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UEMOA

FOREST CONSERVATION AND COCOA IN WEST AFRICA

AN OVERVIEW OF INITIATIVES AND TOOLS TO SUPPORT FOREST CONSERVATION AND ENVIRONMENTALLY FRIENDLY COCOA PRODUCTION

PAPFor

agreco

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TITLE

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AFD	*Agence Française de Développement* (French development agency)
AFI	Accountability Framework Initiative
AGUIPEX	Guinean Agency for the Promotion of Exports
ANADER	National Rural Development Support Agency (Côte d'Ivoire)
ARCC	Cacao Coffee Regulatory Authority (Côte d'Ivoire)
ARS	African Regional Standards
AVSF	Agronomists & Veterinarians Without Borders
AWAC	Walloon Air and Climate Agency
BCC	Coffee and Cocoa Exchange (Côte d'Ivoire)
CARI	Central Agricultural Research Institute (Liberia)
CCC	Cocoa Coffee Council
CCCDF	Coffee-Cacao Producers Development Fund (Côte d'Ivoire)
CHED	Cocoa Health and Extension Division (CHED) of Ghana Cocoa Board
CIAT	International Centre for Tropical Agriculture
CILSS	Interstate Committee for Drought Control in the Sahel
CIRAD	Centre for International Cooperation in Agricultural Research for Development
CLMRSs	Child Labour Monitoring and Remediation Systems
CNES	National Centre for Space Studies
CNRA	National Centre for Agricultural Research (Côte d'Ivoire)
COCOBOD	Ghana Cocoa Board
CRIG	Cocoa Research Institute of Ghana
CRIN	Cocoa Research Institute of Nigeria
CSSL	Conservation Society of Sierra Leone
CSSVD	cocoa swollen shoot virus disease
CST Forest	Forest Scientific and Technical Committee
CTA	Technical Centre for Agricultural and Rural Cooperation
DAF	dynamic agroforestry (in French: *agroforesterie dynamique*)
ECOWAS	Economic Community of West African States
EU	European Union
FACE	Fund a Child's Education (International)
FAO	Food and Agriculture Organisation
FAOSTAT	Food and Agriculture Organisation Statistics
FCPF	Forest and Carbon Partnership Facility
FDPCC	Coffee-Cacao Producers Development (Côte d'Ivoire)
IPCFFEM	French global environment facility
FFI	Fauna & Flora International
FIP	Forest Investment Plan
FIP	Forest Investment Programme (Côte d'Ivoire)
FMARD	Federal Ministry of Agriculture and Rural Development
FRC	Cocoa Coffee Regulation and Control Fund (Côte d'Ivoire)
FSC	Forest Stewardship Council
FT	fair trade
GAP	good agricultural practice
GCFRP	Ghanaian Cocoa-Forest REDD Programme
GHG	greenhouse gas
GIZ	*Deutsche Gesellschaft für Internationale Zusammenarbeit* (German development agency)
ICCO	International CoCoa Organization
ICRAF	International Center for Research in Agroforestry (better known as World Agroforestry)
IDDRI	Institute for Sustainable Development and International Relations
IITA	International Institute of Tropical Agriculture
ILO	International Labour Organisation
IRAD	Agricultural Research Institute for Development (Cameroon)

IRAG	Agronomic Research Institute of Guinea
IRCC	Coffee and Cocoa Research Institute, France
ISCO	National Initiatives for Sustainable Cocoa (European movement)
ISO	International Organisation for Standardisation
ITK	Agricultural Technical Route
IUCN	International Union for the Conservation of Nature
LACRA	Liberia Agriculture Commodity Regulatory Authority
LISUPED	Liberia Initiative for Sustainable Peace and Development
LINACEA	Liberia National Cocoa and Coffee Exporter Association
LPMC	Liberia Produce Marketing Corporation
MAF	Ministry of Agriculture and Forestry (Sierra Leone)
MEA	Millennium Ecosystem Assessment
MEFSIN	Ministry of Economy, Finance and Industrial and Digital Sovereignty (France)
MGE	Guinean House of the Entrepreneur
NC3P	National Cocoa Sector Public-Private Platform (Liberia)
NCDB	National Cocoa Development Board (Sierra Leone)
NDC	National Defined Contribution
NGO	non-governmental organisation
NIRSAL	Nigerian Incentive-based Risk-sharing System for Agricultural Lending
NOFNA	Notre Forêt Notre Avenir (local NGO, Côte d'Ivoire)
NWFP	non-wood forest products
ONCC	National Office of Coffee and Cocoa (Cameroon)
PAPFor	Support programme for the conservation of forest ecosystems in West Africa
PES	payments for ecosystem services
PICD	Ivorian Platform for Sustainable Cocoa
PINA	National Investment Plan for Agriculture (Côte d'Ivoire)
PMB	Produce Monitoring Board (Sierra Leone)
PPP	public-private partnership
PPREF	Policy of Preservation, Rehabilitation and Extension of Forests (Côte d'Ivoire)
RA	Rainforest Alliance
REDD	reducing emissions from deforestation in developing countries
RSPB	Royal Society for the Protection of Birds
SCNL	Society for the Conservation of Nature of Liberia
SLARI	Sierra Leone Agricultural Research Institute
SLIEPA	Sierra Leone Investment & Export Promotion Agency (Sierra Leone)
SME	small and medium-sized enterprises
SNDI	National Strategy Against Imported Deforestation (France)
UEMOA	West African Economic and Monetary Union (French acronym; WAEMU in English)
UNESCO	United Nations Educational, Scientific and Cultural Organization
USA	United States of America
USAID	US Agency for International Development
USD	US dollars
UTZ	Universal Trade Zone
WABiCC	West Africa Biodiversity and Climate Change
WABiLED	West Africa Biodiversity and Low Emissions Development
WAEMU	West African Economic and Monetary Union
WCF	World Cocoa Foundation
WFCL	worst form of child labour
WHH	Welt Hunger Hilfe (German NGO)
WHO	World Health Organization
WWF	Worldwide Fund for Nature
YVEO	Yacoli Village Open School (national NGO in Côte d'Ivoire)
ZID	Zero Imported Deforestation (European Union Law)

USEFUL DEFINITIONS

Agroecology: Theorised in the 1970s and 1980s by ecologists like Altieri and Gliessmann, agroecology is a set of practices combining agronomy and ecology. Agroecosystems must guarantee a productive function as well as the sustainability of a set of ecological services (Sanial, 2019).

Agro-forest: An original wooded formation in which the fauna and flora composition are managed by the local human population(s), with the interest of meeting their vital needs (food, energy, building materials, etc.). Although canopy area and tree size may correspond to the definition of a forest, anthropogenic origins and management with either subsistence farming or cash crops classifies these areas as agroforestry in rural and non-forestry areas.

Agroforestry: According to ICRAF and CTA (1993), 'agroforestry is the voluntary integration of trees into agricultural landscapes, in any spatial arrangement or temporal sequence, to obtain benefits from the ecological and economic interactions between these different components'. This definition covers all agricultural practices that, on the same plot, associate trees (in all their forms: hedges, alignments, groves, etc.) with an agricultural and/or livestock culture (Agroforestry, 2022). In the cocoa sector, some producer countries have been able to give more precise definitions to agroforestry, sometimes with details on the density of shade trees per hectare or that of cocoa trees.

Cocoa as a commodity: Cocoa is a basic everyday consumption product with qualities defined and recognised by the consumer. As a commodity, cocoa is placed on international markets (in terms of price) and is often transformed into a blend.

Cocoa as a speciality: Cocoa is recognised for its superior traceability, including knowing the price paid to the producer. Specialty cocoa generally has descriptive and superior physical and organoleptic properties, qualities that allow it to be sold in separate batches.

Ecosystem services: Benefits that people derive from ecosystems, which are grouped into four broad categories: (i) supply, e.g. food production and water; (ii) regulation, e.g. climate and disease control; (iii) support, e.g. nutrient cycles and crop pollination; and (iv) cultural, e.g. spiritual and recreational benefits (MEA, 2005).

Forests: The United Nations Food and Agriculture Organization (FAO) defines forests as land occupying an area of more than 0.5 hectares (5 000 m^2) with trees reaching a height of more than 5 meters and a forest cover of more than 10 %, or with trees capable of meeting these criteria. The definition excludes land with the predominant purpose of agriculture or urbanisation. A forest must include a stand of trees, shrubs and hedges. More generally, the term also refers to the ecosystem grouping the flora (which delimits the geographical space) and the fauna that live there (temporarily for migratory species and continuously for the species for which it constitutes the natural habitat). This space has a particular symbiotic function.

