

AGROFORESTRY IN THE COCOA SECTOR: A NEED FOR AMBITIOUS COLLABORATIVE LANDSCAPE APPROACHES

Consultation paper for the 2020 Cocoa Barometer / July 2020

Cocoa agroforestry systems can bring a wide range of ecological benefits; biodiversity conservation of flora and fauna, carbon sequestration, preserving and strengthening soil moisture and fertility, contributing to pest control, and microclimatic control such as stimulating rainfall, and many other benefits.

However, a large gap separates the current reality of agroforestry in the cocoa sector from its potential. Alignment on an adequate definition is missing. Sector commitments and certification have low impacts. Existing diverse agroforestry systems are at risk. There is confusion about and artificial tension between yield improvements and biodiversity. Tree distribution campaigns have low success rates, and there is low adoption of agroforestry by cocoa farmers. Decent monitoring is absent. Finally, agroforestry and zero-deforestation are wrongly conflated with each other.

Agroforestry should not replace forest areas¹, nor can simplified agroforestry be a substitute for more diverse agroforestry systems. Instead, agroforestry systems should be used to strengthen resilience of cocoa production regions and to restore degraded land. All monoculture cocoa should over time be replaced with agroforestry cocoa, with progressively more robust agroforestry systems put in place. Approaching agroforestry development on a landscape scale and adopting multi-stakeholder approaches could enhance emergence of initiatives well-suited to local and regional contexts. These landscape approaches must include solutions to land and tree tenure issues, innovative ways to finance the costs of agroforestry are equally necessary, and these must provide additional sources of income for farmers as well.

This paper highlights shortcomings in current industry and government approaches to agroforestry in cocoa. It also suggests a way forward to ensure that cocoa agroforestry delivers on its promise of environmental sustainability while contributing to farmers' livelihoods. Lastly, it proposes basic parameters of integrated agroforestry cocoa standards on both farm and landscape scale and sets forward recommendations for all actors in the supply chain.

1. Shortcomings in the cocoa sector's current approach to agroforestry

Lack of adequate definitions should be remedied

A clear definition on agroforestry is sorely lacking, at least for the cocoa sector. Strictly defined, agroforestry only signifies that there is an association between trees and cultivated crops (Nair 1993). As such, a wide range of agricultural systems can be called agroforestry. This is demonstrated by the problematic range of perspectives on operational definitions provided in response to the questionnaire for the 2020 Cocoa Barometer (see *Box 1: Definitions of agroforestry by cocoa companies*).

It is essential for the cocoa sector – and for cocoa-producing governments – to come to a consensus on what we are speaking of when we discuss agroforestry.

Box 1. Definitions of agroforestry by cocoa companies
<i>Direct responses from cocoa and chocolate companies to the 2020 Cocoa Barometer.</i>
For Ghana, the recommendation is to plant up to 18 emergent trees (≥12 m height) per hectare also providing permanent canopy cover corresponding to approximately 30–40 % shade; For Ivory Coast, the regulatory authorities have defined the expectation of a canopy cover by forest trees of 30 to 50% for cocoa agroforestry systems with no specific number per hectare; Our company's definition: Cacao agroforestry is a managed, intentional system of cultivation of cacao with other trees and crops over time and space. Agroforestry can optimise cocoa production, farmer income, carbon storage and environmental benefits, and supply chain resilience.
30% shade cover achieves a balance between maximising productivity potential, diversifying a farmer's income thereby assuring food security of communities, and achieving the desired environmental benefits
We understand agroforestry as the deliberate integration of trees on farms or in the wider landscape agroforestry system is a multifunctional land-use system where woody perennials (e.g. trees, shrubs, palms and bamboos) are deliberately used on the same plot as other crops (e.g. cocoa) Cocoa-based agroforestry system maintains the production of cocoa while incorporating at least one additional species. The term agroforestry may refer to a multitude of structures, planting designs and management phases

¹ As defined under national regulations and using HCS and HCV methodologies for cocoa production.

