rainforest Alliance certified almost 3.5 million hectares of various commodities managed by 1.3 million producers. Cocoa had the largest area (741 000 hectares), followed by tea (more than 550 000 hectares) and coffee (more than 411 000 hectares). Most Rainforest Alliance-certified areas were in Africa (48%) and Côte d'Ivoire had the largest area (more than 618 000 hectares). (Lernoud et al., 2019).

Fairtrade International

Fairtrade International is a global network working to share the benefits of trade more equally – through standards and certification, producer support, focused programmes, advocacy and awareness raising. The first Fairtrade label was launched in 1988 in the Netherlands, and called Max Havelaar. Following the growth of additional Fairtrade initiatives in other countries, Fairtrade International was founded in 1997 to unite the national Fairtrade organisations and harmonise worldwide standards and certification. The standards require buyers to pay a set Fairtrade minimum price to producers. This minimum price for cocoa is currently USD 2 400 / ton (FOB price).[7] It is based on the average cost of sustainable production and acts as a safety net when market prices fall. Producers and cooperatives also receive a Fairtrade premium, a required additional amount on top of the selling price, which farmers and cooperatives decide how to invest in their businesses and communities. Cocoa accounted for almost half of the total area certified by Fairtrade International, with nearly 1.2 million hectares, or close to 10 per cent of the global cocoa area (Lernoud et al., 2019).

Comparing the standards

Table 2 shows how some of the requirements of different certification standards vary in how they address different sustainability issues. Only Rainforest Alliance has a specific criterion related to deforestation (from a baseline date of 1 January 2014). Fairtrade and Organic labels do not include such an approach. In theory, the International Federation for Organic Agriculture (IFOAM) forbids the establishment of a field on a natural forest zone. But in practice, this principle is rarely transcribed into Organic standards, which focus instead on plot management and agrochemical use. Meanwhile, the particularity of Fairtrade standards is that they consider fair economic transactions to be a prerequisite for sustainability (Amiel et al., 2019).

[7] FOB = Free on Board; see www.fairtrade.net/standard/minimum-price-info

Rainforest Alliance is the most demanding standard in terms of deforestation (after the baseline date), native vegetation cover and proportion of shade cover on cocoa farms. However, these requirements are limited because Rainforest Alliance:

- Has not defined a monitoring system and methodology for deforestation.
- Has not defined a methodology with which to assess shade rate at farm scale.
- Is focused on avoiding sourcing in areas with a high deforestation risk instead of on mitigating deforestation in these risky areas (when a plot is certified, deforestation has already happened, so the label arrives too late to prevent deforestation).

Table 2. Comparison of some of the requirements of certification standards on different sustainability issues

	Rainforest Alliance (2020 standard)	**Fairtrade (2017-2022 standard)**	**Organic (EU standard)**
Child labour	No child labour / forced labour. Establish committee accountable for child labour. Identify and mitigate risks.	No child labour / forced labour.	No requirement.
Deforestation	No deforestation from 1 January 2014 onward. No production from protected areas (unless management plan allows it). Management plan needed if buffer zone is under 2 km from protected area. Monitoring: ask for the management plan during audit; high carbon stock methodology; deforestation monitoring is not defined yet.	No requirement. Reflections for the next standard are ongoing.	No requirement.
Agroforestry[8]	Shade cover of 30% (at farm scale). Five native tree species per hectare. Riparian buffer zone. Monitoring: not defined yet.	Recommended but no requirement.	No requirement. Riparian buffer zone.
Price	Premium paid to cooperatives and producers.	Fairtrade price set at UDS 2 400 per metric ton (FOB).[9]	Organic cocoa price set by supply and demand.

[8] See Annex 1 for different agroforestry definitions

[9] https://www.fairtrade.net/standard/minimum-price-info

	Rainforest Alliance (2020 standard)	Fairtrade (2017-2022 standard)	Organic (EU standard)
Premium	Part of the premium must be cash paid to farmers. The cooperative must be transparent and report annually on premiums paid to farmers. Monitoring: cooperative accountability.	USD 240 per metric ton, to be shared between cooperative and producers. Monitoring: Fairtrade Development Plan to justify the allocation of premium.	No premium.
Production practices	Integrated pest management to reduce pesticide use; crop rotation crop; yearly pruning; renovation and rejuvenation practices; no genetically modified organisms; soil assessment; no clearing by fire. Monitoring: plot visits during audits (share of farmers complying with the standards at cooperative scale).	Farmers are trained to reach optimal productivity through: increased adoption of good agricultural practices and agroforestry techniques such as use of shade trees, soil fertility management including fertiliser application, integrated pest management, access to inputs and finance and income diversification strategies. Monitoring: establishing a farm development plan to achieve optimal productivity.	No synthetic chemical inputs; soil fertility maintenance; riparian buffer zone; risk analysis; no genetically modified organisms; monitoring system; monitoring practices and harvest; buffer zones; no contamination of the product along the value chain. Monitoring: plot visits during audits and chemical tests; internal control systemsof cooperatives; verify efficiency and relevance of internal monitoring system.
Sale and traceability	Mass balance authorised. Collect socio-economic data on farmers and geolocate them. Monitoring: fill in the “Good inside portal” (UTZ traceability platform).	Mass balance authorised. Collect socio-economic data on farmers.	Identity preserved (at farmers’ scale). Plots census. Physical traceability all along the value chain until the consumer. Management of suspicious batches. Monitoring: no single model, but organisations must be able to show a reliable system as part of the risk analysis.

2.1.2 ISO standards on sustainable and traceable cocoa

In 2011, the European Committee for Standardization, which has 34 member countries, started to develop voluntary standards for sustainable and traceable cocoa. The process involved stakeholders of the value chain, producing and consuming countries' representatives including the secretary of CODINORM (standardisation agency of Côte d'Ivoire) and Ghana Standards Authority (the standardisation agency of Ghana). After long negotiations, the process ended in May 2019 with the publication of the ISO 34101 'Sustainable and traceable cocoa' standards. Unlike Rainforest Alliance and Fairtrade certifications, this series of standard has no logo or a trademark. However, conforming with the standards allows companies to include 'sustainably grown' on the packaging of their products once they have been audited by an independent certification body (Carimentrand, 2020).

The standards have four parts:

- Sustainability management systems (ISO 34101-1)
- Economic, social and environmental performances (ISO 34101-2)
- Traceability (ISO 34101-3)
- Requirements for certification standards (ISO 34101-4)

Producers and their organisations must comply with parts 1 and 2 for their cocoa to be considered to be 'grown sustainably'. Part 3 concerns all downstream actors in the supply chain. The norm has three levels of compliance: threshold, medium and high.

Table 3 summarises the main sustainability-related definitions and requirements of ISO 34101. The standard requires that farmers' organisations or companies have a sustainability management system with good governance, a list of farmers (with the collection of socio-economic data and field location data), and must provide training for farmers. Most of the ISO 343101 requirements are less stringent than those of the Rainforest Alliance / UTZ common standard, and are already captured in corporate sustainability programmes.

Table 3. Sustainability-related definitions and requirements of the ISO 34101 series of standards

DEFINITIONS	
Sustainable cocoa production	State of an economically viable, ecologically rational and socially responsible cocoa production system that fulfils present needs without compromising future generations' capacity to answer their needs.
Primary forest	Never exploited nor cut down forest that has developed according to natural disturbances and process no matter its age.
Secondary forest	Exploited forest that has regrown naturally or artificially.
Child	Person under 18 years old.
Child labour	Labour that deprives children of their childhood, their potential and their dignity, and that harms their physical and mental development (see 138 OIT convention).
Light works	Works, done by children, that are adapted to their age and maturity, and that do not affect their health and personal development and do not interfere with their schooling.

REQUIREMENTS	
Production	Each farmer must have a 'development plan' for their cocoa field. Environmental requirements for production aim to: • Support water saving • Prevent water pollution • Support responsible use of agrochemical products • Preserve wildlife (flora and fauna) habitat and conserve a diverse ecosystem Farmers must have: • Ability to manage shade and cocoa trees • Appropriate safety equipment for applying phytosanitary products When applying phytosanitary products, children must not be present in the field and the farmer must put up warning signs. The standard promotes integrated pest control.
Deforestation / natural resources	A buffer zone of 10m must be established between cocoa stands and water points, and no phytosanitary products can be applied in this zone. **No deforestation or degradation of primary forest since 1 January 2018.** No deforestation or degradation of secondary forest unless the farmer has legal deeds, landowner authorisation or customary land rights. No felling of tall native trees present before the creation of the field. No clearing by burning. Make a census of flora and fauna species. Map shade trees and clarify their legal status with forest authorities. Producers' organisations must promote planting of forest and fruit trees on farms.
Traceability	The minimum requirement is mass balance traceability. Traceability must be established from the first buyer (cooperative or middleman), with a list of producers' names, and data on these producers and their fields. In the case of mass balance traceability, product packaging can state that the company "supports sustainable-certified production". In the case of identity preserved traceability, product packaging can include the words "contains sustainable cocoa" or "contains sustainably produced cocoa".
Working conditions	Workers must agree on wage levels. Work should not exceed 48 hours in a week. Child labour is forbidden. When discovered, it must be reported to competent authorities. Producers' organisations must have a policy on child labour, identify risks and set actions to prevent, identify, monitor and remedy any case of child labour.
Certification	Certification can be acknowledged if the above requirements are respected, as shown by audits that must take place at least every 30 months,on a minimum sampling size (square root of the total number of cocoa fields). The audit must last at least 1/6 days per producer. Producers' organisations have six months to resolve non-compliance.

Ghana and Côte d'Ivoire have decided not to embrace the ISO 34101 standards and are now developing a West African ISO standard that should better reflect the interests of producing countries. The governments of Ghana and Côte d'Ivoire have also stipulated that the implementation of the ISO 34101 standard will be postponed in their countries. This is to give Côte d'Ivoire's Conseil Café Cacao and the Ghana Cocoa Board enough time to carry out their own work on the topic. The West African sustainable cocoa standard was adopted in June 2021 and work is ongoing to development implementation guidelines.

2.1.3 Corporate sustainability initiatives

In response to rising consumer awareness, growing calls for more information and transparency, and criticism of certification standards and the cost of their implementation, most cocoa companies have decided to establish their own sustainability programmes (see Table 4). These companies have declared their intention to transform their practices and have developed their own 'labels' or trademarks that appear on chocolate products to differentiate them in a very competitive market.

These sustainability programmes are often applied only to a proportion (often less than 50%) of the non-compliance company's total activity (Amiel and Laurans 2019). Although these programmes vary from company to company, Amiel and Laurans (2019) conclude that they all share the same objectives, theory of change and approaches for achieving sustainability. The objectives relate to three sustainability challenges:

- Halting child labour
- Supporting producers' communities and increasing farmers' incomes
- Halting deforestation and promoting agroforestry practices

Some programmes, such as Cargill's, Nestlé's or Cémoi's, add goals on traceability and bean quality. A central role is given to farmers' training (for example, on production practices or farm management). The main assumption on which these programmes are based is that increasing cocoa yields (and, by doing so, potentially increasing farmers' incomes) is the key to addressing the above-mentioned challenges (Amiel and Laurans 2019). However, sustainable or responsible cocoa is lightly defined and most of progress indicators are measured at macroeconomic scale (for example, the number of producers above the poverty line, number of trees distributed, number of replanted hectares, or farm productivity). Neither technical nor environmental criteria for sustainable production are detailed. To this extent, corporate sustainability programs are very different from certification standards that aim at providing precise criteria.