Land area: This is the index corresponding, for a given tree, to the trunk section area, generally measured at 1.30 meters from the ground. The total or average land area of a given site can be calculated as the sum of the land areas of all the trees there; it is usually expressed in m^2/ha.

Non-wood forest products (NWFP): Goods derived from forests that are tangible and physical objects of biological origin other than wood (FAO).

Protected area: A clearly defined geographical area, recognised, dedicated and managed, by legal or other means, to promote the long-term conservation of nature, ecosystem services and related cultural values (IUCN definition).

Traceability: Traceability is the ability to trace all processes, from the supply of raw materials to production, consumption and disposal. In some cases, it is interpreted as the ability to verify the history, location or application of an item through documented and recorded identification.

EXECUTIVE SUMMARY

The transition of cocoa production systems towards greater sustainability is a concern widely shared today by governments, industry and civil society, particularly when combining the conservation of forest resources (by stopping all deforestation related to cocoa) with climate regulation and the social well-being of populations of cocoa farmers (by improving income or access to goods and services provided by ecosystems, such as access to non-timber forest products or microclimate regulation).

In West Africa, the cocoa sector faces many challenges. The low income of cocoa producers prevents any sustainable development of the sector. Farmers have a low capacity to save and reinvest, thus limiting their plot maintenance to the strict minimum. Apart from a plantation's first years of production, yields are generally low and orchards tend to wither away, leading to the search for fertile land on which to develop new forest areas. Coupled with rural demography (of internal and external origin), this has sometimes led to dynamics resembling a pioneer frontier. Cocoa that is ecologically, economically and socially sustainable is being grown in an attempt to respond to the multiple challenges facing the sector. Prompted by industry and government commitments (e.g. corporate sustainability policies or collective commitments such as the Cocoa and Forest Initiative), this production system is increasingly framed by laws, standards and labels defining guidelines and the roles and responsibilities of each actor in the production chain. The two main standards are ISO 34101 and ARS (African Regional Standards) 1000. The main labels are those from fair trade, Rainforest Alliance and organic farming, each with a particular angle. Sustainability also requires the deployment of technical guidance appropriate to agronomic plans, market access or access to finance.

In addition to standards and labels, the new regulation adopted by the European Commission[1], known as avoided deforestation, provides rules on mandatory due diligence for operators who will place specific commodities associated with deforestation and forest degradation on the EU market, including cocoa. Its objective is to ensure that only legal products (in accordance with the current legislation of the country of origin) and those produced with 'zero deforestation' are allowed on the EU market. This means that PAPFor area cocoa producers must be able to adapt to this regulation's requirements in order to develop value supply chains that are compatible with European requirements.

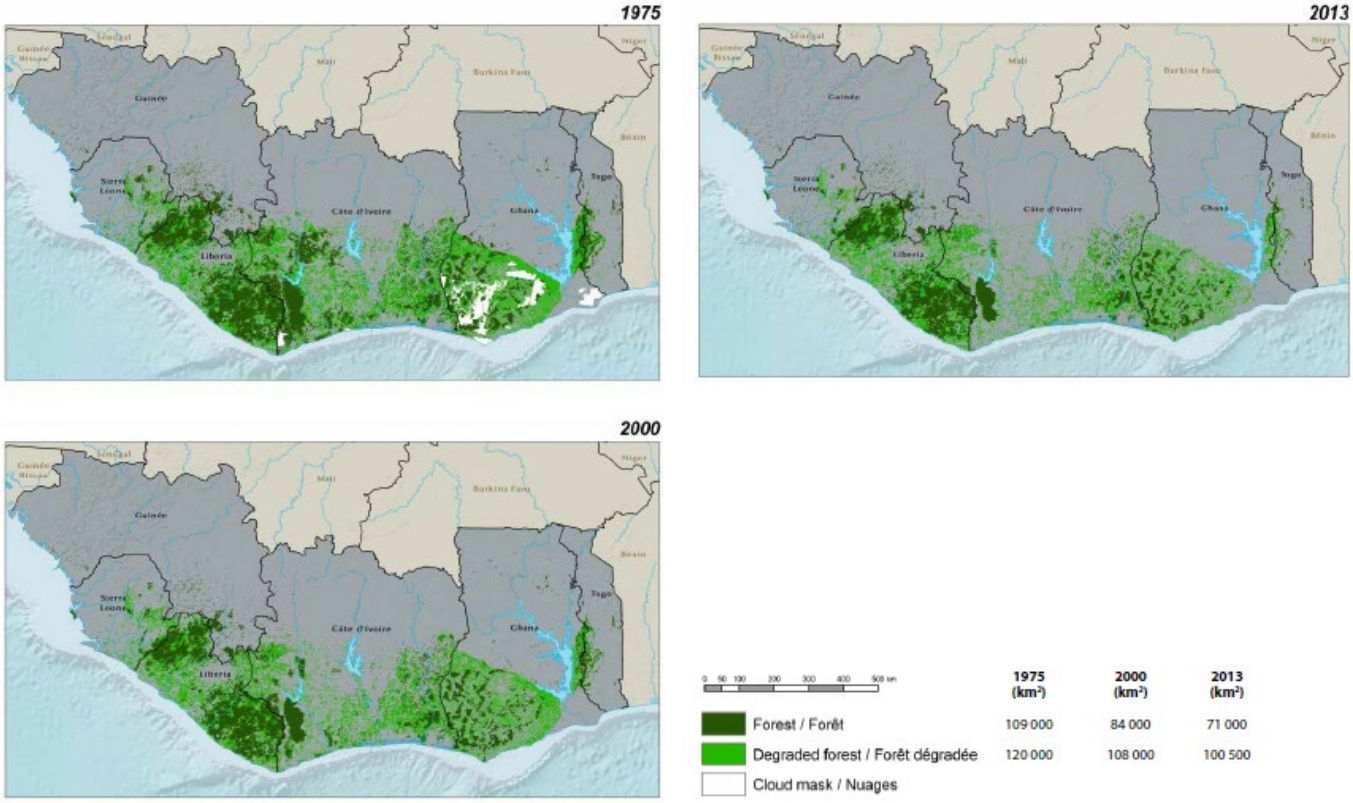
The Support Programme for the Conservation of Forest Ecosystems in West Africa (PAPFor) project aims to protect and enhance the protected transboundary areas of West African rainforest ecosystems (Guinea, Côte d'Ivoire, Liberia, Sierra Leone and Nigeria). To help improve local communities' incomes, the managers of the different landscapes encourage the development of income-generating sectors on the periphery of protected areas. Cocoa is one of the crops considered. Providing a guide to sustainable cocoa aims to allow operators to access information that is useful in supporting cocoa projects towards greater sustainability and to eliminate any negative impact on biodiversity.

This report highlights sustainable practices following a review of the existing literature, consulting with various experts and analysing feedback from the field. This exercise indicates that many sustainability practices exist but need to be adapted according to the area and any previous cocoa-growing history (e.g. existing or pre-existing orchards):

- Positive practices: replacement of non-productive cocoa trees, regular plot maintenance (cleaning, planning, cutting, pest and disease management), soil management (composting, mulching, etc.), agroforestry (AF) (association of local species, shade management and NWFPs), agroecology (management of natural resources, intercropping, permanent cover);
- Income diversification: through rational natural resource use and/or diversification of crops and tree species to increase the producers' resilience to outbreaks of disease, etc. At the beginning of the 20th century, West Africa was home to a forest area covering 1.5 million km² (about 150 million ha). Today, only 20 % of this area remains (there has been a loss of 94 % of forest cover in Côte d'Ivoire over the last 60 years). It is still in danger due to constant exploitation and clearance by local populations who need timber and arable land (IUCN, 2005). The evolution of West Africa's forests is illustrated in the figure opposite.

1 Regulation adopted in December 2022: REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the making available on the Union market as well as export from the Union of certain commodities and products associated with deforestation and forest degradation and repealing Regulation (EU) No 995/2010.

FIGURE 1 Coverage of dense and degraded forest from 1975 to 2013



Source: CILSS 2016.

INTRODUCTION

At the beginning of the 20th century, West Africa was home to a forest area covering 1.5 million km² (about 150 million ha). Today, only 20 % of this area remains (there has been a loss of 94 % of forest cover in Côte d'Ivoire over the last 60 years). It is still in danger due to constant exploitation and clearance by local populations who need timber and arable land (IUCN, 2005). The evolution of West Africa's forests is illustrated in the figure opposite.

In this landscape, agriculture, including cocoa, plays an important role alongside other factors such as logging, mining, bushfires, etc.