We understand Cocoa Agroforestry as the promotion, conservation, and renewal of different woody perennials in addition to cocoa on a plantation. Tree diversification can occur through domestication to meet the farmer's functional needs or to take advantage of market opportunities
We do not have an operational definition
Aligned with the World Cocoa Foundation and Climate Focus.
Agroforestry can take many forms and in the broadest sense can be defined as any farming system that involves the deliberate planting or retention of trees on the farm and at a sufficient population to interact with cocoa e.g. in the form of shade We work with farmers and recommend the introduction of economic shade trees inside or at the border of their cocoa farms, which is what we will refer to as agroforestry. The density of trees can vary from 15 to +50 trees/ha and there shouldn't be a minimum number of different species per ha. What is important is that the farmers themselves decide what species they plant.
We recognize agroforestry systems to include the intentional integration of non-cocoa trees into cocoa agricultural systems to create environmental, economic, and/or social benefits
We would keep a strict definition, approx. 50 multi-purpose trees per ha
Min. 30% shade cover and min. 25 permanent shade trees of min. 5 different species per hectare
Discussion and definition within CFI

Low impact of sector commitments and certification must be addressed

Agroforestry and sustainability commitments like the Cocoa & Forests Initiative (CFI) launched in 2017 have led to investments in large-scale certification and to tree distribution campaigns by industry. Unfortunately, commitments from some entities in industry and government have not extended to all key actors, nor have these commitments been monitored or fully implemented on the ground (Higonnet et. al.). Thus, these promises have not led to a significant increase in agroforestry, nor to improved farmer livelihoods or resilience.

This has much to do with the low – and changeable – criteria to achieve agroforestry not only in CFI but also for both large-scale certification labels with an agroforestry component² as well as the government agroforestry and deforestation standards in Ghana and Côte d'Ivoire.

Fairtrade and Organic certifications do not even attempt to address agroforestry. Though Rainforest Alliance/UTZ does address agroforestry, it has not monitored and enforced strict implementation of their own stated agroforestry goals, such that much of the cocoa certified by them is, in fact, often not robust agroforestry even when requirements and definitions are adequate.

Most efforts also remain uncoordinated, with little synergy between companies and the landscapes they operate, resulting in minimal landscape transformation and agroforestry improvements.

Diverse agroforestry systems should not be watered down

Promoting agroforestry in its simplest forms is not enough to meet the needs of forest preservation and restoration, sustainability and farmers' resilience, especially not when simpler forms replace diverse biodiversity agroforestry systems (Ruf 2011). Despite good intentions, low shade standards (as exist in the current voluntary sustainability standards – VSSs) encourage and enable degradation of existing, more complex agroforestry systems to stimulate productivity.

Currently, a number of chocolate and cocoa companies are mostly establishing simple forms of agroforestry such as promoting high yielding varieties that are propagated to grow without or little shade mixed with commercial timber³. Whilst this strategy can offer some environmental services compared to full-sun cocoa systems (Blaser, W. J., Oppong, J., Hart, S. P., Landolt, J., Yeboah, E., & Six, J.), it is a degradation if it replaces diverse pre-existing agroforestry systems or fallow secondary forest regrowth.

Companies and VSS put in place low agroforestry standards because they seem easy to realize in the field, for example by giving away tree seedlings. However, these new trees often do not survive in established cocoa

² Rainforest Alliance (RA) and UTZ (now merged with RA) certified farmers were respectively told to keep 18 and 12 trees per hectare in 2015. Then, in 2017 RA required 30% shade cover with 5 different indigenous tree species before both ending up to requiring "an optimal agroforestry" in the draft for 2020 standard. Organic certification has nothing to do with agroforestry; a farm can be certified organic while being a full-sun monoculture plantation. Fairtrade has no agroforestry standard for cocoa. An example of a standard with a high bar for agroforestry is Bird Friendly Coffee, though this is not used in cocoa.

³ Barry Callebaut's "agroforestry" in Côte d'Ivoire uses "Mercedes" cocoa – a full sun cocoa variety – in combination with trees such as Niangon, Acajou, Cédrela, Teak, Framiré, Fraké, Samba that address timber industry needs.

monocultures or are not even planted, which due to a lack of monitoring is then not documented. As a consequence, a greater number of cocoa plantations can be certified, or touted as being “agroforestry”, without significant improvement on the ground.