It should be noted that these programmes focus mainly on the means deployed (and the best way to communicate and promote efforts undertaken), but they are usually not based on requirements for results. This is despite the fact that operators in the cocoa sector have, for years, made various quantified commitments . The monitoring and evaluation of these sustainability programmes are important (and often account for a large share of budgets). However, they do not really allow for the monitoring of the real impacts of these programmes on major sustainability issues. Indeed, most of the indicators monitored focus on "activity" or "achievement" indicators, such as the number of trees distributed, the number of farmers trained, the amount of money spent, the number of schools built, and so on. This often leads to a "smoke cloud" effect that focuses attention on the efforts made at a given moment, but does not allow understanding of the impacts over time. For example, how many trees will reach maturity out of the millions distributed? What are the effects of training on the practices of the farmers? How does the construction of a school affect patterns of child labour?

Impact monitoring is complex to implement and might be out of reach of such companies. This is especially because the impacts sought are multi-factorial, and it is sometimes impossible to link them directly to programmes that are implemented in specific landscapes in which a wide variety of actors shape the sustainability dynamics. Indeed, the emergence of these corporate programmes has led to the multiplication and sometimes the overlap of sustainability initiatives at farmers' scales.

It is also important to note that some smaller industry actors have undertaken sustainability initiatives that are different from the corporate sustainability programmes mentioned above and in Table 4. For example, the Ethiquable is publishing its buying prices, Uncommon Cacao is measuring and reporting transparent pricing data for every transaction, and Tony's Chocolonely is sourcing "slave free" cocoa along a transparent supply chain. Even if these initiatives remain niche ones, they are taking up the challenge of traceability.

Table 4. Overview of corporate sustainability programmes. Source: Adapted from Carimentrand, 2020 and programme websites)

Programme name	Companies and brands involved	Objectives
		TRADERS/GRINDERS
Cocoa Horizons	Barry Callebaut (trader–grinder with ~20% of global cocoa trade)	Cocoa Horizons is "an impact driven program focused on cocoa farmer prosperity and helping build self-sustaining farming communities that protect nature and children". The Cocoa Horizons Foundation is an independent, non-profit organisation. The main donors are Barry Callebaut and its clients. The objective is to improve the livelihoods of cocoa farmers and their communities through the promotion of: • Sustainable, entrepreneurial farming • Improved productivity • Community development that protects nature and children
Cocoa Compass	Olam (trader–grinder with ~18% of global cocoa trade)	Cocoa Compass aims for 100% traceability of its directly supplied value chain (= cooperatives only). Its goals and activities include: • Child labour monitoring (recording social data, supporting the issuance of birth certificates, distributing school kits, and building schools, teachers' residences and canteens with sustainability premiums) • Deforestation monitoring (GPS mapping of deforestation hotspots) • Living incomes for 150 000 farmers by 2030 • Investment in forest protection • Access to finance (creation of village savings and loans associations) • Training farmers on good agricultural practices • Distribution of improved cocoa seedlings and shade tree seedlings

Programme name	Companies and brands involved	Objectives
The Cargill Cocoa Promise	Cargill Cocoa et Chocolat (trader–grinder with ~15% of global cocoa trade)	The Cargill Cocoa Promise was established in 2012 as a "formal, future-looking and action-oriented framework for global sustainability activities". It includes 200 local farmers' organisations as well as NGOs, governments and industry partners. The programme includes five sustainability goals: • Farmer livelihoods: championing professional cocoa farming practices to strengthen the socio-economic resilience of cocoa farmers and their communities • Community wellbeing: enhancing the safety and wellbeing of children and families in cocoa farming areas • Protect our planet: promoting environmental best practices in Cargill Cocoa et Chocolat's business and across its supply chain. • Consumer confidence: helping consumers around the world choose more sustainable cocoa and chocolate products with confidence • Transformation together: using the power of partnerships to accelerate and magnify Cargill Cocoa et Chocolat's efforts to achieve sector transformation
ECOM sustainability department	Ecom (trader–grinder with ~12% of global cocoa trade)	There is no specific sustainability program, but there is a sustainability department. It focuses on four themes: • Rooted supply chain: supporting farmers with certification • Resilient communities: training farmers, and increasing farm productivity, financial inclusion, gender empowerment and child protection • Protecting the planet • Driving innovation
SUCDEN sustainability department	SUCDEN (trader with ~10% of global cocoa trade)	There is no specific sustainability program, but there is a sustainability department. It focuses on three themes: • Support farming families (improving access to healthcare and water, child labour monitoring and remediation systems) • Safeguard the planet (protecting forests by not sourcing from protected areas, training farmers and providing access to inputs) • Provide trustworthy cocoa (mapping farms, monitoring sustainability, providing beans that meet specific customer sustainability requirements)
Touton sustainability department	Touton (trader–grinder with ~8% of global cocoa trade)	There is no specific sustainability program, but there is a sustainability department. It focuses on four themes: • Basic rights • Adapting to changing conditions • Industry and innovation • Professionalisation and economic growth

Programme name	Companies and brands involved	Objectives
Beyond Beans	ETG (formerly Cocoanect; trader–grinder with ~2% of global cocoa trade)	Beyond Beans is a foundation dedicated to developing and implementing projects across ETG's commodity supply chains. It has four workstreams: • Dedicated partnership • Skilled farmers • Resilient communities • Healthy environment Beyond Beans is developing projects suited to each community (such as access to microfinance, preservation of the Hana River, women's empowerment).
Transparence cocoa	Cémoi (trader–grinder-chocolate maker with ~2% of global cocoa trade) Brands include Cémoi, C'est qui le patron ?!	This programme was launched in 2015. It has four workstreams: • Environment: halting deforestation, promoting agroforestry • Economic: professionalising cooperatives and producers, improving farm management, providing access to microfinance • Social: eliminating child labour, ensuring decent working conditions • Quality: Cémoi built its own drying and fermentation centres
CHOCOLATE MANUFACTURERS		
Cocoa for Generations	Mars (chocolate maker with ~14% of global sales) Brands include Mars, M&Ms, Twix, Bounty, Maltesers, Milky way, Snickers, Dove and Balisto	The objectives are: • Reinforcing the struggle against child labour and deforestation • Supporting cocoa producers and their communities in sustainably developing their activities Mars is also investing USD 1 billion over ten years (2018-2028) through its "Sustainable in a Generation Plan".
Ferrero Farming Values	Ferrero (chocolate maker with 10% of global sales) Brands include Nutella, Kinder and Ferrero Rocher	Ferrero collaborates with non-profit and farmer organisations to address agricultural, social, environmental and business issues in cocoa farming and supports ongoing local projects to combat child labour and train farmers.
Cocoa Life	Mondelez (chocolate maker with 10% of global sales) Brands include Milka, Côte d'Or, Daim, Toblerone, Oreo	Launched in 2012, Cocoa Life will have invested USD 400 million by 2022 with the goal of benefiting at least 200 000 farmers and one million members of cocoa communities. This programme is organised in partnership with the Fairtrade Foundation and its economic performances are verified by FLOCERT audits.

Programme name	Companies and brands involved	Objectives
Shared Goodness	Hershey (Chocolate maker with 6% of global sales) Brands include Hershey's	Shared goodness has four workstreams: • Shared future (helping children succeed, improving children nutrition) • Shared business (responsible sourcing, child labour monitoring and remediation, traceability) • Shared communities (investments for communities) • Shared planet (addressing climate change in cocoa communities)
Cocoa plan	Nestlé (Chocolate maker with 6% of global sales) Brands include Kit Kat, Smarties, Lion, Crunch, Galak, Meunier, Nestlé dessert, Lanvin, After Eights, Nuts, Sundy, Quality Street, Nestlé les recettes de l'atelier.	This programme operates in Côte d'Ivoire and Ghana. It relies on the mapping of 87 000 farms, the implementation of an exclusion process for farmers who cultivate cocoa in protected areas, raising awareness among farmers about forest law, shade tree distribution (target of 2.8 million by 2022), agroforestry pilots, training on good agricultural practices, and financial inclusion.
Lindt & Sprüngli farming program	Lindt & Sprüngli (Chocolate maker with 4% of global sales) Brands include Lindt	This programme operates in Ghana, Ecuador, Madagascar, Papua New Guinea and the Dominican Republic in partnership with Earthworm Foundation. It has four workstreams: • Traceability • Farmer training to improve yields, social and environmental aspects • Actions to improve living conditions (such as access to microfinance, good planting material, drinkable water, mosquito nets) • External assessment: independent audits evaluating the systems and farmers' practices

2.1.4 The Cocoa & Forests Initiative

In November 2017, the Governments of Côte d'Ivoire and Ghana, and the world's leading cocoa and chocolate companies signed an agreement to end deforestation and promote forest restoration and protection in the cocoa supply chain. They committed to converge their individual sustainability programs and to work together, beyond competition.

This partnership – called the **Cocoa & Forests Initiative** (CFI) – is facilitated by the World Cocoa Foundation, IDH – the Sustainable Trade Initiative, and The Prince of Wales' International Sustainability Unit, in partnership with the Governments of Côte d'Ivoire and Ghana.

Several global development partners have supported the CFI, which coordinates with a wide range of global and local environmental organisations and partnerships, including the German Initiative on Sustainable Cocoa, Partnerships for Forests, Proforest, Rainforest Alliance, Tropical Forest Alliance, World Resources Institute, World Agroforestry (ICRAF), and the World Wildlife Fund.

CFI activities have three priorities:

- **Forest protection and restoration:** the governments and companies have pledged no further conversion of forest land for cocoa production and have committed to the elimination of illegal cocoa production and sourcing in protected areas. Both countries are introducing a differentiated approach for improved management of forest reserves, based on the level of degradation of forests. In 2019, the Government of Côte d'Ivoire adopted and published a new forest code which, among other things, put forth policies for the promotion of cocoa agroforestry to restore degraded land, improve forest cover, and promote sustainable livelihoods and agriculture in the classified forests and rural zones.
- **Sustainable production and farmers' livelihoods:** both governments are updating their cocoa maps, including socio-economic data on cocoa farmers, and this is expected to inform private sector investments. To ensure effective implementation and monitoring of CFI commitments, companies have pledged to develop verifiable monitoring systems for traceability.
- **Community engagement and social inclusion:** this engagement has a particular focus on women and youths. The governments and companies have committed to full and effective consultation and participation of cocoa farmers in the design and implementation of key actions, and to promotion of community-based management models for forest protection and restoration.