Cocoa cultivation is one of West Africa's most important resources: Côte d'Ivoire produces 40 % of the world's cocoa production, Ghana 15 %, and Nigeria and Cameroon both produce 5 % (FAOSTAT, 2021). In Ghana and Côte d'Ivoire, it supports not only the farmers (1.5 million farmers derive 70-100 % of their income from it), but also the economy: 68 % of agricultural export revenues in Côte d'Ivoire are from cocoa, which is equal to 10 % of the national economy (World Bank, 2019). This 'revenue' culture also contributes to local development (financing requirements, such as education and health), as well as being a source of wealth and work.

However, the international value chain structure and a low export price lead to low incomes, estimated at 50 cents per day on average (Mighty Earth, 2017), and therefore to the growers' inability to invest in labour, fertilisers and equipment, which are necessary for maintaining satisfactory yields over the longest possible term. On the other hand, to maximise yield in a shorter time, cocoa trees are grown in full sun, i.e., without shade, that quickly depletes the fields, which are then abandoned in favour of new forest areas (Angoran E.J., 2018; Ruf F., 1995; Tondoh et al., 2015). The consequence of this loss to the farm yield or production level on a regional scale has resulted in cocoa plantations shifting to new areas. Generally, the creation of new fields leads to deforestation (Ruf F, 1995; Gockowski and Sonwa, 2011; Amiel F, 2019b). Cocoa cultivation is therefore recognised as the main deforestation driver in this area (30 % in Côte d'Ivoire alone) during the expansion of cultivated areas (40 % over the last 20 years) (Mighty Earth, 2017).

These low incomes also lead to social challenges, including the inability to hire skilled or even unskilled workers, which then involves the employment of children in physical or dangerous positions (use of machetes, carrying heavy loads).

Development practitioners, research centres and the private sector have identified very real solutions to these challenges. However they need to learn not only techniques and practices but also how to invest in transitioning from current models to models that are economically, socially and environmentally viable.

PAPFor is a 4-year European programme under the umbrella of the Economic Community of West African States (ECOWAS) and the West African Economic and Monetary Union (WAEMU). Its objective is the sustainable management of protected areas and forestland, as well as regional convergence on this theme. PAPFor sees cocoa as a development path for the communities of the landscapes concerned, but on a sustainable basis from the outset so that the value chains are compatible with the European regulation to avoid imported deforestation[2]. To this end, PAPFor wishes to conduct a review of the projects that are supporting and developing the cocoa sector in West Africa, so as to understand the impacts, bottlenecks and dynamics of these different projects, including how to identify actions to help producers and to provide them with reference points to show how their impacts on biodiversity can be reduced.

2 Europe is behind China, the second largest contributor to deforestation due to the import of agricultural products. The regulation adopted in December 2022 aims to reduce its impact in terms of deforestation and forest degradation worldwide, and limit greenhouse gas emissions and biodiversity loss.

1

STUDY CONTEXT, OBJECTIVES AND APPROACH

1.1 CONTEXT

PAPFOR PROGRAMME

The overall objective of PAPFor, a programme funded by the European Union (EU), is to protect and enhance the protected transboundary areas of the West African rainforest ecosystem (in Guinea, Côte d'Ivoire, Liberia, Sierra Leone and Nigeria).

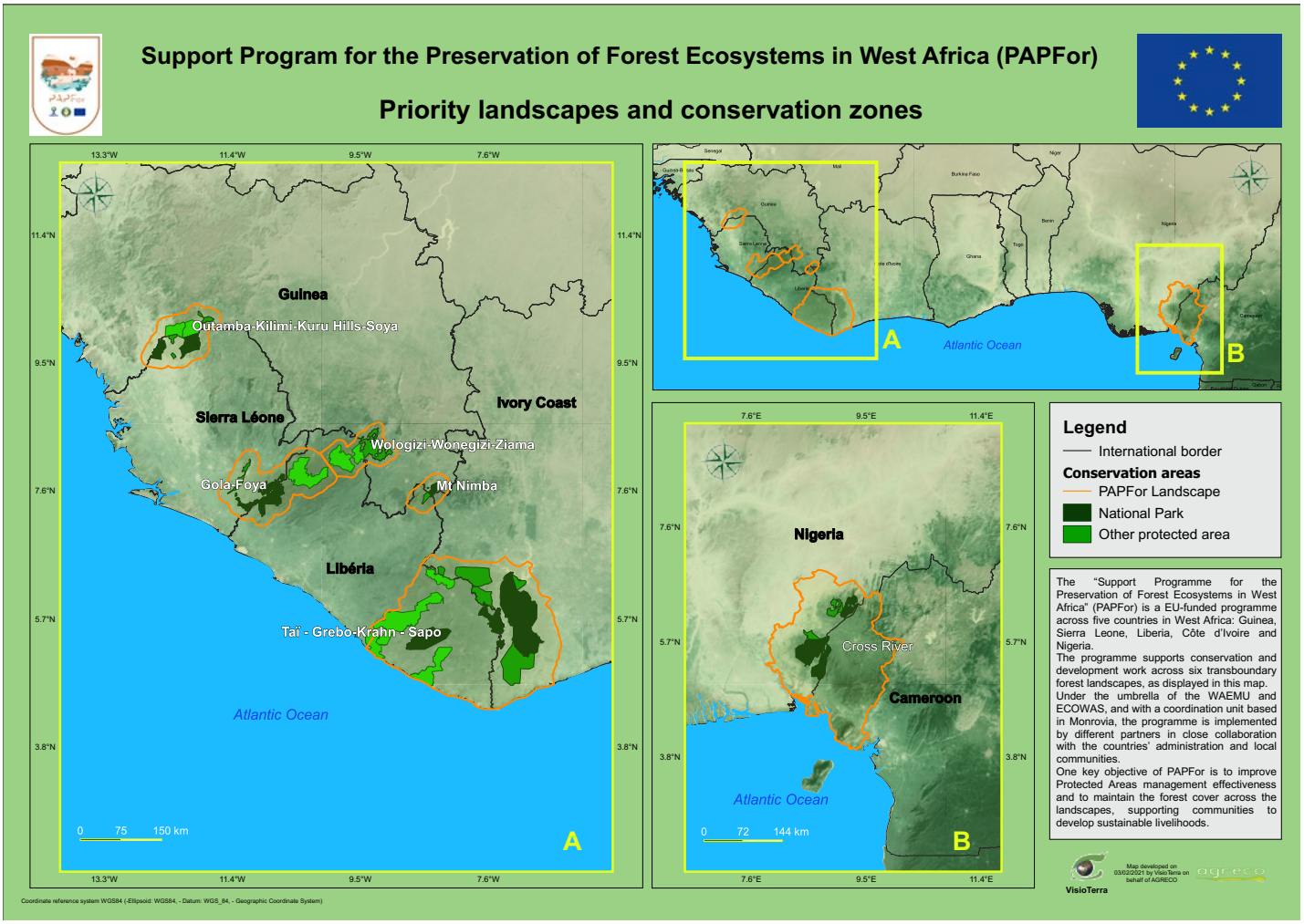
PAPFor is made up of two components:

- A 'field' component, set up by different implementing agencies through 6 cross-border forest landscapes;
- A second component, for regional convergence and integration.

Field activities are focused on 6 priority forest landscapes:

- Outamba - Kilimi - Kuru Hills - Pinselli - Soyah
- Gola - Foya
- Wologizi - Wonegizi - Ziama
- Mount Nimba
- Taï - Grebo-Krahn - Sapo
- Cross River

FIGURE 2 Map of priority landscapes supported by PAPFor



THE WABICC AND WABILED PROGRAMMES

The West Africa Biodiversity and Climate Change (WABiCC) programme was created to address the threats of ineffectiveness in programmes hampered by limited intra-regional coordination, as well as by a lack of communication and outreach to policymakers and the general public. It ended in February 2021 and the West Africa Biodiversity and Low Emissions Development (WABiLED) programme then continued the work (WABiCC, 2021).

The WABiLED programme has a 4-year duration and is funded by the United States Agency for International Development (USAID). It has three main objectives:

- combating wildlife trafficking and improving great ape conservation;
- reducing deforestation, forest degradation and biodiversity loss in key transboundary forest landscapes;
- reducing greenhouse gas emissions and increasing carbon sequestration through land use.

The programme works with partners to build the capacity of networks and institutions in law enforcement, implementation of cooperation strategies and economic planning.