Artificial tension between productivity and agroforestry must be debunked

Many stakeholders express fears about alleged tensions between agroforestry and productivity. However, yields can be just as high in certain high-biodiversity agroforestry systems as in full-sun production (Clough et al. 2011), and there are indications that cocoa agroforestry systems can have similar or even better economic performance compared to conventional, full sun systems (Jezeer et al. 2017).

A great deal of research has been done by a large cooperative in the Dominican Republic (Conacado 2018) and elsewhere, showing that senescent cocoa plantations can be rehabilitated to increase production through grafting (whilst maintaining phytosanitary hygiene to avoid the spread of diseases), hand-pollinating, pruning, agroecological fertilization, and weed management without altering the shade composition above the cocoa.

In addition, when communicating with farmers, the focus needs to shift from measuring just cocoa yields to total system yields, and comprehensive cost-benefit analyses that consider food security, long term effects of intensified agriculture, and diversified income as well as costs (especially minimizing costs of agrochemicals and labour), and ultimately and most importantly achieving a living income.

Best practices in agroforestry cocoa and in cocoa productivity enhancement can be combined to ensure that agroforestry does not need to be paired with increased use of agrochemicals. Programs adopting the paradigm of “sustainable intensification” or “climate smart agriculture” need clear insights into these trade-offs. Furthermore, cocoa varieties should be developed that thrive under diversified shade conditions, varieties that do not need high levels of external inputs such as fertilizers and pesticides or fungicides.

Farmer inclusion & education is needed to reverse low success rates in tree distribution campaigns

The impact of agroforestry reforestation campaigns for existing cocoa plots is unfortunately minimal. In Côte d’Ivoire, despite a great number of tree distribution campaigns, distributed tree survival was less than 2% (Sanial 2019). Even when trees do survive distribution, most young tree seedlings are cut down during weeding, due to a lack of training on agroforestry practices provided to the person who is doing the actual work at farm level, such as sharecroppers (Uribe-Leitz and Ruf 2019). This clearly shows the need for intensive training, education, and collaborative work with cocoa farmers and farm workers to ensure success in any transition away from monoculture towards agroforestry. In Ghana and Côte d’Ivoire CFI signatory companies collectively distributed 2,144,440 multi-purpose trees to farmers for agroforestry and trained 224,500 farmers in climate smart cocoa in 2018&19 seasons (CFI 2019 Progress report Ghana & Côte d’Ivoire). How many of these will survive and grow out to serve their purpose?

Industry and governments must address root causes of low adoption by cocoa farmers

Adoption of agroforestry by farmers currently in cocoa monoculture systems is minimal, for several reasons. First, knowledge and information are crucial. Costs and benefits of agroforestry are often unclear to farmers, and many farmers have been led to believe that full-sun monoculture is the way to go.

Second, money matters. Few farmers – most of whom are on the edge of food insecurity and earn less than \$1 per day - can afford the initial investments to transition to agroforestry.

Thirdly, land tenure and tree tenure insecurity provide additional barriers (see section below for details).

Fourthly, men and women are impacted differently regarding income and land tenure. When agroforestry programmes are not rolled out taking gender into account, adoption rates by women farmers will also be low.

Finally, when farmers have access to new cocoa planting material, these are often varieties that have been adapted to full-sun conditions, and therefore are not very suitable to agroforestry.

Lack of monitoring means progress is hard to track and achieve

Strong monitoring systems (that include satellite mapping) are absent from current cocoa environmental agroforestry initiatives such as the Cocoa & Forests Initiative, national government action plans, or standards such as RA/UTZ. Without these it is hard to verify whether or not companies live up to their commitments (Uribe-Leitz and Ruf 2019), especially in areas where cocoa fields are established under thinned forest cover, such as in Cameroon.

Industry must stop confusing zero-deforestation commitments with cocoa agroforestry

There is no direct relationship between promotion of agroforestry and halting deforestation. Agroforestry cannot replace natural forest.

However, agroforestry cocoa can play a minor part in compensation and restoration measures for previous historic deforestation. In this sense, it is important for companies in the cocoa industry, who have benefitted from past deforestation in their supply chains.