The Frameworks for Action for Côte d'Ivoire and Ghana aim to define core commitments, verifiable actions and timebound targets (see Annex 2 for examples of actions). The Governments of Côte d'Ivoire and Ghana are supposed to establish national strategies, policy environments, and governance structures for CFI implementation. They have to ensure that the CFI is fully aligned with their national Reducing Emissions from Deforestation and Forest Degradation (REDD+) strategy and other relevant national strategies and plans. They are expected to provide key operational guidance, and baseline economic, environmental, and social data, to help companies identify and plan the most effective and efficient private investment activities for the CFI. For this reason, both Ghana (through Ghana Cocoa Board; COCOBOD) and Côte d'Ivoire (through the Conseil Café Cocoa) launched in 2020 their census and mapping of cocoa farmers.[10]

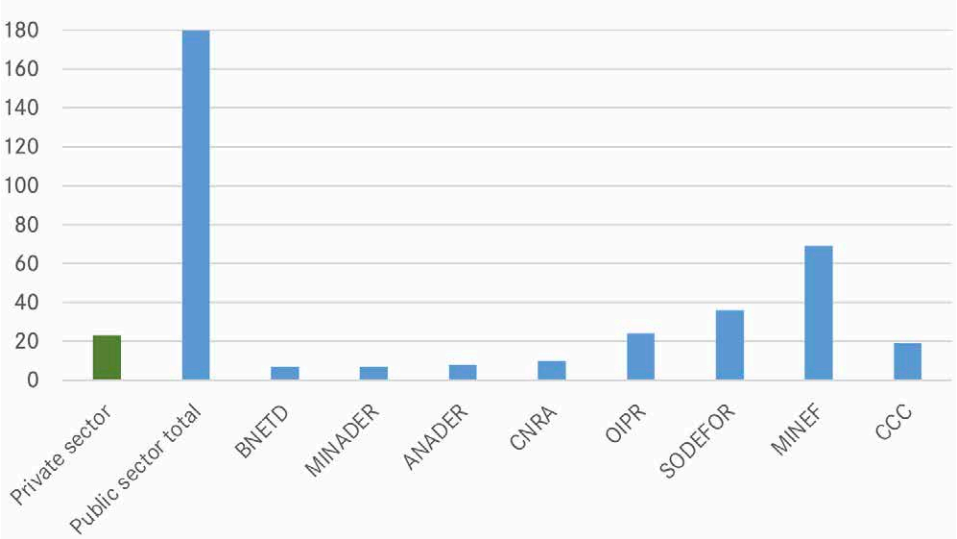
The 2018-2022 CFI Action Plan for Côte d'Ivoire (see Annex 2) shares themes with the corporate sustainability programmes. However, the CFI multistakeholder platform allows for work beyond a single company's scope. Indeed, many of the actions planned are targeting legal and political levels. This is particularly the case for deforestation and traceability measures. Examples include action to update national parks boundaries, clarify the legal status of forests and establish a national, standardised traceability system. Without the collaboration of Ivorian Government, such objectives could not be considered. However, as Figure 5 shows, the public sector is responsible for more than 180 actions, whereas the private sector is only accountable for 20.

With this imbalance, effective public sector reform will be needed to create an enabling framework for sustainability actions by the private sector in Côte d'Ivoire. This is because many laws, and their implementation, remain unclear and this can slow down sustainability approaches. For example (Sanial 2018), who owns the tree? How can a farmer sell timber? What are classified agroforests?

[10] World Cocoa Foundation website: www.worldcocoafoundation.org

Meanwhile, cooperation between the private companies participating in the CFI remains insignificant. The CFI is more about the alignment of corporate sustainability programmes than true cooperation. Indeed, transparency commitments and synergies are limited by competition among companies, especially as their sustainability programmes are the most important way to differentiate themselves from one another.

Figure 5. Numbers of actions entrusted to each stakeholder under the CFI 2018-2022 Action Plan for Côte d'Ivoire



BNETD - National technical and development office; MINADER - Ministry of agriculture and rural development; ANADER - National rural development support agency; CNRA - National centre for agricultural research; OIPR - National office for parks and reserves; SODEFOR - Forest development agency; MINEF - Ministry of Water and Forests; CCC - Coffee Cocoa Board

2.1.5 National child labour policy (Côte d'Ivoire)

Between 2015 and 2017, the government of Côte d'Ivoire prepared a National Action Plan to prevent child labour. This action plan formulation had five main steps:

- Studies and research.
- Strengthening of the legal framework to prevent, regulate and punish actions linked to child labour.
- Adoption of National Action Plan and national policy for child protection.
- Consolidation of database system – called Système d'Observation et Suivi du Travail des Enfants en Côte d'Ivoire (SOSTECI) – to observe and monitor child labour in the country. The system was launched in seven departments of the country in 2013. It was later extended to two more departments with financial support from UNICEF. Under the Action Plan, the system will be extended progressively to the whole of the country.
- Establishment of a national institutional framework: Two committees[11] are in charge of monitoring the implementation of governmental policies, validating national programmes, and coordinating actions. This centralised framework is relayed enacted by local committees at villages and prefectures level.

[11] Comité interministériel de lutte contre la traite, l'exploitation et le travail des enfants (CIM) and Comité National de Surveillance des Actions de lutte contre la traite l'exploitation et le travail des enfants (CNS).

2.1.6 The Abidjan Declaration signed by Ghana and Côte d'Ivoire, and the 'Living Income Differential'

On 26 March 2018, the Presidents of Ghana and Côte d'Ivoire signed an agreement on cocoa sales – the Abidjan Declaration (*Déclaration d'Abidjan*) on Facing the Challenges of the Cocoa Economy.[12] Among other things, the two countries agreed to:

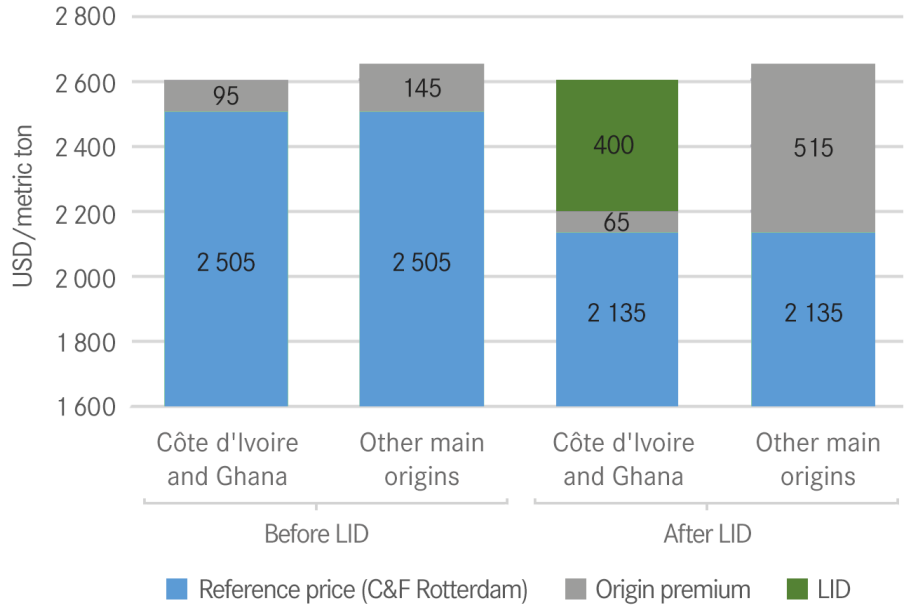
- Harmonise their cocoa marketing policies.
- Jointly announce, before the start of the new harvesting season each year, the price to be paid to producers (farm gate price).
- Intensify their collaboration on scientific research on cocoa plant protection and variety improvement.
- Establish a regional programme to address the Cocoa Swollen Shoot Virus.

Ghana and Côte d'Ivoire also invited private sector to invest heavily in cocoa processing in Africa. And they declared their intention to jointly promote domestic cocoa consumption.

In June 2019, the two countries suspended cocoa sales for the 2020-2021 harvesting season in order to set a Living Income Differential, or LID (In French, Différentiel de revenu décent; DRD). The LID is a premium that buyers must pay per ton of cocoa beans. It aims to increase farmer incomes and strengthen the position of the cocoa-producing countries in international trade. Ghana and Côte d'Ivoire set the LID at 400 USD/ton and the floor price at 2600 USD /ton C&F[13]. The objective is to allocate 70% of the floor price to producers[14]. OLAM was the first company to buy cocoa under these conditions.

This bilateral initiative is leading the international market price of cocoa to decrease and the spread of price between beans from Côte d'Ivoire/Ghana beans and beans from other places to widen. In other words, the international market is progressively adjusting to the LID, providing an identical differential in other regions with a lower reference price (Figure 6).

Figure 6. Adaptation of the international cocoa market to the Living Income DIfferential (LID) of Côte d'Ivoire/Ghana (Indicative market prices and premiums after and before the launch of the LID for an effective price around 2600 USD/metric ton)



[12] http://www.gouv.ci/doc/1522158093Declaration-d-Abidjan-Cote-d-Ivoire-Ghana.pdf

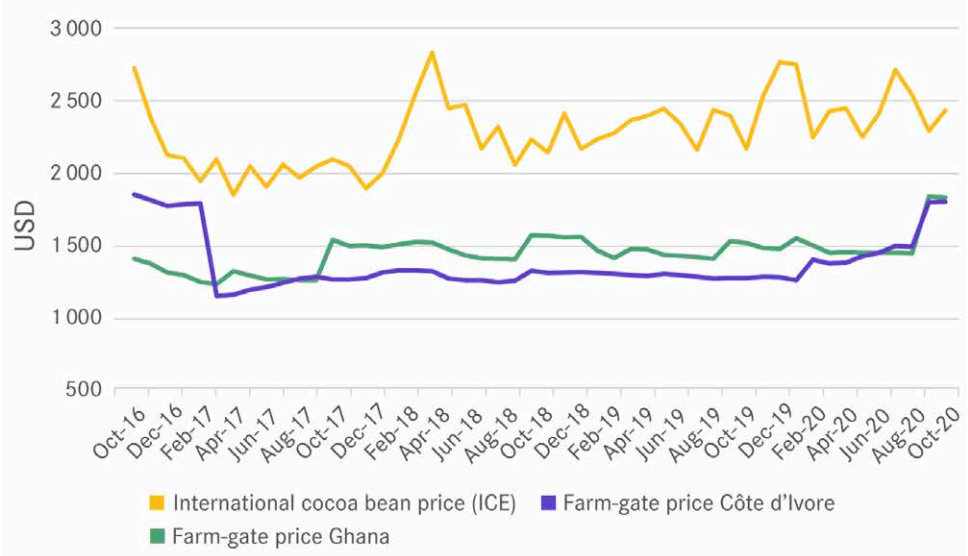
[13] Value including all Cost & Freight (C&F)

[14] https://www.rfi.fr/fr/afrique/20190618-infographie-comprendre-crise-cocoa-ghana-cote-ivoire

The main impact of the LID is an effective decrease of the tax base for the export duties paid in Côte d'Ivoire and Ghana on cocoa exports. Taking 400 USD/MT off the tax base allows an increase of farm-gate price by 50–100 USD/MT (27.5–55 FCFA/kg at current exchange rates).

As Figure 7 shows, the gap between the minimum farm-gate price in Ghana and Côte d'Ivoire and the international market price of cocoa beans (ICE Futures market in New York) narrowed considerably since the start of the 2019/2020 season. This is mostly linked to efforts by regulatory agencies in both Côte d'Ivoire and Ghana to force international prices to stabilise at 2600 USD/MT (efforts that are not yet succeeding). However, we estimate that around 100 USD/MT in Côte d'Ivoire and 50 USD/MT in Ghana (where taxes on cocoa beans are lower) is directly a consequence of the LID implementation through a decrease of export taxes.

Figure 7. International and farm-gate prices (USD per metric ton) of cocoa beans in Côte d'Ivoire and Ghana, October 2016 – October 2020. Source: Official data processed by Nitidae



2.1.7 Policies in cocoa-consuming countries: France's national strategy to halt imported deforestation

The European Union is responsible for about 10% of global deforestation through the consumption of internationally traded agricultural products (EC, 2019) . In November 2018, the French Government adopted a national strategy to halt the importation of forest or agricultural products contributing to deforestation. This strategy is called the SNDI (*Stratégie nationale de lute contre la deforestation importée*). Five other EU member states and Norway have made the same commitment.

A consultative body is in charge of developing and following the progress of the national strategy. The wide range of actors participating includes NGOs, professional organisations, private sector representatives, experts, research centres. The strategy's scope is 2018–2030 and it targets five commodities: soy beans, palm oil, beef, cocoa and rubber. The strategy's definition of "forest" is the one used by the Food and Agriculture Organization of the United Nations (FAO); that is, land with tree crown cover of more than 10% and area of at least 0.5 hectares.