TABLE 1 Level of implementation of cocoa projects in the different PAPFor landscapes

Landscape	Gola - Foya	Wologizi - Wonegizi - Ziama	Taï - Grebo-Krahn - Sapo	Cross River
Country	Sierra Leone, Liberia	Guinea, Liberia	Côte d'Ivoire, Liberia	Nigeria, Cameroon
Partners	RSPB, SCNL, CSSL, different farmers' associations	GRET, FFI, MGE, ADCAP	GIZ, NOFNA, YVEO, Earthworm Foundation, World Chimpanzee Foundation, LISUPED, FACE, WHH	Wildlife Conservation Society, Cross River National Park authorities
Main achievements	Creation of an association of producers and found economic opportunities with a premium price	Training in agroforestry, forestry and market gardening technical routes	Participatory approach to forest conservation Search for multiple interests in the preservation and transformation of NWFP	Decrease in hunting levels in the park Increased implementation of good agricultural practices (GAP), more sustainable cocoa areas and increased wellbeing of targeted communities
Main challenges	Lack of financial means, short-term projects (4 to 5 years)	Increasing production by reducing pressure on the forest	Lack of GAPs for cocoa in the landscape, finding alternatives to logging	Obtaining seeds and plant material of good quality (from the CRIN), conservation of wildlife, propose effective economic alternatives to ensure preservation Improving the effectiveness of conservation laws
Number of beneficiaries	1 766 in Sierra Leone and 105 in Liberia	X	Tens of thousands	100 communities including 2 000 inhabitants

TABLE 1 Continued...

Landscape	Gola - Foya	Wologizi - Wonegizi - Ziama	Taï - Grebo-Krahn - Sapo	Cross River
Resource available	USAID-WABiLED and EU-PAPFor partnership, documents on the establishment of farmers' groups	Identification sheets Image boxes	Awareness-raising tools, inventory of cocoa production on the national park's outskirts, studies on species of shade trees and agroforestry devices suitable for cocoa farming	Use of a spatial tool for patrol monitoring (SMART tool), questionnaire to collect primary needs (BNS) Working together with the state; farmers are an integral part of conservation
To be integrated during future projects	Replant more in degraded areas while restoring forest areas; integrate more training	Devote budget and time to training in purely technical aspects, support structuring and marketing to ensure economic viability	Consider the project environment (gold panning, poaching) having direct consequences on preservation Rely on customary laws to introduce new regulations	Have a seed production centre to become independent Working in partnership with market players to ensure economic viability

1.2 OBJECTIVES AND EXPECTED STUDY RESULTS

This study was conducted as part of component 2 and a collaboration between PAPFor and WABiLED, a USAID-funded programme. The mission's overall objective is to provide conservation practitioners with a comprehensive set of references and tools to ensure that the 'cocoa initiatives' included in the programmes funded by the European Union and USAID in the geographical areas covered by PAPFor and WABiLED are as effective as possible, and that they contribute to the conservation of Guinean forests and their biodiversity, while supporting the livelihoods of communities living around protected and conserved areas.

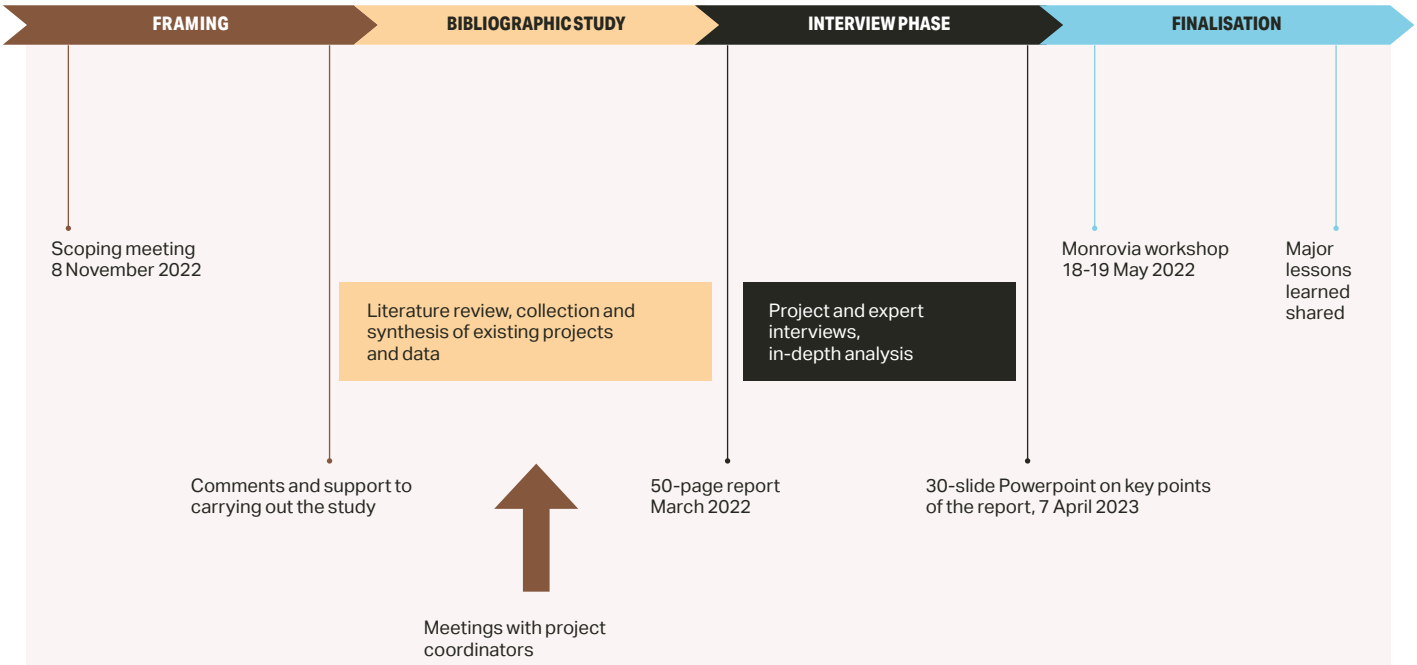
The study aimed to analyse the lessons learned, the challenges of the past and the ongoing initiatives that promote coexistence between forest conservation and environmentally friendly cocoa development in West Africa. An important aspect of the mission was to provide an external perspective, making it possible to identify recommendations in support of EU and USAID interventions. The major forest states of West Africa were emphasised: Guinea, Sierra Leone, Liberia, Côte d'Ivoire, Ghana and Nigeria/Cameroon.

It had to also lead to recommendations consistent with the EU regulation adopted in December 2022, aimed at avoiding imported deforestation, so that cocoa value chains developed in the PAPFor zone are eligible for the European market.

1.3 TECHNOLOGICAL APPROACH

The assessment was undertaken in methodological steps:

FIGURE 3 Methodological phases of the study



Source: Kinomé 2023.

PHASE 1: SCOPING
A scoping meeting was held on 8 November 2022 to ensure each of the study's stakeholder's roles and missions.

PHASE 2: BIBLIOGRAPHIC STUDY
The bibliographic study aimed to identify useful knowledge and resources on the 'sustainable cocoa' and 'conservation' connection. Thus, sites existing in the world and specifically in West Africa were inventoried, with the cocoa sector, cocoa agronomy, sustainability and the environment as key themes.

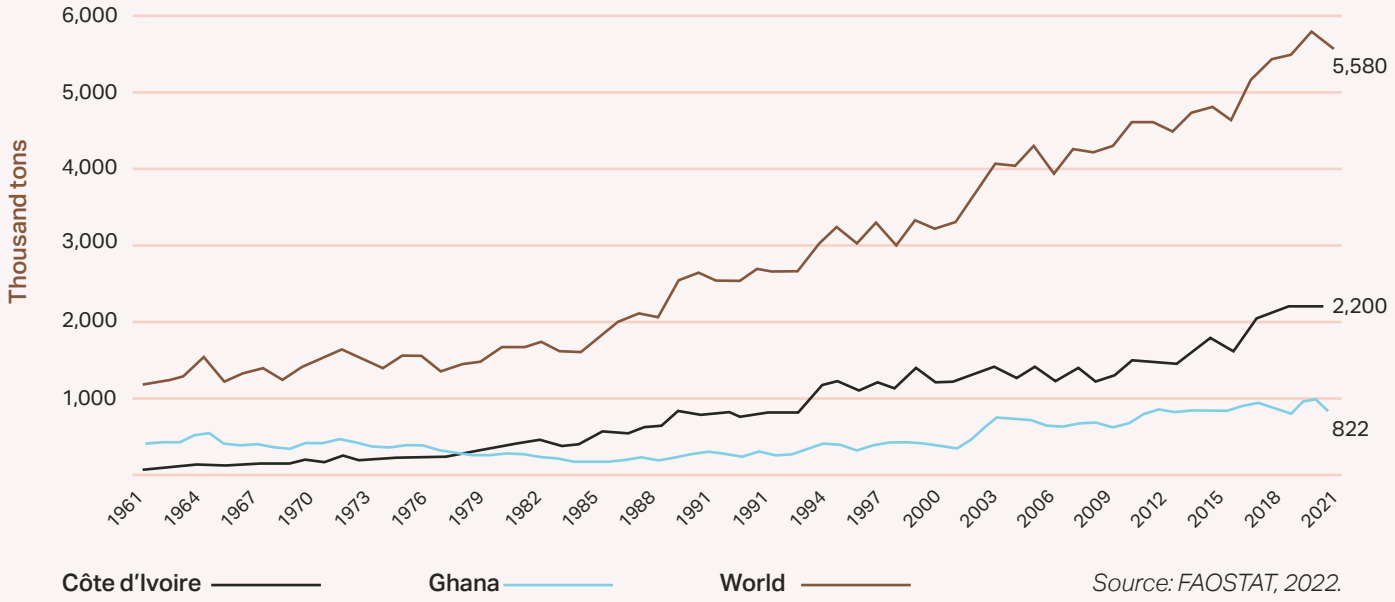
PHASE 3: INTERVIEW PHASE
An interview phase was added to allow each stakeholder to contribute to identifying lessons learned, challenges and major successes, and as a means for them to provide suggestions for better effectiveness of future projects. This phase also involved the use of subject-specific experts to further the analysis. Finally, it was an opportunity for the farmers to present their practices or intentions regarding cocoa farming. This phase was exclusively in the form of telephone interviews or videoconferences. The list of interviews is provided in Chapter 10: List of interviews conducted as part of the study (list of interviews performed within the study).