Agroforestry is also important for major cocoa producing countries, as they urgently need to re-green their nations, some of which are on a collision course to desertification because of tree cover loss. For example, it is estimated that Ghana and Côte d'Ivoire have lost between 80-95% of their forests since 1955, leading to widespread rainfall loss and increasingly unpredictable weather patterns. For such countries, rolling out agroforestry wherever possible can help anchor rainfall and restore some tree cover.

Box 2: Definitions of deforestation and forest degradation

Currently, the Cocoa & Forests Initiative (CFI) maintains the following definition on deforestation: *There will be no further conversion of any forest land (as defined under national regulations and or using methodologies such as High Carbon Stock (HCS) and High Conservation Value (HCV) approach) for cocoa production.*

However, since the CFI was launched, there has been considerable progress made on deforestation definitions, within the High Carbon Stock Approach and the Accountability Framework, among other platforms. CFI would do well to update their definitions based on the evolving current discussions.

2. A way forward: collaborative development of landscape approaches

Structural changes in the governance of agroforestry approaches are needed; a shift from cocoa-plot to landscape, collective and inclusive development of locally defined landscape approaches, with farmers in the driver's seat, and innovative financing making this economically possible.

Embrace agroforestry at landscape scale

Many agroforestry initiatives are currently limited to cocoa-plot scale (e.g. through promoting good agricultural practices, distributing trees, or rolling out certification). However, a landscape level perspective is needed, both to protect remnants of natural forests intertwined with farm plots using agroforestry and to remediate past deforestation and forest degradation – including restoration of natural forests that have been degraded by cocoa production.

A landscape-level approach places agroforestry in the wider context of environmental sustainability, resilience, climate mitigation and adaptation strategies. It also integrates the interests for a variety of commodities, apart from cocoa, food, non-timber forest products, timber. This diversity of land uses can bring environmental benefits such as stable water provisioning, habitats for pollinators, improved soil quality, corridors for fauna, and the control of pests and diseases such as swollen shoot disease.

Implementation plans must be locally defined and collaboratively developed

Although based on a set of minimum threshold criteria that should apply globally (see Box 3: *Minimum requirements for agroforestry*), landscape approaches to agroforestry must be developed and defined collaboratively at a local level, bringing together a variety of stakeholders and actors to coordinate for integrated management, protection, and restoration of their landscape. Local ownership helps ensure that trees are fully integrated into local socio-political and economic contexts so they can survive longer than project lifetime and reach true farmer interest.

Cocoa industry actors have an important role to play, as do local governments, expert researchers, communities, individual farmers, and forestry administrations. It is also important to integrate other value chains that are involved in buying or processing the non-cocoa crops grown in cocoa agroforestry systems, from kola nuts in Nigeria to acai in Brazil and vanilla in Madagascar, palm oil in Indonesia, etc.

Put cocoa farmers in the driving seat

A landscape approach should be based on a more inclusive process to agroforestry development; farmers should have a strong voice in planning land use, forest protection and restoration. This should start with putting cocoa farming communities in a driving seat – in a gender-sensitive manner and ensuring that not just landowners, but also farm labourers and sharecroppers are involved. By giving a voice to those with on-the-ground experience, local landscape agroforestry approaches could be strengthened with realistic and diverse farming practices (e.g. shade management, tree pruning, organic fertilisation, tree nurseries, harvesting

techniques of non-timber forest products, etc). As such, farmer-based organisations and local civil society organisations should be included – as equal decision-makers, not just in consultation – in the development and governance of landscape approaches.

Joint local monitoring of progress is needed

Joint monitoring of forest protection and restoration commitments is key to making this work. This requires a full mapping of the agroforestry landscape, including remaining forested areas, forest patches at risk of forest degradation, and of all land that should be converted from monoculture or simple agroforestry to more diverse agroforestry systems. Results of this initial mapping should be publicly available. Regular monitoring of progress should be done in a collaborative and inclusive way, ensuring that local civil society and farmer-based stakeholders are empowered members of the monitoring bodies alongside government actors and industry.