The SNDI has defined several objectives and levers of action:

- International cooperation with exporting countries, and mapping of risks, taking into account the development needs of producing countries. A strategy will be developed for each country from at institutional and operational levels. The operational side will include tools such as: sustainable 'zero-deforestation' territory contracts, multistakeholder partnerships to articulate supply-chain approaches and territorial approaches, and initiation of 'payment for environmental services' programmes.
- Integrate zero-deforestation scope into public policies.
- Integrate deforestation issues into the European Union's trade agreements.
- Coordinate stakeholders action (European, national, companies, civil society).
- Increase the ambition of existing certification standards or develop its own standard.

Regarding cocoa specifically, the SNDI's scientific and technical committee (CST) is discussing the options presented in Table 5.

Table 5. Options for halting imports of cocoa that has contributed to deforestation, as discussed by the scientific and technical committee of France's national strategy to halt imported deforestation

Option	Issues
Improve existing certification labels	• Certification covers less than 15% of the market, whereas SNDI requires 100% of the market to be covered. • The dominant approach – mass balance traceability – is very difficult to reform yet SNDI requires 'identity preserved' traceability. • Limited impact of certification on deforestation trends.
Bilateral trade agreements with producing countries	• 100% of the market covered. • The issue of legal deforestation; in some countries, some forms of deforestation are legal (for example, deforestation of 'rural domain' lands in Côte d'Ivoire, or 'non-permanent domain' lands in Cameroon). • Risks of low acceptability, technical constraints.
Create a new standard	• Risk of multiplying certification initiatives and standards. • Risk of targeting only niche markets, as a standard cannot be made compulsory for all companies in a given supply chain.
Avoid high deforestation risk area	• Useless to halt deforestation because focusing on in areas with low deforestation risk (in which deforestation already occurred in the past) does not impact areas with high deforestation risk.
Certify zero-deforestation territory	• Risk of niche market. • Very costly.

2.1.8 Public-private partnerships: the example of classified agroforests

In 2019, the Government of Côte d'Ivoire decided to reform the status of some classified forests.[15] These forests had been massively encroached by cocoa fields. According to some estimates, almost 40% of Ivorian cocoa is illegally produced in these classified forests (Higonnet et al., 2017). The forest code was therefore reformed to introduce a new category: agroforests. Although the government has not provided all of the details, some characteristics of these future classified agroforests are known:

- The reclassification of classified forest as (classified) agroforests is possible only for the most degraded forests (degradation rate > 75%).
- The forest can be managed by a single or several private actors (often cocoa companies or partnerships between cocoa and timber companies). The company/companies sign a public-private partnership agreement with the forest administration and lease the forest as a concession.
- The private company must ensure that cocoa production covers no more than 20% of the overall forest area, and that the cocoa is sustainably produced through agroforestry practices.

Among the aspects that remain unclear are:

- The status of farmers already settled in the classified forest (independent or under the authority of the forest administration/private concession-holder?).
- The terms of the contracts.
- The conditions for timber exploitation (within cocoa fields and in the forest).

Some companies have already started negotiating concessions with the Ivorian state. Barry Callebaut and Inprobois are interested by Arrah forest, Olam is interested in Rapid Grah and Haute Dodo forests, and a rubber company called SIAT is interested in Goin Débé forest.

This public-private partnership approach is ambitious. It aims to:

- Formalise the situation of thousands of illegal cocoa farmers.
- Identify and establish productive agroforestry systems.
- Legalise cocoa and timber production.
- Test forest management by big private companies, initially not involved in forestry activity for the most part.

But this approach also poses risks to human rights. To ensure cocoa occupies no more than 20% of the total forest area, concession holders are likely to evict some farmers. It can also be seen as a form of land-grabbing, as the private concession-holder will have rights to land previously cultivated by smallholders.

2.1.9 Landscape/jurisdictional approaches: a trend that may inspire the cocoa sector

Landscape or jurisdictional approaches are also shaping current debates about sustainability. Although they are not fully implemented in cocoa sector yet, sustainable cocoa stakeholders could adopt them in the future. Indeed, ISEAL Alliance, the think tank of certification standards, is promoting such approaches. Landscape or jurisdictional approaches are also supported by the Alliance for the Preservation of Forests, an organisation gathering, among others, some companies involved in the cocoa sector.

Pacheco et al., (2017) described a jurisdictional approach as follows:

> "A type of integrated landscape management with an important distinguishing feature: the landscape is defined by policy-relevant boundaries and the underlying strategy is designed to achieve a high level of governmental involvement".

[15] Décret 2019-979 du 27 novembre 2019 portant modalités de l'aménagement des Agroforêts, d'exploitation des plantations agricoles et de commercialisation des produits agricoles dans les Agroforêts.

Such approaches emerged following the realisation that most sustainability challenges result from overlapping drivers operating at scales that exceed the ability of individual actors. Landscape or jurisdictional approaches aim to align interests and coordinate actions among governments, companies, local communities and NGOs regarding conservation, supply chain sustainability and green development objectives. It aims at promoting land use planning in production and protection zones through geographically tailored political interventions, market incentives and, often, climate finance.

The emergence of such approaches can be explained in relation to different stakeholders' interests (Pacheco et al., 2017):

- Certification bodies are looking for ways to scale up the uptake of sustainability standards.
- Companies are looking to trace their supply from smallholders in more cost-effective ways.
- Investors are looking for production zones with comparatively lower risks.
- Governments are trying to improve the performance of public investments while attracting foreign investments and international cooperation.

It is notable that all of these motivations are deeply present in the Ivorian and Ghanaian cocoa sectors and address the challenges stakeholders meet in reaching sustainability. Jurisdictional approaches are an invitation to go beyond plot scales and beyond individual supply chains, to embrace the complexity of factors and consider that most significant sustainability issues have the potential to be addressed more effectively at a landscape or regional scale (WWF and ISEAL Alliance, 2019).

WWF and ISEAL (2019) defined the conditions for jurisdictional approaches success as follows:

- An engaged government actor that is driving or supporting the change process.
- An inclusive agreement by producers, local communities, sourcing companies, NGOs and government to work together on an action plan with progress indicators and long-term targets (10-15 years).
- The ability of participating stakeholders to institutionalise that commitment within a long-term policy or regulatory framework.
- A legal entity responsible for coordinating implementation.
- Broadly agreed performance metrics with locally adapted targets.
- An effective and transparent monitoring system to measure progress from established baselines.
- Accountability or remediation processes for lack of progress or poor performance.
- An incentive structure and funding that supports improved performance at production unit and regional scales underpinned by company, government and finance sector investments and market benefits.

Touton/IDH/Ghana Cocoa Board partnership: an example of a jurisdictional approach in Ghana

Declining production due to the impacts of climate change on ageing cocoa fields in Ghana has driven trading company Touton to engage in a landscape approach in the Bia West and Juabeso districts in Western Ghana. The approach sees Touton working closely with the Ghana Cocoa Board and other government bodies to establish a landscape forest governance framework, find solutions to land tenure challenges and develop a Climate-Smart Cocoa standard. The company intends to report to its partners on sustainability outcomes at the landscape scale using the standard in the coming years, while simultaneously contributing to the government's efforts to meet its REDD+ commitments. The approach seeks to mitigate risks regarding future supply and provides a platform to work in partnership with the government.

2.2. Summary of sustainability paradigms and their evolution: from plot to landscape towards more public sector inclusion

Table 6 summarises the characteristics of each of the sustainability paradigms described in Part 2.1. It is notable that there has been no initiative carried out by, or involving, consumers. However, consumers also have strong views. For example, in a survey of 7,000 consumers used to inform the creation of the brand *"C'est qui le patron?!"*, the two aspects respondents mentioned most often were the price paid to producers and the fight against deforestation.

Table 6. Main features of sustainability paradigms in the cocoa sector

Name	Stakeholders involved	Scale	Lever of action	Incentive
Certification of cocoa production	NGOs funded by private sector	Plot Farm Cooperative	Definition of sustainability standards, control and label	Premium for farmers Brand recognition for companies
Corporate programmes	Cocoa buyers and manufacturers	Farm Cooperative	Training of farmers (production practices/ farm management), access to microfinance, ad hoc projects	Projects for farmers Brand recognition for companies
Multistakeholder platform (Cocoa & Forests Initiative)	Cocoa value chain Governments	National (Côte d'Ivoire and Ghana)	Multistakeholder dialogue, coherence between private sector initiatives and legal framework	Coordinated initiatives – common reporting indicators
Producer country policies (classified agroforests, child labour, policy, Living Income Differential)	Governments	National/Regional	Clarified and enabling legal framework for sustainability	Law
Consumer market policies (French strategy against imported deforestation (SNDI), EU action against imported deforestation)	Governments	National /EU	Setting sustainability conditions to have access to the market	Market regulation (tax, outlet)
Landscape approaches	All sector stakeholders at a landscape scale	Landscape (territory or jurisdiction)	Working beyond one supply chain to address the complexity of factors affecting sustainability	Geographically tailored action, holistic approach, financially attractive

The preceding benchmarking of sustainability initiatives in Côte d'Ivoire and Ghana in recent decades reveals an evolution of the paradigms shaping efforts to transform the cocoa sector (see Figure 8). Certification standards (UTZ, Rainforest Alliance and Fairtrade) have, for instance, been criticised for the following reasons:

- **Low requirements:** for example, the UTZ standard on agroforestry required 12 trees per hectares. Many plantations could fulfil this requirement without introducing any new trees, and tree density alone is itself not an indicator of biodiversity (Sanial, 2019b).
- **Untrustworthy cooperatives:** the value chain includes thousands of smallholders. As certification cannot deal with each individual farmer, it must rely on cooperatives. Recent research in Côte d'Ivoire (Ruf et al., 2020) showed that most cooperatives are in fact created by individual former cocoa buyers and lack democratic governance. This lack of transparency leads to many dishonest practices in the distribution of premiums, the origin of beans, traceability and compliance with certification requirements (Ruf et al., 2020).
- **The failure of certification to stop deforestation:** some investigations have shown that cocoa illegally produced in classified forests had been certified by UTZ or Rainforest Alliance (Varlet, 2013). This is due to difficulties in tracing beans from the plot and in finding trustworthy cooperatives in areas of high deforestation risk (such as the extreme west of Côte d'Ivoire).
- **Top-down approaches:** these fail to take into account farmers' preferences and needs, and result in low adoption of certification requirements. For example, the trees distributed in large numbers by cooperatives are rarely preserved by farmers. This is because of the choice of species, the weeding practices of farms and ignorance of work practices.[16]
- **Reduced market demand:** as most certified cocoa is sold declassified, it is apparent that there is no great market demand, even for the least demanding labels. Massive certification as an economic lever to reach sustainability appears to be a lost cause.
- **Greenwashing:** some researchers conclude that mass certification is a greenwashing initiative that mainly ensures cocoa supplies for private companies, as the good agricultural practices taught by certification (such as sanitary harvest, phytosanitary product application) are focused on increasing productivity (Lemeilleur et al., 2015).

Aware of such critiques, and probably also to have better control, companies have started to internalise sustainability by launching their own programmes alongside using certification (Figure 8). These programmes are also adopting a top-down approach to sustainability (for example, through mass distribution of shade trees[17], or training farmers on yield intensification). These programmes are also a way to create customer loyalty and instil dependency in cooperatives so as to deter them from side-selling. However, many cooperatives continue selling to multiple partners.