PHASE 4: FINALISATION
This phase aimed at analysing and summarising the sources and then compiling stakeholder feedback to make the report straightforward to use by all stakeholders.

2

COCOA SECTOR ECONOMY

FIGURE 4 Evolution of cocoa production in thousands of tons from 1960 to 2021



Source: FAOSTAT, 2022.

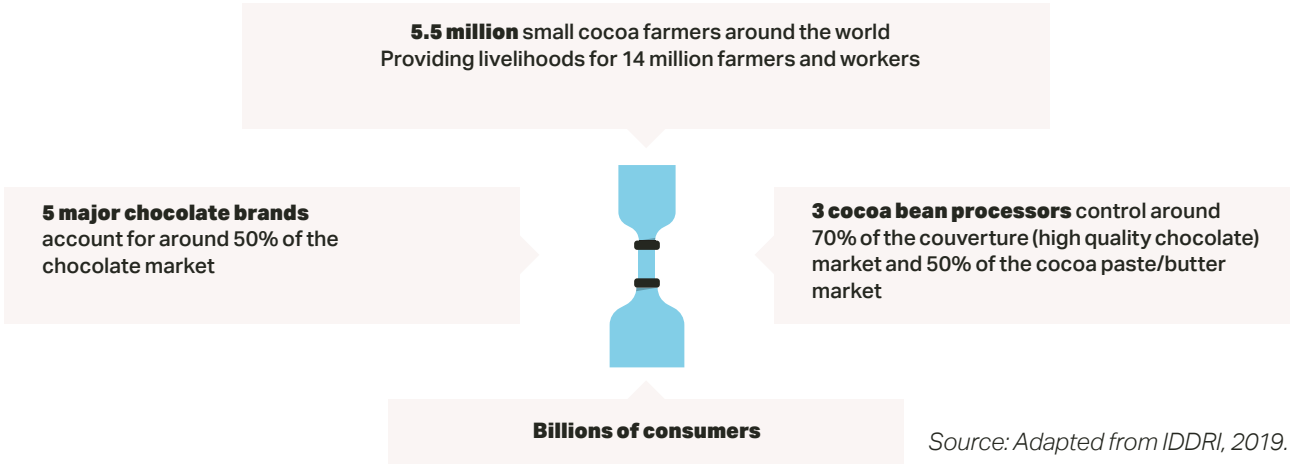
2.1 VALUE CHAIN AND KEY PLAYERS

Cocoa is classified as an agricultural commodity, i.e. it is placed on international markets and a product sample is easily substitutable given standardisation. Only the quantity and a few physical quality criteria are checked (in particular the size and quality of the beans, checked by the 'cut test' and humidity level). There is a much smaller quantity of speciality cocoa on the commodity markets; this is selected on the basis of organoleptic properties, sustainable production methods or social criteria.

According to FAO data, production has steadily increased over the past five decades (Figure 4). In the upstream section of the chain are millions of smallholders who farm fewer than 10 ha; cocoa is generally their main source of financial income, so they are relatively specialised. Paradoxically, producers are mostly structured.

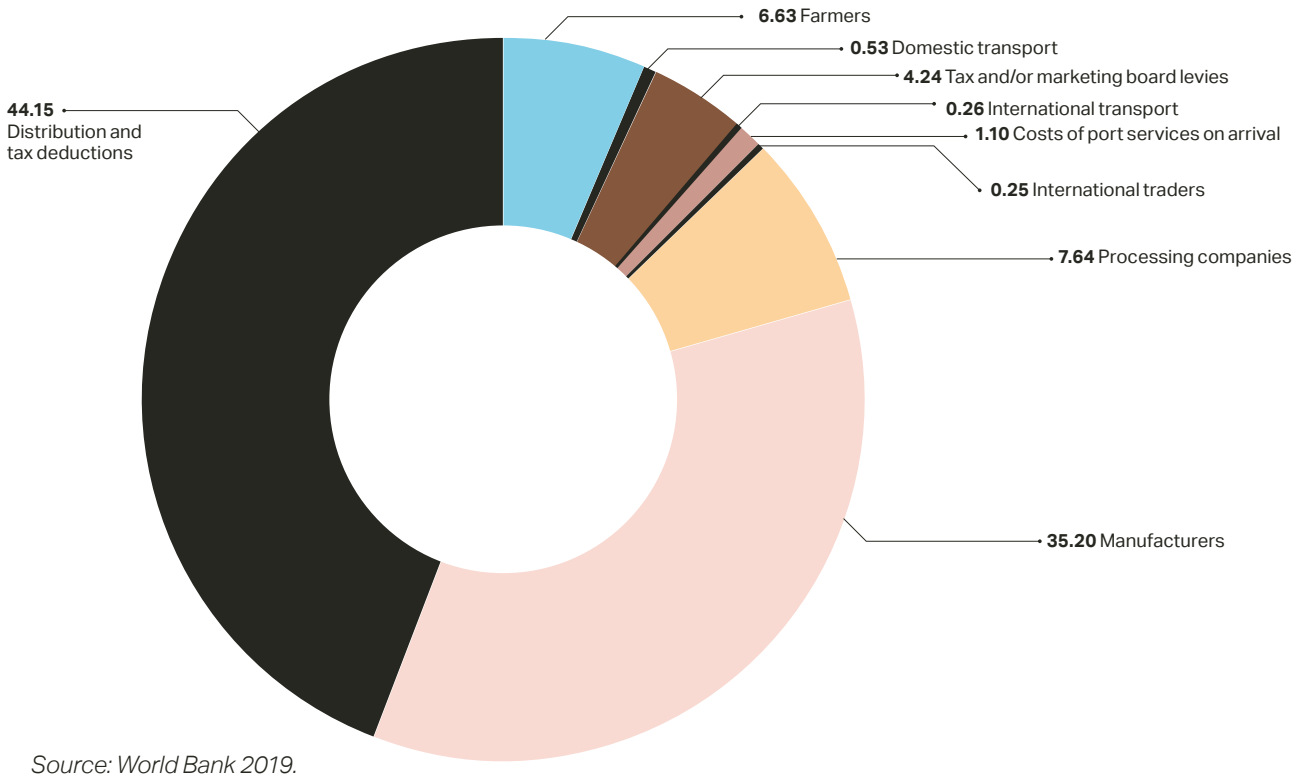
The number of players has decreased at the centre of the value chain, which concentrates the power in terms of purchasing and market share in the hands of a reduced number of players (Figure 5). For example, the four main grinders (those that process the beans) increased from a cumulative market share of 47 % to 65 % between 2006 and 2015 (IDDRI, 2019). Production is atomised, reduced into many units implemented by millions of small producers in the world. Atomised production, facing buyers in oligopoly, is obviously a source of imbalance. Producers hold a very small share in the distribution of the price of a chocolate bar and in the distribution of the added value.

FIGURE 5 Bottleneck in the cocoa chain



Source: Adapted from IDDRI, 2019.

FIGURE 6 Distribution of the added value to a ton of cocoa in the global value chain



Source: World Bank 2019.

2.2 WEST AFRICA'S MAJOR ROLE

The cocoa tree, originally from Central America, is grown only in the intertropical zone. It is now present on all continents in the cocoa belt but more abundantly in West Africa where the tree was introduced at the beginning of the 20th century.