Different landscapes require different approaches

Cocoa-producing landscapes vary greatly between countries and regions. Though landscape agroforestry approaches should be locally developed, the following three categories of agroforestry approaches should form the basis of these local definitions.

- **Current situation: Full-sun monoculture.**

Goal: introduce diverse agroforestry

Geographies: West Côte d'Ivoire, Ghana, South-West Cameroon, Sulawesi (Indonesia).

Necessary interventions: Introduce trees in existing farms, designate land for reforestation, scale up to more complex agroforestry systems

- **Current situation: diverse agroforestry systems in place**

Goal: preserve and promote diverse agroforestry systems

Geographies: East Côte d'Ivoire, cabruca systems in Brazil, Bolivia, and other parts of Central and South America and the Caribbean, Central and East Cameroon.

Necessary interventions: Recognise the value of these systems, preserve, and find ways of scaling-up, prevent transformation into monoculture or down-grading to simple agroforestry

- **Current situation: Old-growth forest with (risk of) new cocoa farms encroaching**

Goal: protect forests through agroforestry in fallows.

Geographies: Amazon Basin, Chocó-Darién Rainforest, Mesoamerican Rainforest, Congo Basin, South East Asia

Necessary interventions: Establish agroforestry systems on fallows to limit deforestation/forest degradation, coupled with mapping, monitoring, and strong enforcement of no-deforestation policies.

Governments must enhance land tenure and tree tenure security

Clarity and security of land tenure and tree tenure are essential for agroforestry to work at scale. In West Africa, national governments and the cocoa sector are struggling with this thorny issue. As long as this has not been properly addressed, investments in agroforestry and forest restoration – both by farmers and private sector – in cocoa-forest landscapes will be problematic. Even though companies can sometimes support farmers in obtaining their land certificates or tree tenure, the issue of tree and land tenure rests squarely on the shoulders of local decisionmakers in producer governments. These governments must urgently revise their tenure laws.

Governments, industry, and financial institutions should finance landscape agroforestry approaches

It is both unrealistic and unjust to expect farmers – the vast majority of whom do not earn a living income – to bear the costs of transitioning to and maintaining cocoa agroforestry systems. Resilient cocoa-agroforest landscapes serve the interests of all stakeholders; farmers, local communities, and local governments should be in the lead, but the necessary investment needs to be mobilised by governments and the cocoa sector, with the help of international financial institutions and private banks.

Costs and benefits are a collective responsibility. It is key to create a mechanism which commits the entire cocoa sector, thus mobilising the necessary resources and creating a level playing field.

A potential route to consider could be applying an environmental tax set on all cocoa exports. Such a tax should in no way decrease the prices paid to farmers. Transparency and accountability of any “Cocoa Environment Tax” revenues would be key. The allocation of resources should be managed by participatory local platforms including local governments, farmers organisation and local NGOs, whereby the resources are invested in restoring past environmental damage and/or maintaining resilient cocoa landscapes, as well as ensuring fair payment to farmers for their agroforestry efforts. Other routes could include adequate Payment for Environmental Services systems.

3. Minimum requirements for a sector wide agroforestry standard

Locally defined landscape agroforestry approaches should deliver on the following four goals:

1. **Maintaining on-farm ecosystem services**
such as CO₂ sequestration, biodiversity, nutrient cycling, pest control, pollinator habitats, soil quality
2. **Aiding the restoration of degraded forests, thereby restoring environmental functions**
including protecting biodiversity, connecting primary forests, providing habitat for native species, avoiding soil degradation and associated water pollution, and preserving natural streams, local humidity, and rainfall
3. **Increasing long-term productivity and resilience of cocoa-growing areas**
especially in light of climate change
4. **Providing diversified income and food to farmers**

Box 3: Minimum requirements for agroforestry

Development of local landscape agroforestry approaches should cover at minimum the following criteria:

- To have 15% of total native vegetation coverage across the farm or group of farmers and a minimum landscape-level canopy cover of 40%. The latter can be 10% canopy cover in one part of the group of farms but compensated by 50% in another part.
- Native trees should not be short-lived pioneer species
- At the (group-)farm level (i) a minimum of 12 species per ha on average (structurally and taxonomically diverse native species); (ii) retain any original rainforest trees that remain; (iii) maintain and establish plot boundary tree hedges; (iv) the tree crowns must comprise at least two strata or stories; and (v) shade species should eventually attain a minimum of 12 to 15 meters in height. (vertical structural diversity results in increased bird diversity)
- At the landscape level the tree canopy would include (i) forests in protected and reserved forests; (ii) forest growth or other natural vegetation maintained at a width of at least 5 meters from each side of small streams and at least 10 meters along riverbeds; (iii) sacred forests; (iv) community forests and other locally managed remnants of natural forest.
- These standards will be validated and/or contextualized with local (farmers') organisations receiving better prices for diversified-agroforestry cocoa production, and for clear arrangements on the financing of the transition to and maintenance of agroforestry.

Any agroforestry approach should pay attention to environmental justice and discourage biodiversity offsetting or land-sparing approaches in cocoa cultivation. Cocoa from diversified agroforestry should be the goal for all cocoa, not just some.

As a first step in setting the local landscape level standard, a participatory mapping should be carried out of all farmland and remaining forests (HCS/HVC) in the cocoa producing landscape, including protected forests and riverbeds.

4. Recommendations

For all

- Commit to transitioning all monoculture cocoa to diverse agroforestry systems, with timebound implementation plans;
- Clarify agroforestry definitions, integrating the concept of agroforestry into the broader landscape as proposed in this paper;
- Develop and implement sector-wide traceability and monitoring.

For policy makers, especially in Côte d'Ivoire and Ghana

- Put in place inclusive landscape-level land-use planning processes that include agroforestry, based on the best available science and local practice;
- Address the land tenure and tree tenure crisis with law and policy reforms;
- Provide extension services for cocoa farmers seeking to diversify their portfolio of crops, assist them in bringing these diversified crops to market;
- Shoulder the financial burden of the transition to agroforestry; stimulate true price accounting that includes environmental costs, in combination with improved transparency & accountability;

- Establish monitoring systems to ensure the commitments to agroforestry become a reality; undertake mapping of cocoa including a differentiation of monoculture vs. agroforestry.

For Voluntary Standard Systems, especially Rainforest Alliance/UTZ, Fair Trade, and Organic

- Set standards that all cocoa must be transitioned to agroforestry;
- Monitor standards effectively;
- Stop permitting existing diverse agroforestry systems to be downgraded to simplified cocoa/timber combinations or monoculture.

For cocoa and chocolate companies

- Commit to a timebound plan to buy only agroforestry cocoa;
- Help pay for the transition from monoculture to agroforestry;
- Collectively develop incentives for farmer adoption of agroforestry practices;
- Train farmers and farm labourers in company supply chains better;
- Contribute financially towards establishment of agroforestry and work with producer governments and stakeholders at the level of cocoa producing landscapes to establish mechanisms for financing agroforestry as defined by local stakeholders.

For civil society and knowledge institutions

- Provide and translate knowledge about cocoa agroforestry systems;
- Promote and facilitate landscape approaches;
- Promote and facilitate access to affordable finance for agroforestry systems at the farmer level.
- Campaign for land and tree tenure reforms;
- Strengthen and help represent the voice of farmers and local civil society in relevant platforms;
- Monitor government and corporate commitments to agroforestry, and implementation thereof.

Colophon

Research: Elsa Sanial

Text: Elsa Sanial, Antonie C. Fountain, Henk Hoefsloot & Rosalien Jezeer

Citation: Sanial, E., Fountain, A.C., Hoefsloot H., & Jezeer, R. (2020): Agroforestry in Cocoa, a need for High-Bar Collaborative Landscape Approaches.

Additional contributors: Ruth Bennett (Smithsonian Conservation Biology Institute), Julia Christian (Fern), Maartje de Graaf (Tropenbos International), Etelle Higonnet (Mighty Earth), Friedel Huetz-Adams (Südwind Institut), Johanna Jacobi (University of Bern), Eric Mensah Kumeh (University of Hohenheim).