These programmes are often ambitious (up to over 100 000 farmers can be targeted) and expensive, but they cannot cover of all the producers with which a company works. For example, only 43% of Mondelez International chocolate is produced by farmers participating in the company's Cocoa Life programme.[18] The programmes undertaken by companies result in a scattering of various projects that affect cocoa farmers' communities differently. These programmes are unable to create a wide enabling framework for sustainability as many of the problems to be addressed take root in a wider context than cocoa one.

[16] Trainings are provided with farm owners whereas work is often undertaken by tenants. They usually cut down trees distributed by the certified cooperatives because they have not received training on agroforestry and are not aware of the distribution of trees. This also reveals a lack of interest from the farm owners who are not passing the information on to tenant farmers (Sanial, 2019a; Uribe Leitz and Ruf, 2019)

[17] For example, the Cocoa Horizon programme distributed 1 459 966 shade trees

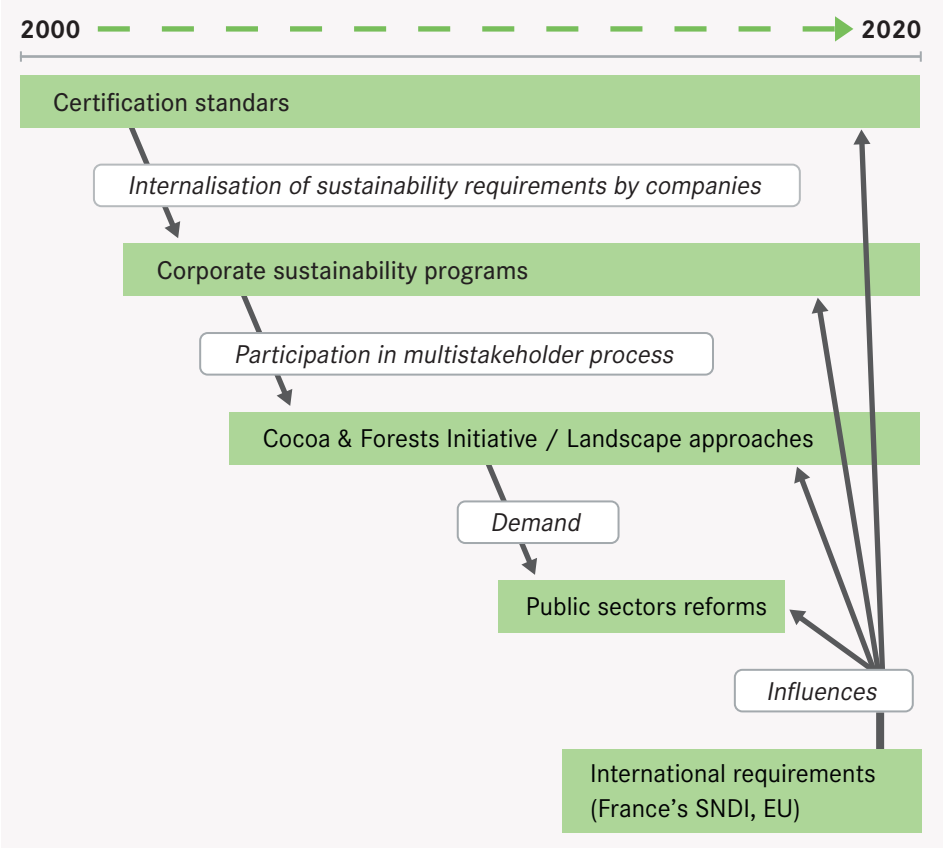
[18] Source: Cocoa Life website

To stop the multiplication of costly and unequal private initiatives, a new paradigm for cocoa sustainability appeared with the Cocoa & Forests Initiative (CFI). Once again, certification and corporate sustainability programmes continued alongside this new initiative (Figure 8). The CFI has potential to encourage the Ivorian and Ghanaian states to face up to their responsibilities, and to reform or clarify their forest laws in order to enable sustainability initiatives. Two analyses of this paradigm can be made:

- First, that the demand for public action and reform is a prerequisite for private sector to go further in sustainability.
- Second, that the focus on public action can be interpretated as a way for private sector to disengage from its responsibilities for unsustainable cocoa production.

CFI participants who Nitidae met during fieldwork explained that the initiative's transaction costs are very high, the multistakeholder consultation process is long, and there is still limited cooperation among companies (in areas such as data sharing or a common sustainability approach).

Figure 8. The evolution of cocoa sustainability paradigms since 2000



In parallel to the CFI, several innovations are emerging:

- Landscape approaches are feeding the transformation of sustainability paradigms. In the West African cocoa sector, the CFI is a first step towards such approaches, as it initiates dialogue among public and private actors.
- International requirements on the producers' side (the Abidjan Declaration) or consumers' side (France's SNDI) will also encourage the private sector or states to adopt more sustainable practices.

However, the risk of such broad approaches (CFI, and national and international policies) is to have very low requirements to ensure acceptability and ease of implementation. For example, the ISO standards are very vague on farming practices, and existing corporate programmes or certification standards already comply with these ISO standards, without needing any further actions toward sustainability. For this reason, these approaches have limited potential to lead to transformative change.

Despite some differences among the sustainability paradigms described above, some commonalities exist in how they define and promote sustainability. According to these paradigms, sustainability will be reached by improving farmers yields which, in turn, will improve their incomes. The rationale is that this will make farmers less dependent on forests and reduce their need to have children working for them. This is questionable, as improved yields could lower cocoa prices, or could make cocoa farming more attractive and lead to more deforestation. However, these assumptions also align with companies' growth objectives.

Indeed, such companies need to increase their cocoa volumes for their core business. For this reason, they select farmers' training practices that can achieve this objective. These training practices can then be justified in a sustainability theory of change. Some authors even conclude that corporate sustainability programmes are in fact hidden productivist strategies aimed at increasing/securing cocoa supplies (Lemeilleur et al. 2015).

Current sustainability approaches are very top-down; they do not include true participation by farmers. They set external standards, rigid baselines for deforestation, and agroforestry system definitions and designs. Some criteria are even not defined at all. Because of these common features and theories of change, these approaches face the same challenges.

3. Technical challenges to reducing deforestation

Developing a sustainable and transparent cocoa value chain requires a recognised, reliable, consistent and robust system for measuring and monitoring cocoa production areas and plots. To date, there is no such system available. The following sections cover three key issues:

- Traceability must begin from producers' plots and not from the first-buyer level, as it is in all current traceability systems apart from the Organic one.
- Plots must be geolocated and deforestation must be monitored.
- To ensure that cocoa beans come from an agroforestry system that respects certain standards (such as tree density or shade cover), reforestation must also be monitored (see Annex 1 for a comparison of agroforestry definitions).

3.1. Traceability to producer level

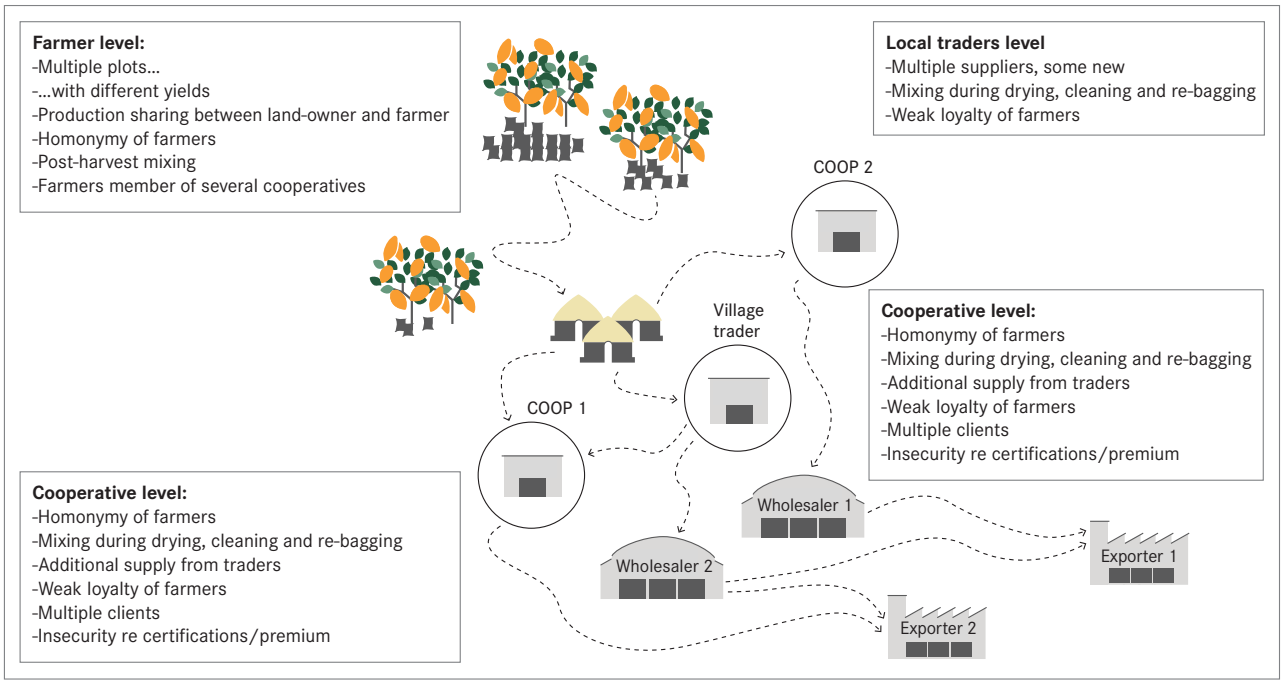
There are many challenges to the implementation of a producer-level traceability system:

- **Multiple plots:** most farmers have several cocoa plots, some old (>20 years) in areas deforested long ago, others more recent, planted in fallow or in forest areas. As farmers are made aware of companies' sustainability objectives, they will likely register production from the youngest plots as having come from the older/legal ones. Therefore, most of the cocoa from recently deforested areas could be marketed as cocoa sourced from older plantations. Also, as many plantations were planted over several years and include trees with very different yields, it is difficult for auditors to estimate the exact yield of a plantation and very easy for farmers to over-report production from older plots.
- **Sharecropping:** many cocoa plots are not managed by the landowner but by a sharecropper, often a former migrant worker. This is why cocoa from one single plot can be sold by several people. One sharecropper can also manage plots owned by several different people, or a landowner can have several sharecroppers working in several plots he or she owns. It is challenging to link the production from one plot to one person.
- **Identification:** within a village or community in Côte d'Ivoire, it is common for people to have the same names. This makes it difficult to clearly identify individuals. Also, many farmers do not have identity documents. Other farmers have several identification documents with different ID numbers and even dates of birth. This also makes it difficult to identify individual farmers.
- **Post-harvest mixing:** the cocoa beans are fermented in the plantation then brought to the farmer's house where they are cleaned and dried before being bagged in the official jute bags (often beans are even bagged at the cooperative warehouse when farmers bring their production). During this process, it is very easy for a farmer to mix beans from several plots. In some cases, this is done to achieve the required quality mix.
- **Multiple buyers:** very few farmers deliver all of their production to their cooperative. As most cooperatives depend on funding from traders they work with, they are not able to pay for beans during the whole season. In addition, as the quantity of beans that will be sold as certified is always unknown (and varies from year to year), farmers are not encouraged to deliver all their production to their cooperative as they will receive a premium only for a part of the quantity they deliver. If alternative buyers/middlemen come to a farmer while the cooperative is lacking funds with which to buy beans, the farmer will sell to the buyer that has immediate cash available.