In 2021, the African continent produced 68 % of the world's cocoa, Asia 14 %, Latin America 18 % and Oceania 1 %. The top 5 majority producing countries are Côte d'Ivoire, Ghana, Indonesia, Nigeria and Cameroon. They accounted for 84 % of global cocoa areas in 2017 (FAOSTAT, 2021). In Africa, other countries cultivate cocoa in a lower proportion, including Sierra Leone, Liberia and Togo.

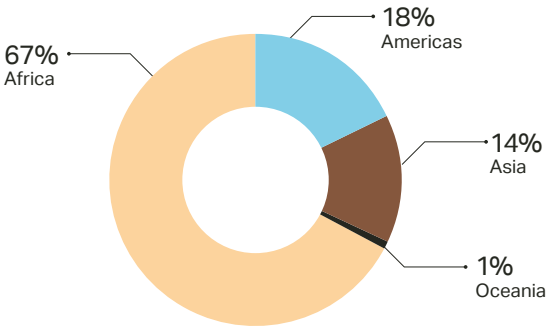
Although Côte d'Ivoire currently accounts for nearly 40 % of world production, cultivation first began on the African islands of Bioko and São Tomé and in Ghana at the end of the 19th century. About 30 years later, around 1920, African production had expanded and surpassed that of Latin America. In Ghana and Côte d'Ivoire, the agricultural development objectives of the colonial powers and the then newly independent states pushed towards expanding cocoa farming. Whether United Kingdom for Ghana or France for Côte d'Ivoire, this sector was supported by the establishment of infrastructure (mostly transport routes) that enabled the installation of small producers in remote places for export cultivation. The increasing commercialisation of these economies via the establishment of markets and taxes also stimulated the production of this commercial culture.

The effects of several coups as well as the development of the Swollen Shoot virus have slowed the growth of Ghana's production. Since 1970, an accelerated growth of Ivorian production has been observed, in particular due to a proactive policy of the then President, Félix Houphouët-Boigny, and a fairly strong Ivorian cocoa union. President Houphouët-Boigny favoured the primary sectors, especially cocoa and coffee, allowing Côte d'Ivoire to become the giant producer of cocoa we know today (Universalis encyclopaedia, 2018). Thus, from 1911 to 1978, Ghana (Gold Coast) was the first major cocoa producer in the world, followed by Côte d'Ivoire (Figure 4). Since then, these two countries have remained at the top of world cocoa production, even today (Figure 9).

FIGURE 7 Cocoa production by state and territory in 2020

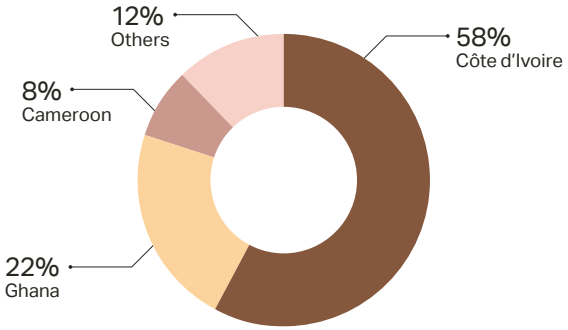
Source: FAO.

FIGURE 8 Global production of market cocoa in 2021



Source: FAOSTAT.

FIGURE 9 African market share for cocoa production in 2021



Source: FAOSTAT.

On the other hand, the agricultural system that has worked so far in the two cocoa flagship countries is coming to an end: the forest cover is rapidly shrinking in Côte d'Ivoire and Ghana, and migration to new fertile lands conducive to cocoa farming is becoming increasingly complex. Maintaining their position as the world's leading producers and conserving the few remaining forest areas are their two major challenges, which do not necessarily go hand in hand.

For other West African countries, the challenge is to develop the sector without reproducing this dynamic. However, the question is what model should be put in place.

2.3 VALUE CHAIN GOVERNANCE IN SELECTED WEST AFRICAN COUNTRIES

Depending on their cocoa history and the sector's weight in the national economy, countries do not have the same type of organisation. The following table summarises the sectoral governance by country.

TABLE 2 Cocoa sector governance by country

	Côte d'Ivoire	Ghana	Liberia	Sierra Leone	Nigeria	Guinea
Share of cooca in the country's exports (Workman D., 2021)	15 % of GDP, 1st exported product (51.4 % of national export)	1st agricultural product exported, 3rd product exported (22 %) (MEFSIN, 2021)	5th product exported (after rubber, diamonds, gold and silver), cocoa is a new sector of opportunity in the country	1st agricultural product exported (85 %), 4th exported product (5 %)	1st agricultural product exported, 4th exported product (1.3 %)	Has a minimal place in Guinea's exports (12 000 tons/ year in 2020)
Regulatory authority	The Cocoa Coffee Council (CCC) is the body entrusted by the Ivorian State with the regulation, stabilisation and development of Côte d'Ivoire's coffee and cocoa sector, and has been since 2012. It is the result of the amalgamation of the Coffee and Cocoa Exchange (BCC), the Cocoa Coffee Regulation and Control Fund (FRC), the Coffee-Cacao Producers Development Fund (FDPCC) and the Cacao Coffee Regulatory Authority (ARCC).	The Cocoa Board (COCOBOD) is responsible for facilitating, regulating and developing cocoa production and trading in Ghana. It was created by executive order in 1947 from Ghana's share in the West African Produce Control Board. COCOBOD has many divisions, such as Seed Production Division and Quality Control Company Limited. Each division has its own role.	The only entities that directly regulate the market are the Government of Liberia and the Liberia Agriculture Commodity Regulatory Authority (LACRA), which replaced the Liberia Produce Marketing Corporation (LPMC) in 2016. The Liberia National Cocoa and Coffee Export Association (LINACEA) also belongs to the landscape	The Ministry of Agriculture and Forests (MAF) is the body that mainly deals with the development of the cocoa sector. It collaborates with the Sierra Leone Investment & Export Promotion Agency (SLIEPA) on plant promotion, with the Produce Monitoring Board (PMB) on quality and certification and with other ministries on certain themes (finance, market, etc.). (Conteh E., 2019) The goal is to create the National Cocoa Development Board (NCDB).	The Federal Ministry of Agriculture and Rural Development (FMARD) is responsible for the cocoa sector. The Ministry of Trade and Investment is in charge of quality control of exported cocoa (Hütz-Adams et al., 2016).	Guinean Agency for the Promotion of Exports (AGUIPEX), with the adoption in 2020 of 6 standards governing the sector and its sustainability.

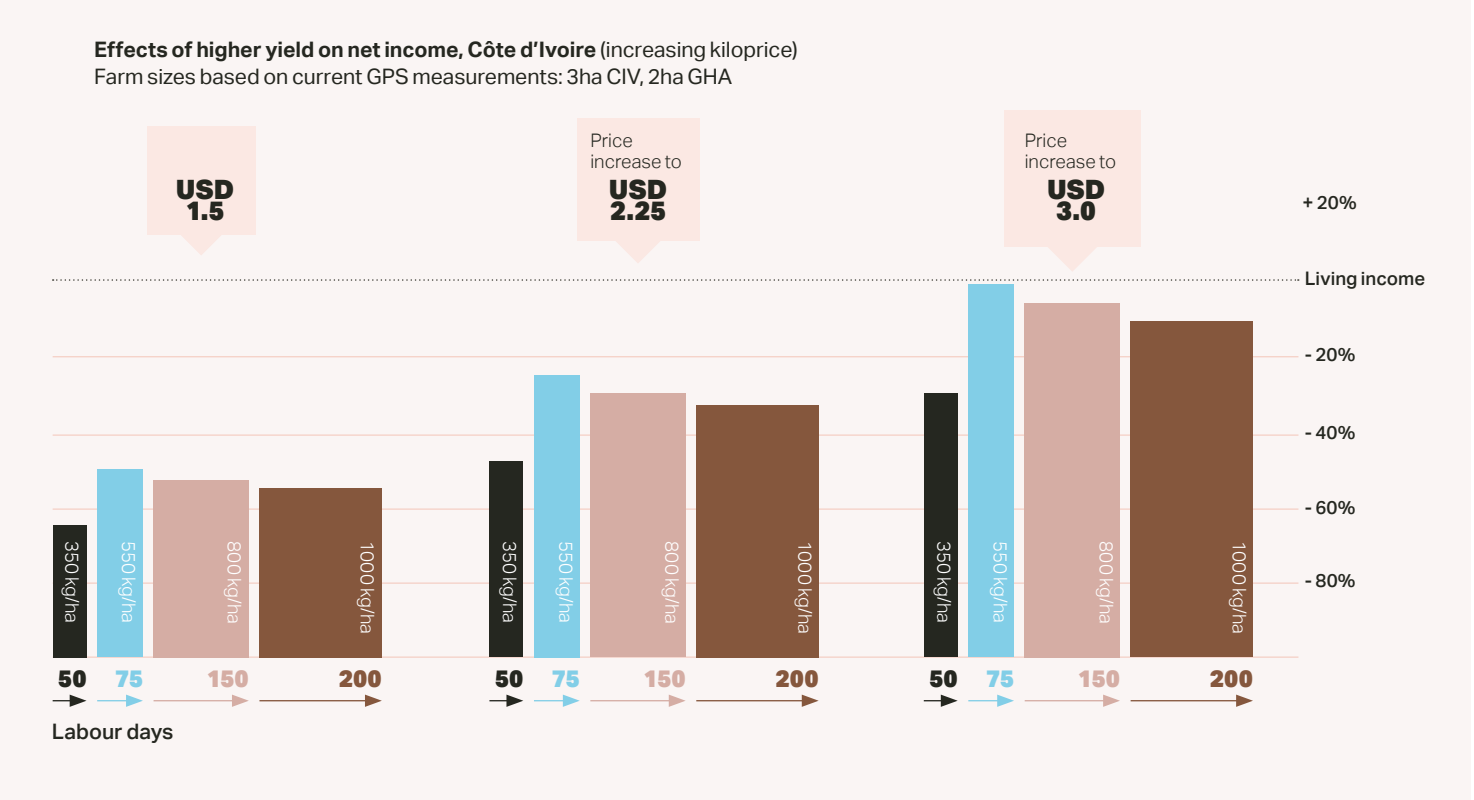
TABLE 2 Continued...