Published by the Cocoa Barometer Consortium, administered by the VOICE Network. The Cocoa Barometer Consortium consists of ABVV/Horval, Be Slavery Free Australia and the Netherlands (formerly Stop The Traffik), European Federation of Food, Agriculture and Tourism Trade Unions (EFFAT), Fair World Project, FNV/Mondiaal FNV, Fern, Green America, Hivos, Inkota Netzwerk, International Labour Rights Forum, Mighty Earth, Oxfam America, Oxfam-Wereldwinkels, Rikolto, Solidaridad, Südwind Institut, Tropenbos International.

This consultation paper is released in preparation of the 2020 Cocoa Barometer and is based on a Tropenbos International draft paper under development, which will be published summer 2020.

This publication is co-financed by



Publication bibliography

Blaser, W. J., Opong, J., Hart, S. P., Landolt, J., Yeboah, E., & Six, J.: Climate-smart sustainable agriculture in low-to-intermediate shade agroforests. In *Nature Sustainability*.

Clough, Yann; Barkmann, Jan; Juhbandt, Jana; Kessler, Michael; Wanger, Thomas Cherico; Anshary, Alam et al. (2011): Combining high biodiversity with high yields in tropical agroforests. In *Proceedings of the National Academy of Sciences of the United States of America* 108 (20), pp. 8311–8316. DOI: 10.1073/pnas.1016799108.

Conacado (2018): Sistematización de parcelas demostrativas. La experiencia del CONACADO en la implementación de un paquete técnico en 8 parcelas. Available online at <https://equalexchange.coop/sites/default/files/INFORMEParcelasDemostrativasCONACADO2018.pdf>, checked on 5/22/2020.

Higonnet et. al.: Problems-and-solutions-concerning-the-CFI-in-Ghana-and-Côte.-final. Available online at <http://www.mightyearth.org/wp-content/uploads/Problems-and-solutions-concerning-the-CFI-in-Ghana-and-Co%CC%82te.-final.pdf>, checked on 3/6/2020.

Jezeer, Rosalien E.; Verweij, Pita A.; Santos, Maria J.; Boot, René G.A. (2017): Shaded Coffee and Cocoa – Double Dividend for Biodiversity and Small-scale Farmers. In *Ecological Economics* 140, pp. 136–145. DOI: 10.1016/j.ecolecon.2017.04.019.

JOHNS (1999): Conservation in Brazil's Chocolate Forest: The Unlikely Persistence of the Traditional Cocoa Agroecosystem. In *Environmental Management* 23 (1), pp. 31–47. DOI: 10.1007/s002679900166.

Nair, P. K. R. (1993): An introduction to agroforestry. Dordrecht, London: Kluwer Academic Publishers in cooperation with International Centre for Research in Agroforestry. Available online at https://www.doc-developpement-durable.org/file/Fertilisation-des-Terres-et-des-Sols/agroforestrie/An-Introduction-to-Agroforestry_World-Agroforestry-Centre.pdf, checked on 5/22/2020.

Ruf, François Olivier (2011): The Myth of Complex Cocoa Agroforests: The Case of Ghana. In *Human ecology: an interdisciplinary journal* 39 (3), pp. 373–388. DOI: 10.1007/s10745-011-9392-0.

Sanial, Elsa (2019): A la recherche de l'ombre, géographie des systèmes agroforestiers émergents en cacaoculture ivoirienne post-forestière. Available online at https://www.researchgate.net/publication/338549035_A_la_recherche_de_l'ombre_geographie_des_systemes_agroforestiers_emergents_en_cacaoculture_ivoirienne_post-forestiere.

Smith Dumont, E.; Gnahoua, G. M.; Ohouo, L.; Sinclair, F. L.; Vaast, P. (2014): Farmers in Côte d'Ivoire value integrating tree diversity in cocoa for the provision of ecosystem services. In *Agroforest Syst* 88 (6), pp. 1047–1066. DOI: 10.1007/s10457-014-9679-4.

Uribe-Leitz, Enrique; Ruf, François (2019): Cocoa Certification in West Africa: The Need for Change. In Michael Schmidt, Daniele Giovannucci, Dmitry Palekhov, Berthold Hansmann (Eds.): Sustainable global value chains. Cham: Springer (Natural resource management in transition, 2198-9702, 2), pp. 435–461.