- **Multiple cooperatives:** many farmers are registered as members of several cooperatives. Most cooperatives are not the result of a process of self-organisation with a strong sense of belonging from their members. Rather, they are initiatives of traders and local leaders aiming to capture the benefits of certification and sustainability programmes. Farmers wish to take advantage of premium payments and social services, so they tend to try to access benefits through multiple cooperatives. Certification organisations confirmed that when they cross-reference data from different international traders, they find many (10–20% of the total) plots double-registered by several trading companies through several cooperatives. The same happens with farmers, but the fact that many farmers share the same names makes it harder to check for double registrations.
- **Downstream mixing:** cocoa beans are often mixed again at the cooperative, local trader, wholesaler, exporter or processor level depending on the quality of the batches of beans received, the state of the packaging and the clients' requirements. Cleaning, sorting and/or re-bagging are steps during which bean mixing helps homogenise or improve quality, compensate weight losses and segregate distinct qualities. Such mixing to provide a standardised product is central to the cocoa trade.
- **Lack of loyalty from suppliers:** building sustainable trade relations is a complex and long-term process for cooperatives, traders, exporters and processors. Big changes in market prices between major and minor marketing seasons, variability of yields/production by region, issues with quality, timing of delivery or funding use can impede suppliers from fulfilling their commitments. To meet their contractual obligations, exporters and processors are often forced to complete their procurement with new, opportunistic suppliers. In this process, beans with unknown supply information will be integrated into their supply chain. When international prices are high, exporters and processors compete to increase their procurement and exceed their objectives. The same happens, even with steady prices, if procurement targets are not reached fast enough due to the inaccessibility of some production areas, lower harvests or smuggling to neighbouring countries. In this context, even the most ambitious trading and grinding companies cannot expect to source more than 80% of their cocoa through direct procurement with long-term/well-known suppliers.
- **Diversity of clients:** even if more and more chocolate manufacturers want certified or/and traceable cocoa products, other manufacturers will always look for the cheapest product or for the best price/quality balance without paying for a traceable/sustainable/certified product. Many traders and chocolate manufacturers also tend to diversify their offer, proposing several brands/categories of products, some with high levels of requirement and others with the lowest price possible. Due to the diversity of clients and final customers, most trading companies combine sustainability commitments with an opportunistic/aggressive procurement approach to be able to answer all their clients' requests. No major trading company has committed so far to 100% direct procurement and certified supply chain.

Figure 9 summarises the various issues that limit supply chain traceability in the absence of strong public regulation and a complete change in market structure.

Figure 9. The limits of traceability. Source: Nitidae



3.2. Monitoring land use and deforestation

Initiatives monitoring forest change have been emerging in Côte d'Ivoire in relation to deforestation policies, such as REDD+, sustainable value chain development, and so on. These initiatives range from pilot or local proof-of-concept approaches to national, fully-operational systems. They include the National Land Monitoring System (NLMS[19]), public-sector oriented solutions (such as Global Forest Watch[20] and IMAGES[21]), and private-sector oriented solutions (such as Starling[22], Econometrica[23], MapHubs[24] and Satelligence[25]). We provide a brief overview of the three leading systems in Côte d'Ivoire: an official nationwide reporting system (NLMS) and two systems that are in the process of scaling-up (IMAGES, Starling). While these systems are promising, several limitations and technical challenges related to forest monitoring and cocoa production tracking remain.

[19] http://www.geoportailsst.com/

[20] https://earthenginepartners.appspot.com/science-2013-global-forest

[21] https://www.vivideconomics.com/images/

[22] https://www.starling-verification.com/

[23] https://ecometrica.com/space/forests2020

[24] https://www.maphubs.com/

[25] https://satelligence.com/

Forest monitoring systems include a regularly updated reference land cover map and deforestation alerts. The reference land cover map for Côte d'Ivoire was produced using Sentinel 2 satellite images acquired in 2016 (BNEDT, 2016). Other global land cover maps exist for various time periods or years (For example, European Space Agency Climate Change Initiative annual land cover map) but with undocumented level of accuracy at the country level and no matching national land typology and definitions (national land classification system). Indeed, deforestation should be reported based on official national definitions. In Côte d'Ivoire, "forest" was defined by law in the forest code recently as:

> "Any land, with a minimum area of 0.1 ha in one piece, comprising forest trees whose canopy covers at least 30% of the surface and which reach a minimum height of 5 metres at maturity, constituting a dynamic and heterogeneous environment, exerting a direct or indirect effect on the soil, climate and water regime."[26]

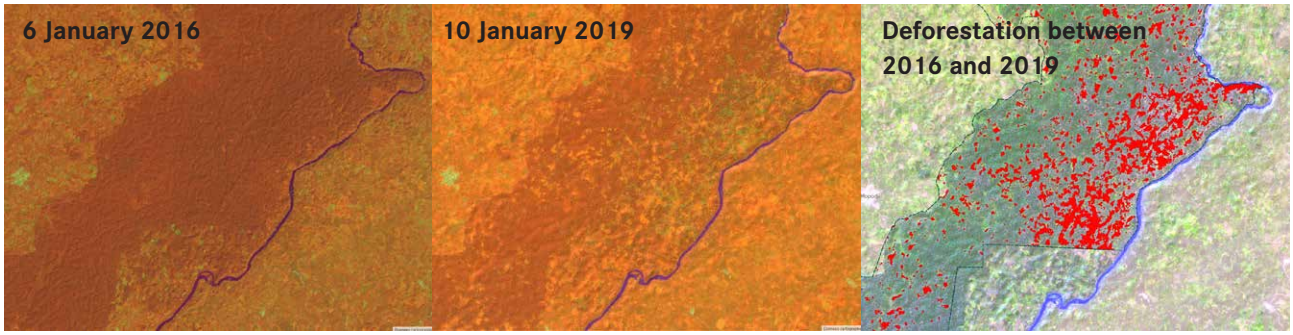
Considering such a small extent of land to be forest may impede consistent detection of deforestation, as that area represents around one pixel of Landsat imagery (~30m resolution) that is typically used for deforestation monitoring (for example, by Global Forest Watch). Tree cover is also an issue when using remote sensing, as the signal recorded does not exactly represent tree cover as measured in the field but biophysical conditions at pixel level that are related to vegetation cover (trees and other plants). Thus, it is difficult to differentiate degraded forest from agroforestry, or cocoa agroforestry systems from other agroforestry crops, unless a spatial pattern (such as alleys cropping plantations, very large trees with shadows in intercropping alleys) is observed visually.

We are also limited in our ability to detect understorey vegetation such as traditional cocoa systems or young understorey illegal plantation in protected areas and classified forests. Some advanced remote sensing techniques are able to detect forest perturbations which may be related to forest structure change related to understorey cocoa plantation but there is currently no operational and validated system in Côte d'Ivoire or Ghana.

Another shortcoming in detecting forest conversion to cocoa is that it is difficult to tell whether forest was cleared specifically to grow cocoa, or whether cocoa is grown on land that had already been deforested, either naturally or intentionally. While deforestation early-warning systems use time-series analysis of vegetation cover, they do not provide information on the cause of deforestation. Forest or tree loss detected could be due to various causes, such as logging, wildfire, urbanisation, pests, natural disasters, that also decrease vegetation cover. This is particularly the case for remnant natural forest in classified forests or natural reserves where both selective logging and cocoa plantations settlements occur (Figure 10).

[26] Law 2019/675 of 23 July 2019 on the "Forest Code"

Figure 10. Illustration of the challenge of attributing deforestation to cocoa production, using the example of the National Reserve of Maby Yaya. The red areas (image on right) indicate the loss of trees between 6 January 2016 (image on left) and 10 January 2019 (image in centre). Selective logging and illegal cocoa plantation both occurred but their contributions to tree loss cannot be differentiated. Source: Nitidae



Based on these limitations, none of the current systems allows robust and consistent annual monitoring of deforestation caused by cocoa production. Global monitoring systems can nevertheless be used as an efficient way to target investigations or have a quick overview of trends and risks of deforestation.

Earth observation technologies are rapidly evolving, so it might be possible for them to overcome these limitations in the short term. For instance, the Norwegian Government is working with Kongsberg Satellite Services (KSAT) and its partners Airbus and Planet to provide free satellite imagery to monitor deforestation at unprecedented scale, frequency (updated monthly) and resolution.[27] This will contribute to the development of operational tools. Nonetheless, new spatial products would need to May set a baseline and common framework for the cocoa sector. This should include:

- **Producing a reference land-cover map** for the chosen baseline year. This map should include different forest types (at least level 2 of the national land classification system) for the chosen baseline year.
- **Developing a reference cocoa map** based on a large inventory of cocoa plots developed through extensive collection of ground information by private companies and NGOs. Geospatial machine learning can generate high quality maps but this requires large amounts of ground data to calibrate the models. A first cocoa map for the year 2019, produced by the European Commission's Joint Research Centre,[28] could provide a first reference map. Vivid Economics also produced a cocoa map (a land cover map including cocoa as a category) but the methodology (reference year, source of ground data on cocoa plots, accuracy) is not yet public.[29]
- **Producing high-resolution annual land cover maps from now on.** While challenging a few years ago, it is now possible to rapidly produce large-scale, high-resolution land cover maps with a satisfactory level of accuracy. This would make it easier to document deforestation as well as post-deforestation conversion.

One should also note that research is still required to test and develop new methodologies, in particular a) to improve understorey cocoa detection using multiple sensors including Lidar and b) to map drivers of deforestation, for example by using texture and pattern recognition and/or combining with other sources of information (such as fires occurrences).

[27] https://www.nicfi.no/current/new-satellite-images-to-allow-anyone-anywhere-to-monitor-tropical-deforestation

[28] Abu et al. (2020): Cocoa Map (44 804 KB) for Cote d'Ivoire and Ghana. PANGAEA, https://doi.org/10.1594/PANGAEA.917473

[29] https://www.mightyearth.org/cocoa-accountability

Table 7. Leading systems in Côte d'Ivoire for monitoring deforestation and forest degradation

System	Provider	Description	Features	Limits
National Forest Monitoring System (SNSF)	Government of Côte d'Ivoire (REDD+ Permanent Executive Secretariat)	System based on the annual land-use map produced by the BNETD/CIGN[30] using the 2016 Sentinel-2 images. This system is progressively fed by ongoing projects such as the National Forest and Wildlife Inventory. The monitoring frequency is not yet defined but expected to be at least every five years.	A recognised national system that centralises all activities related to forest monitoring. Data are accessible free of charge on the SNSF platform.[31]	System only partly implemented as it does not yet include deforestation alerts.
STARLING	Airbus Defence and Space, and the Earthworm Foundation	System combining large coverage capabilities with 1.5 m resolution of SPOT 6 and SPOT 7 satellites, which are complemented by other satellites, including RADAR such as Sentinel-1 and TerraSarX. Monitoring on demand.	Full system integrating reference land cover map and early warnings of deforestation on an interactive platform.	The system has been piloted in the Cavally classified forest with SODEFOR[32] but has not been used yet on a national scale available for a fee.
IMAGES	Vivid Economics	System based on the use of Sentinel-1 and Sentinel-2 images for the production of the reference map. Updated maps of land cover are expected every 2/3 years. The system includes processing of Sentinel-1 images to produce deforestation alerts every 12 days.	System made available to the Ivorian government. It includes an automatic alert process from an interface to reduce user intervention. A nationwide roll-out is underway (2020) with users trained. Access to the platform is upon request.[33]	The system is housed in the Ministry of Planning and Development but does not involve other ministries in charge of forests and agriculture (MINADER, MINEDD and MINEF[34]). Source code and methodology are meant to be public but are not yet available.