	Côte d'Ivoire	Ghana	Liberia	Sierra Leone	Nigeria	Guinea
Research organisations	The CNRA, or National Centre for Agricultural Research, is in charge, among other things, of varietal research. For example, the CNRA has made available to cocoa farmers varieties with high yield potential (large pods with beans meeting the official size criteria) that are supposed to have good sensory qualities or tolerance to cocoa swollen shoot virus disease (CSSVD).	CRIG (Cocoa Research Institute of Ghana) is a division of COCOBOD. This entity has several axes of study: on the establishment and improvement of cocoa orchards but also on the issue of disease information and the development of new products. This division is also responsible for mapping the sector in Ghana.	Central Agricultural Research Institute (CARI) is Liberia's agricultural research centre. However, it appears to have stopped cocoa research during the civil war and has not resumed activities on these topics since.	Sierra Leone Agricultural Research Institute (SLARI) was established in 2007 as a semi-autonomous state agent. The main research line expected by the Government is an approach by the Agricultural Production Value Chain for commercial rather than subsistence agriculture.	The Nigerian Institute of Cocoa Research (CRIN) is developing cocoa species that are more resistant to disease and have high yield potential. The CRIN is also responsible for providing cocoa farmers with better quality plants.	IRAG, Agronomic Research Institute of Guinea
Dissemination and supervision structures	The mission of ANADER (the National Rural Development Support Agency) is to contribute to the improvement of rural living conditions through the professionalisation of farmers and professional agricultural organisations. In the cocoa sector, it publishes official guides and trains via its wide network of organisers while managing collections of cocoa clones with various properties (tolerance to mirids, CSSVD, brown rot, good yields, etc.).		Liberian National Cocoa Sector Public-Private Platform (NC3P)	The data concerning cocoa in Sierra Leone is little known at the moment, recovered marginally by non-governmental organisations (NGOs) during missions, but not yet complete, organised and centralised. The MAF, in collaboration with other bodies (SLARI, NCDB, StatSL), is responsible for carrying out this work according to the National Cocoa Value Chain Policy document.	The Central Bank's NIRSAL Division (Nigerian Incentive-based Risk-sharing System for Agricultural Loans) guarantees loans to trading companies and cocoa farming groups. NIRSAL also provides technical assistance and assistance in the implementation of projects managed by donor organisations.	
Fixed price (Y-N)	Yes	Yes	No / Yes some years, e.g. 2020-2021 (LACRA)	No	No	No
Possibility for export, direct purchase from planters (Y-N)	Yes	No (not for certified cocoa at least)	Yes	Yes	Yes	Yes

3

ISSUES IN THE COCOA SECTOR

FIGURE 10 Profitability based on price per kg and productivity per ha



Source: Cacaobarometer, 2022

With a concentration of more than 70 % of the world's cocoa production, West Africa's cocoa sector also faces many challenges. A Hardman agribusiness study identified very different dynamics between Africa, Latin America and Asia in terms of cocoa production and yield (Chen Y., 2016). According to the authors, African production increased when the areas were harvested, as yields tended to remain stable or even slightly decreasing. Thus, the structural increase in production may be directly related to encroachment on forests. This illustrates that field productivity in West Africa is slowly declining and that constant demand has pushed farmers to expand their farms. In addition, despite low prices, producers are tempted to expand their area to compensate for the price differential, referred to as the scissor effect, between cocoa and other goods and/or services (health, education, etc.).

Growth has therefore been achieved at considerable social and environmental cost, as set out below. To maintain its position as a world leader, West Africa needs a profound structural change to its agricultural model (e.g. South America has a more respectful and growing production).

3.1 DECENT INCOME

The cocoa price has been hovering around USD 2 400 per tonne for five decades and despite chocolate price increases, producers are not earning more. In 1970, the cocoa bean accounted for 50 % of the chocolate bar's value. Today, producers only receive 6 % (The Guardian, 2022). The conventional sector, dominated by a few actors and increasingly financialised, is not sustainable because of purchases at low prices compared to local producers' economic needs. This entails societal costs in the countries that cultivate the crop. Producers' income is far below subsistence level and even far below the average income of this sector. For example, in Côte d'Ivoire in 2017, the median income of a producer household was USD 1 919 per year while the minimum subsistence income for a typical household of 8 people in Côte d'Ivoire was estimated at USD 7 318 per year (Fairtrade, 2018). The debate about lifting West African cocoa farmers out of poverty has been going on for years. The cocoa farmers' labour budget does not allow them to hire sufficient and qualified labour, or even to increase productivity (an operation that requires upstream investment).

In addition, in response to the possibility of reducing cocoa farmers' poverty, most private enterprise projects focus on improved productivity, which does not provide a better net income to the producer. Indeed, high productivity implies a greater volume of work, which does not solve the problem of salary. For example, according to Hütz-Adams (2016), to cover the costs of only 10 days of additional labour and inputs related to the search for productivity, it would take almost 100 kg of additional cocoa. There is no price guarantee, and the climate risks persist. It has been shown that increasing productivity and the surface area of cocoa fields could aggravate the social situation by placing the risk increasingly on the producer (Hutz-Adams, 2022).

Thus, one of the best ways to properly increase producers' incomes is to increase the price per kg actually paid. According to the Cocoa Barometer, productivity influences producers' income marginally (and not only positively).

UNDERSTANDING THE DEFINITIONS AROUND CHILD LABOUR

Child labour does not pertain to all children on cocoa plots, neither to all the tasks entrusted to them.

There is:

- light work: occasional tasks that do not interfere with schooling or the opportunity to enjoy childhood;
- child labour: work that interferes with schooling, the ability to enjoy childhood and endangers health or well-being;
- worst forms of child labour (WFCL): whether conditional or unconditional, these have been ratified by all countries (ILO Convention 182), including trafficking, slavery or forced labour.

PRODUCTIVITY ≠ DECENT INCOME

HIGHER PRICE PER KILO => BETTER INCOME TO THE PRODUCER

3.2 HUMAN RIGHTS

The 2022 Cocoa Barometer draws up a long, non-exhaustive list of the human challenges of cocoa production areas that need to be managed properly in the context of sustainable production: gender inequality; child malnutrition; lack of access to education, sanitation and inadequate health structures; insecure land tenure, etc. There is a specific action plan for each challenge. Access to a living income is the key to resolving all these difficulties, although it is essential to note that the living income is a step towards improving living conditions and not an end goal.

Today, about 2 million children work in the cocoa sector (BASIC, 2016). While it is necessary to make a distinction between child labour, slavery and casual help in the fields, it is important to face facts and take drastic measures to stem this destruction of universal human rights. The International Labour Organisation (ILO) drafted laws to safeguard children's rights; some links are available in appendix 1.

An integrated system in the supply chain now makes it possible to identify children forced to work. Child Labour Monitoring and Remediation Systems (CLMRSs), when designed correctly, identify 60 % of children who are forced to work and then lead almost half of these children to stop working after three years of monitoring. The CLMRS cost is negligible for the exporter. The barometer estimates it at USD 85 per household or 6 % of the producer price (which itself represents 6 % of the final price).