[30] Geographic and Digital Information Centre of Cote d'Ivoire

[31] www.geoportailsst.com

[32] Forest Development Agency

[33] https://images-beta.vivid-earth.com/login

[34] Ministry of Agriculture and Rural development, Ministry of Environment and Sustainable development, Ministry of Water and Forests

3.3. Monitoring reforestation

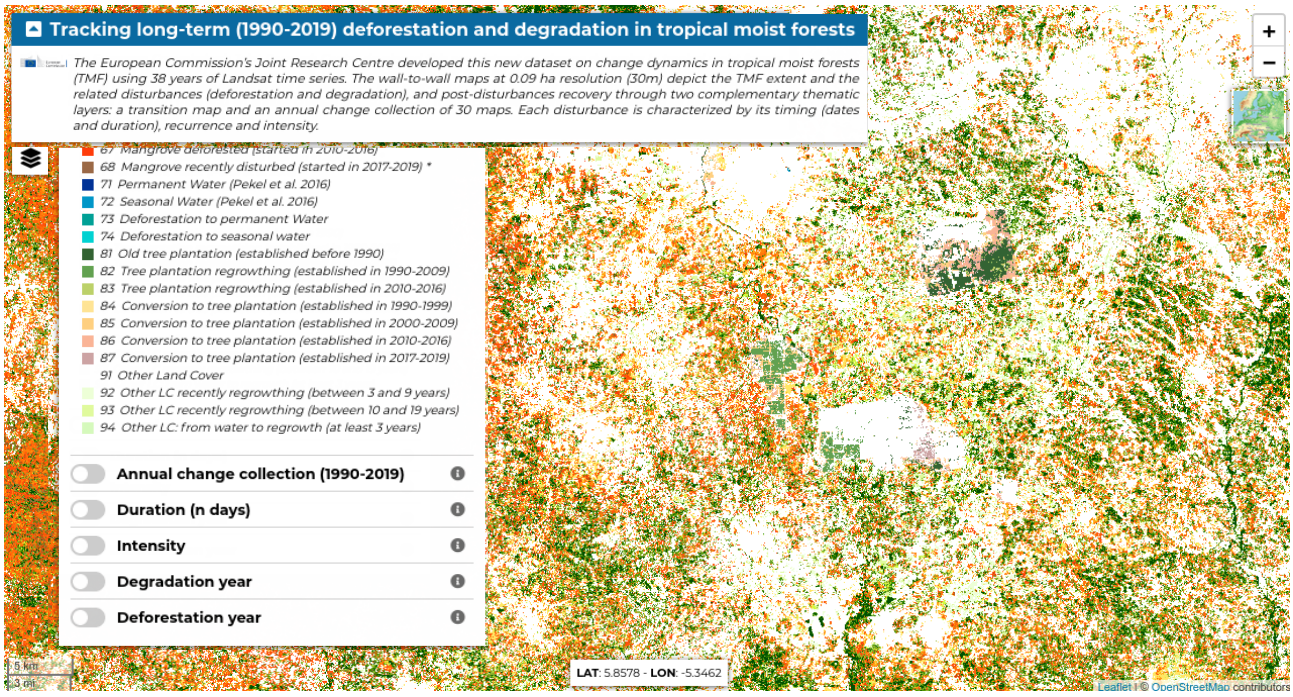
While efforts to detect deforestation have historically been driven by climate change policies such as the REDD+ mechanism, reforestation monitoring has been promoted by other recent international initiatives under the umbrella of sustainable land management. These include 'land degradation neutrality' targets, the '4 per 1000' initiative on enhancing soil carbon stocks, 'reduced impact logging' and the 'high carbon stock' approach. These initiatives all aim to increase productivity while maintaining or improving vegetation cover and biodiversity.

Reforestation monitoring techniques look similar to deforestation monitoring techniques but they have their specificities, as regeneration is a slow, gradual process with intra- and inter-annual dynamics, particularly in crop systems. Indeed, regeneration can cover multiple land management practices and natural processes, such as: crop-rotation systems including fallow land, secondary forest, tree planting, bush encroachment, increased soil productivity, and so on.

A first technical challenge to monitoring an increase of tree cover at stand level is the measurement technique. As mentioned above, there is a difference between tree cover, as measured on the ground, and vegetation cover, as measured by remote sensing. The latter may include vegetation other than trees. For instance, the "tree cover" product of the Hansen et al. (2013) Global Forest Change maps indicates values above 50% for what are, in fact, irrigated monoculture rice fields near Lake Aloatra, Madagascar.

The vegetation index of remote sensing systems is sensitive to chlorophyll concentration and can saturate. Technical innovations use a mix of optical and radar imagery to differentiate between tree structure and density. However, so far, this does not provide species information. As a result, ambiguity about the density of tree cover and type of vegetation can persist. These limitations of current global products can be overcome by developing ah-hoc spatial models (to monitor tree cover or above ground biomass).

Figure 11. Illustration of a system for monitoring forest cover, including tree recovery and regrowth. Source: https://forobs.jrc.ec.europa.eu/TMF



Free, frequent and very high-resolution images are a promising source of information for developing annual measurements of tree cover and monitoring potential increases. In arid to sub-humid areas, a recent study demonstrated that it was possible to map trees individually at unprecedented scale (Brandt et al., 2020).

For frequent (annual) regeneration monitoring, the development of a local (national) tree cover or carbon spatial model can be a solution. This enables the measurement of vegetation dynamics at a shorter time frame compared to trend analysis. Such models require calibration and validation data (forest inventory plots), based on national forest inventories and local project inventories (biomass or biodiversity evaluation by nongovernmental organisations).

In the short-term, the European Commission's Joint Research Centre's forthcoming map of forest cover change in tropical moist forests includes numerous tree cover and recovery categories, for various time periods (Figure 11). Such a method, with intervals of several years, can be useful to monitor tree recovery at plot scale (30 m). This global scale study should be assessed on the ground for cocoa systems, and potentially calibrated to the cocoa agrosforestry system in Côte d'Ivoire and Ghana.

Table 8. Remote sensing methods used to evaluate tree recovery or land regeneration

Method	Description	Advantages	Limits
Land cover change detection	An annual or frequent land cover map could theoretically provide sound information on regeneration processes (such as conversion from grassland to tree plantation).	Rapid estimation that address both monitoring deforestation and regeneration in one system.	Tree plantation or tree recovery are not detectable every year; ambiguity can be high in such land change categories.
Land properties change detection	This method relies on threshold or break analysis in biophysical measurements (such as normalised difference vegetation index; NDVI). Example includes "tree gain" in the Global Forest Change maps, and tree regeneration categories in the Joint Research Centre's map of forest cover change in tropical moist forests.[35]	This is a common yet very computing-intensive technique at high resolution. It can generate high-quality change detection. Vegetation gain or tree recovery is monitored over medium to long-term periods.	Land cover definition (% canopy cover, tree height) are difficult to use. Algorithms should be adapted to finely tune the parameters to limit confusions (caused, for instance, by tree loss, or crop-fallow systems).
Land productivity trend analysis	The trend of the biophysical information in the time series is reported. The decrease or increase of the trend is mapped with a certain level of certainty (confidence interval). This technique is used for global- to national-scale setting of targets and reporting of land degradation reduction. Further information can be found in Montfort et al. (2020).	Quick assessment of land productivity changes at large scale. The time period and level of confidence of change can be adjusted to account for significant change.	Existing solutions are based on middle resolution (250 m, 6-hectare pixels) for historical analysis. Other image sources such as Landsat or Sentinel may not be suitable due to the lack of sufficient and consistent measurement within the year. Ground-truthing is required to correctly document the change.
Carbon change detection	Similar to land cover change maps but with carbon maps. This accounts for quantitative change (tons/ha) and set up a threshold for conversion areas. A pilot study was conducted in Madagascar to assess forest degradation and regeneration.	The slow process of vegetation growth can be monitored every year with gradual change measurement (increase of biomass) provided that the model is accurate enough. The advantage of this solution is to link with other approaches such as High Carbon Stock or REDD+.	Requires developing a carbon model based on forest inventory plots.

[35] https://forobs.jrc.ec.europa.eu/TMF

4. Sustainability indicators at jurisdictional level

To address the shortcomings of previous initiatives described in Part 2.2, we propose monitoring sustainability at the territorial level, looking beyond only the cocoa value chain. For Côte d'Ivoire and Ghana, we recommend the regional level as a relevant jurisdictional scale. This is because of the limited power of departments/districts, and greater availability of data at the regional level.

LandScale[36] provides an assessment framework, with core and landscape-dependent requirements, for monitoring sustainability progress at the jurisdictional level. Nitidae suggests combining LandScale core requirements with complementary indicators (proposed by Nitidae) that are relevant to cocoa and the West African context. Table 9 presents this combined series of indicators. Annex 3 provides more detail on these indicators and corresponding databases.

Table 9. LandScale and Nitidae (in bold type) indicators for monitoring the evolution of sustainability at the territorial level

Protect and restore natural ecosystems	
Natural ecosystem protection	Total area of the landscape that is managed for long-term protection. Total area of each natural ecosystem type under protection. Percentage of area with protected areas with effective management.
Natural ecosystem conversion	Total area of natural ecosystems recently converted. Natural ecosystem conversion rate.
Natural ecosystem degradation	Total area of natural ecosystems in the landscape currently degraded. Natural ecosystem degradation rate.
Protect and restore biodiversity	
Threats to species	Changes in threats to threatened species (IUCN). Changes in threats to populations of indicator species.
Biodiversity habitat conversion	Area of natural ecosystem conversion within areas identified as important for biodiversity.

[36] https://www.landscale.org/wp-content/uploads/2020/03/LandScale-Assessment-Framework-V0.1.pdf

Improve standard of living, especially for vulnerable and/or marginalised groups	
Household income and assets	Percentage of population living below the local poverty line.
Health and nutrition	Percentage of children that are undernourished. Percentage of population without access to health services. Mortality rate of children under 18 years (averaged over the past five years). **Percentage of inhabitants with health insurance (CNPS/private insurance).** **Phytosanitary products application (quantity per hectare).** **Incidence rate of malaria and diarrhoea.**
Education	Percentage of school-aged children that are not attending school. **Percentage of children who are registered in a census.** **Adult illiteracy rate.** **Primary school mapping/matching to number of children.** **Average distance from home to the closest school (walking distance).**
Water sanitation and hygiene	Percentage of households without access to safe drinking water within a 15-minute walk from home. Percentage of households without a safely managed sanitation facility exclusive to the household.
Basic infrastructure	Percentage of households without electricity. Percentage of households where the roof, walls and/or floor are composed predominantly of rudimentary material. Percentage of households that use dung, wood, charcoal or coal as fuel for cooking or heating. **Average distance to a paved road.**
Respect, protect and fulfil human rights	
Child labour	Estimated number of child labourers in economic activities of interest.
Forced labour	Estimated number of forced labourers in economic activities of interest.
Recognise and protect rights to land and resources and reduce related conflicts	
Land tenure	Percentage of the landscape with formalised land tenure rights.
Land conflicts	Number of unresolved land and resource conflicts or grievances, and the area of land subject to such conflicts. Number of people (such as environmental and human rights defenders) subject to violence or receiving threats of violence as a result of conflicts over land and resources.

Promote transparency, participation, inclusion and coordination in land-use policy, planning and management	
Land-use plan adoption and enforcement	Quality and status of land-use and/or zoning plans. Percentage of landscape covered by land-use or zoning plans that are formally adopted/ enforceable.
Coordination of government agencies in land-use policy planning and management	Quality and status of government coordination on land-use policy, planning and management across sectors.
Stakeholder participation and inclusion in land-use policy, planning and management	Quality and status of stakeholder participation and inclusion in land-use policy, planning and management.
Promote regenerative agricultural, agroforestry and tree production systems	
Agricultural, agroforestry and tree plantation productivity	Average **annual** crop productivity (yield/ha), disaggregated by crop. **Average perennial crop productivity (yield/ha) disaggregated by crop and age class over.** Average forest plantation productivity (timber volume/ha) disaggregated by plantation type. **Timber companies' sourcing (rural domain, plantations, natural forests).**
Certification	**Percentage of agricultural area under a sustainability certification scheme.** **Percentage of agricultural area under a fair-trade certification scheme.** **Percentage of agricultural area under an organic certification scheme.** **Percentage of exploited forest are under a certification scheme (FSC, PEFC, OLB).**
Promote sustainability within cocoa systems	
Cocoa income	**Minimum price.** **Share of producers receiving a premium paid to cooperatives and producers, and average value of premiums.** **% field price/Free On Board price.** **Certification impacts on income (% of certified beans sold as certified).**
Production system	**Soil carbon.** **Percentage of total income that is cocoa income.** **Change in basal area/density of shade trees in cocoa systems.** **Proxys on trees' origins.**
Value chain governance	**Percentage of beans marketed by cooperatives.** **Share of premiums transferred to members/social projects/infrastructure.** **Share of cooperatives with transparency on premiums paid to producers.** **Average age of cooperatives.**

4.1. Sources of data to inform regional sustainability indicators in Côte d'Ivoire

In Côte d'Ivoire, the National Statistics Institute (Institut National de la Statistique; INS) conducts a regular population-wide census (Recensement Général de la Population et de l'Habitat; RGPH). The most recent complete census was finished in 2014, and a new one is ongoing. The census gathers various socio-economic data (such as household composition, living conditions, professional activities, incomes, and so on) that could inform many of the indicators in Table 9. However, this data is not freely available. It can be purchased at INS but this is very expensive. As the European Union is supporting the INS to conduct this census, data access could be negotiated to inform sustainability mapping. Alternatively, some of the data needed to inform the proposed indicators can be found in different data sources (see Table 10). As there are few accurate data available, the sustainability assessment would also have to rely on global databases. Table 10 presents relevant databases, their accessibility, content and accuracy. For a more complete table see Annex 4).

Table 10. Data sources available to inform sustainability indicators at regional level in Côte d'Ivoire

Database	Owner	Availability	Date	Interest/limits
NATIONAL POPULATION CENSUS				
National census of Côte d'Ivoire (RGPH)	INS	Available for a fee	2014, (2020-ongoing)	Income, economy Exhaustive but expensive (EU may be able to negotiate access)
Agricultural census (Côte d'Ivoire)	INS	Available for a fee	1974, 2001, 2015/2016, 2018/2019	Farming Acreages of main crops by region, yields, socio-economic indicators on farm management and livelihoods
RESEARCH/INSTITUTIONAL DATABASES (SAMPLING)				
CGAP (Côte d'Ivoire)	World Bank	Publicly available online	2016	Smallholders' socio-economy Accurate sampling methodology, socio-economic indicators
Demystifying the Cocoa Sector (study)	KIT Royal Tropical Institute	Publicly available online	2016-2017	Cocoa farmers' socio-economy Available for Ghana and Côte d'Ivoire
ORSTOM vegetation map	ORSTOM	Publicly available online	1969	Main ecosystems Basis for identifying the main biomes of Côte d'Ivoire

Database	Owner	Availability	Date	Interest/limits
MICS 5	Ministère du Plan, INS, UNICEF	Publicly available online on request	2016 (updated every ten years)	Child labour, health, sanitary conditions Data on children's and women's living conditions, schooling, nutrition and sanitary conditions
Forest Innov	CIRAD	Publicly available online	2020	Forest plantation productivity Database on forest plantation productivity- not available at territorial level
NORC study on child labour (Sadhu et al., 2020)	NORC	Publicly available online	2020	Child labour Analysis of progress in reducing child labour
NATIONAL ADMINISTRATION DATABASES				
Land information system (Système d'informations foncières)	AFOR, MINAGRI, BNETD	Partly available online	2017	Land property Rural cadastre (land registry) data
National Social Security Fund (CNPS)	CNPS	Not available online		Health insurance Number of people with social security/ health/pension
Road map	BNETD	N/A	N/A	Road quality Different roads' qualities
Global databases				
International Labour Organization (ILO)	ILO	Available online		Child and Forced labour Forced labour – at national scale only
Protected Planet	IUCN (data from OIPR)	Publicly available online	2020 (updated yearly)	Protected area boundaries Protected areas and their characteristics
PAME (Protected Area Management Effectiveness	IUCN	Publicly available online	2016-2017	Protected area management Assessment of the efficiency of protected area management
IMAGE	VIVID	Publicly available online	2019	Land use No transparency on the methodology
Global Forest Watch	University of Maryland	Publicly available online		Forest cover Deforestation, forest degradation
Earthmap	Several	Publicly available online		Land use, land productivity, demography
UN Biodiversity Lab	UN	Publicly available online	2019	Biodiversity Threatened species richness

Database	Owner	Availability	Date	Interest/limits
Humdata	Several	Publicly available online	2020 (updated monthly)	Demographic data Much demographic data (population, health centres, schools)
Land Matrix	Several	Publicly available online		Land conflicts Data on land grabbing, large land transactions
Global Yield Gap	Wageningen University	Publicly available online		Crop productivity No territorial data for Côte d'Ivoire
Soil Grid	ISRIC	Publicly available online		Soil characteristics
Private sector databases				
Certification standards databases	UTZ/ Rainforest Alliance, Fairtrade Label Organization, and private sector funding	Private	2020 (updated)	Cocoa households' socio-economy, agricultural practices, premiums Cocoa households only
Corporate sustainability programmes' databases	Cocoa private sector	Private	2020 (updated)	Cocoa households' socio-economy, agricultural practices, premiums Some inaccuracy in data collection

Conclusion: technical and moral limits to the implementation of a certified ‘zero-deforestation’ cocoa chain in Côte d'Ivoire and Ghana

Technical limitations of a certification approach

Difficulty in establishing "zero deforestation" specifications

Certification approaches, being based on private initiatives, necessarily involve two elements:

- A demand from consumers and the willingness of economic operators to segregate products in order to meet this demand, based on a business model that covers the costs of segregation and passes them on to an actor in the value chain (often the consumer, but not always).
- The need to translate the demand into specifications establishing indicators and criteria, whose definition requires the creation of specific governance frameworks, including for monitoring and verification.

When applied to technical criteria (production methods or physical characteristics of the products marketed, for example), this normative approach is functional and, moreover, it is the basis of most industrial processes. This approach has been successfully applied to the organic cocoa production method, where the specifications have a direct and measurable link with the quality of the products marketed (and are easily measured by physicochemical analyses of residues).

Implementation of this approach to social criteria (via fairtrade labels) has shown serious limitations. For example, linking fair trade impact to livelihood benefits is challenging and labels are still seeking to improve their impact analysis methods in this respect.

As stated in this report, the issue of deforestation is complex and a systemic understanding of the drivers of deforestation underlines essential points: a dilution of responsibilities from private to public, the complexity of power relations in the natural resources sector, the specific agrarian history of the different production areas, and so on. In this context, elaborating specific criteria related to deforestation is necessarily an incomplete task, that is difficult and costly to verify (and therefore will not be supported by the market). Segregating economic operators based on market segmentation is not an adequate response. The nature of the certification approach is therefore not adapted to the issues at stake.

Traceability systems too imprecise to guarantee the origin of the product

On one hand, the traceability systems of sustainability and fair-trade standards (UTZ/Rainforest Alliance, Fairtrade Label Organization, and so on) are very porous (as outlined in the body of this report). On the other hand, marketing channels are too complex to avoid mixing certified cocoa without recent deforestation with cocoa from more recently deforested plots. Organic agriculture certification has the most advanced and rigorous physical traceability system in the food industry. Two factors limit the system's porosity:

- The economic cost of the conversion period is a disincentive to bypassing the control system. Indeed, to earn the certification premium, a producer must demonstrate their compliance with the organic standard for three years before gaining certification. A producer who cheats takes the risk of losing the benefit of this heavy investment.
- The physicochemical control that complements the plot audit and the internal control systems of the cooperatives can help unmask organised fraud. It represents a second, independent and more objective verification than the first.

In the case of a "zero deforestation" cocoa sector certification, these two factors do not come into play. It is difficult to imagine sufficient incentives and/or coercive measures to guarantee perfect segregation of the beans. For this reason, UTZ and Rainforest Alliance certifications have opted for documentary traceability models (mass balance).

Farms are too scattered and satellite images are too inaccurate to measure deforestation at the farm level

Unlike in other regions in the world, most farms in southern Côte d'Ivoire and Ghana do not consist of a clearly delineated and contiguous blocks. Housing and storage buildings are clustered in villages or camps, and the agricultural plots of each farm are often scattered along several axes starting from the village or sometimes even in several towns. More than a third of cocoa farmers own multiple discontinuous plots (Sanial 2019). In addition, a farmer's other crops (such as rubber, food crops, coffee and oil palm) are rarely adjacent to their cocoa plantation.

Many farms also include fallow plots or old, unproductive or low-yielding cocoa trees that are difficult to locate precisely. Finally, some residual forests and tree fallows in the rural estate are managed on a community basis and are not linked to a specific farm but to a community. It is difficult to identify a single person responsible for the deforestation of these areas since it is generally a community decision (for community cultivation, allocation to a farmer, a young couple taking up self-employment, a women's group for food production, a migrant integrating into the community, and so.).

There is therefore too much room for uncertainty to make the criterion coercive. This level of discrimination could make any "zero-deforestation" certification system at plot or farm scale socially unacceptable, and technically and methodologically challenging.

A mismatch between the method and the objectives: impacts on spatial justice

Even if the technical limitations mentioned above were resolved, the implementation of a "zero-deforestation" approach based on a specific cut-off date would be challenging.

At farm scale, ensuring that cocoa has not contributed to deforestation could mean directing cocoa production to plots/areas already deforested and encouraging indirect deforestation or degradation: via other non-certified crops, via uncertified cocoa, and so on. Thus, certifying plots that were not forest in recent years would have absolutely no impact on current deforestation dynamics.

At supply basin scale, cocoa producers' organisations cannot impose rules, incentives or sanctions on producers who are not members, and even less so on people and organisations carrying out other forms of deforestation-generating activities in the territory (other crops, logging, coal mining, and so on). The responsibility for enforcement therefore could not lie solely with producers' organisations.

Moreover, certifying regions where there is no (or no longer) cocoa-related deforestation would be tantamount to rewarding producers who are located in areas of historical deforestation where there is no longer any forest. Indeed, by definition, the less forest there is, the less deforestation can be.

This could also disadvantage the most virtuous individuals and producer organisations: those who fight to preserve forest cover in areas where deforestation is high. Finally, the "zero-deforestation" approach to the sector could have an impact that runs counter to its objectives: diverting attention away from areas with high deforestation risk to focus on historically deforested areas that no longer have forests.

These limitations and risks highlight the need for an integrated approach, focused on economic and agronomic sustainability at the farm level, combined with environmental, social and economic sustainability at the jurisdictional level.

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