Gender inequalities are strongly present in cocoa farming, as well as in agriculture generally. Women are involved in the majority of tasks from the nursery to drying pods without obtaining the same access to services as men (e.g. consultation, certification or credits). Sustainability programmes in the cocoa sector must be designed with the gender dimension in mind; otherwise they risk increasing gender differences and failing to reach 50 % of producers.

BIODIVERSITY

Biodiversity, by definition, is all the components and variations of the living world (plant, animal, fungi, bacteria, etc.). There is ecological diversity (ecosystems), specific diversity (species) and genetic diversity (genes). Humans are dependent on this biodiversity directly (for their food needs) and indirectly (by the services that biodiversity offers, such as the contribution to regulatory services for example).

The interaction between the agricultural holding and biodiversity takes place at several levels:

- **Biodiversity of plot pollinators**
  Agroecology and biological control, including the reintroduction of auxiliary insects, make it impossible to treat plots with chemicals. Thus, whereas before a chemically treated field had a very low diversity (15 species of insects on average/plot), fields today have a high diversity (more than 800 species). Of these 800 species, the majority are considered useful species (pollinator, pest control, decomposition of organic matter, etc.).

- **Plant biodiversity of the plot**
  A genetic diversity of cocoa trees on the same plot allows for greater resilience to pests and diseases and to climate change effects. The association of species also makes it possible to extend the cocoa trees' production time (vegetation cover capturing nitrogen, agroforestry tree species, etc.)

- **Plant biodiversity of adjacent forests**
  Tropical rainforests are often very dense, with an average of 100 to 300 different species of trees per hectare. It is estimated that the world's tropical forests shelter 60 % of the world's species and varieties, thus justifying the need for their protection. Conserving forest areas create an opportunity: if the deforested plot is kept regenerated and protected for 20 to 30 years, it will regain the majority of its biodiversity and also its functionality (CO_2 capture, restoration of soil fertility and water reserves) (CIRAD, 2022b).

- **Animal biodiversity of adjacent forests**
  Plots increasingly encroaching on areas of forest enlarge the exchange zone between man and wildlife. There are two major risks: (i) the increase in poaching leading to the decline of animal populations, and (ii) an increase in infectious diseases and pandemics (zoonoses).

3.3 ENVIRONMENT AND BIODIVERSITY

Although deforestation is not due only to agricultural expansion of, this remains its main cause. Agriculture and livestock production account for 80 % of global deforestation (soybean in Brazil, cocoa in Côte d'Ivoire and oil palm in Indonesia, to name only the largest sectors).

This deforestation in favour of agriculture is the product of two distinct factors: the increase in global consumption (particularly with a growing global demography and universalising consumption patterns) and unsuitable farming methods (extensive monocultures, for example). Other deforestation is due to: an increasing number of forest fires; pests; urban sprawl (clearing land to build roads, dams and other structures), which remains minimal; timber exploitation (which still constitutes 5 % of global deforestation, especially tropical timber), mining and oil exploitation (directly and indirectly), and climate change impact (drought, floods, high winds, etc.) without forgetting issues of poor governance and economic factors (SNDI, 2018; Conservation Nature, 2022).

Unfortunately, forest destruction involves undermining an ecosystem that has many positive actions: in addition to being a habitat for biodiversity and useful resources for humankind, the forest is a barrier to climate change, constituting immense carbon sinks and protecting crops and populations from bad weather (flooding is avoided due to plants providing good soil drainage, the shade makes droughts more tolerable, trees form barriers to dry winds, etc.). Deforestation does away with all these 'ecosystem services' and creates inhospitable spaces on which to grow cocoa properly.

Some of these forests are now classified as nature reserves and protected areas nationally and internationally for preserving forest cover and endangered wildlife (hippopotamus, primates, forest elephant, crocodile, etc.) while including the development of activities by local populations in forest peripheries.

Despite these protection statuses, and therefore the prohibition of certain practices in these areas (such as agriculture, deforestation and hunting), deforestation continues to worsen (Mighty Earth, 2019).

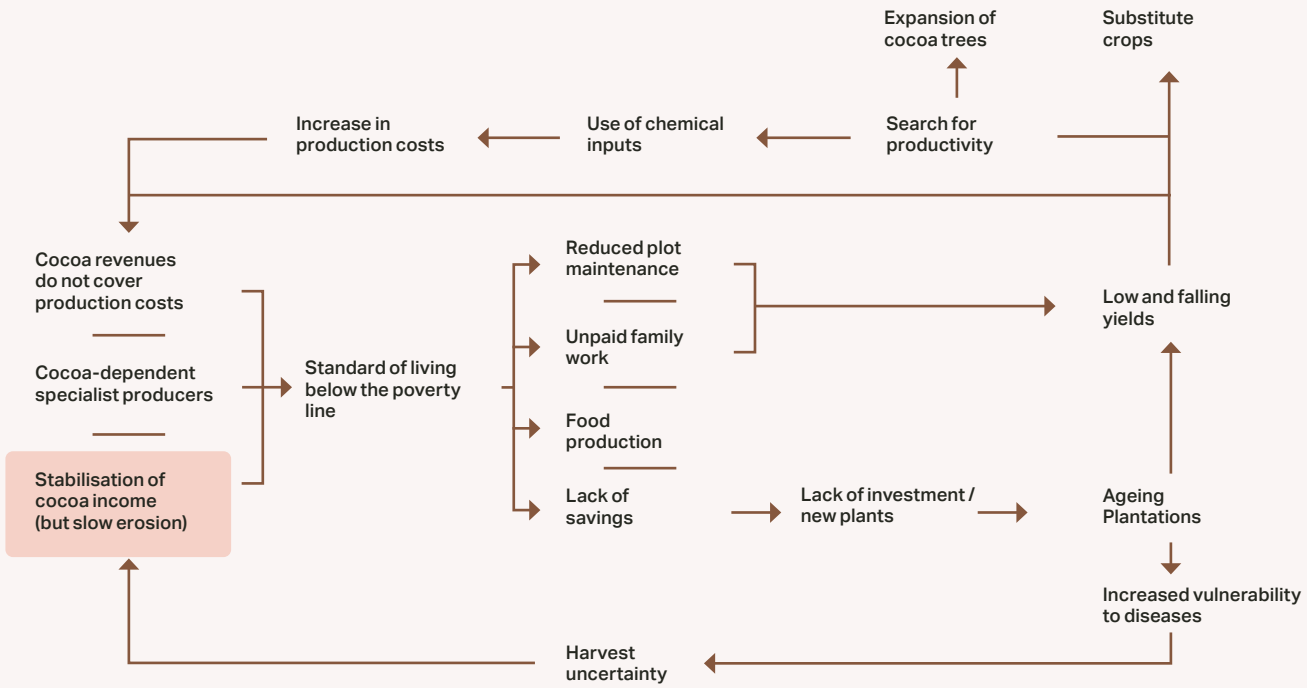
The problem inherent in this form of deforestation is that it only provides space for farmers in return for soil depletion, which implies a decrease in productivity (directly impacting small producers), pressure on wildlife and local ecosystems (destruction of natural habitats) and a loss of resilience to climate change (the disappearance of carbon sinks that these forests represent). The vicious cycle of deforestation to allow cocoa farmers to provide for their needs must be interrupted before the forest totally disappears (World Bank, 2018).

Pesticide use and other inputs is an effective way to combat the many diseases that can affect the cocoa tree. However, although some countries, such as Ghana, try to promote the rational use of these pesticides (common active ingredients: metalaxyl, cuprous oxide, cuprous hydroxide, bifenthrin, thiamethoxam, etc.), this results in greater damage than before their use: soil acidification, toxicity of products widespread in the environment, water contamination, etc.). Other pest and disease management practices are certainly more environmentally friendly but are more expensive, with less predictable results, and more complicated to implement than pesticide use (InTech, 2011).

Another problem concerning the use of plant protection products in Côte d'Ivoire (and probably in other countries too), is that glyphosate (a highly aggressive product for vegetation and probably also carcinogenic, according to the WHO) is used without protection by producers and their children to reduce the time required to weed the fields.

Due to low incomes and the lack of means to invest in the maintenance of productive cocoa (renewal, varietal selections, etc.), farmers unfortunately have few alternatives. This is how vicious circles of social and environmental destruction are created in order to increase

FIGURE 11 Cocoa crop impact loops in West Africa



Source: Le Basic, 2016.

cocoa production, as illustrated by the 2016 BASIC study shown in Figure 11. The key to sustainable cocoa is therefore access to a fair, remunerative and stable price.

Despite this context, what can keep farmers in the sector? Cocoa is an important crop for farming communities around the world as it represents a significant income source. While cocoa prices may vary from year to year, global demand for chocolate and other cocoa products remains strong, prompting many farmers to continue the crop with its assured market opportunities.

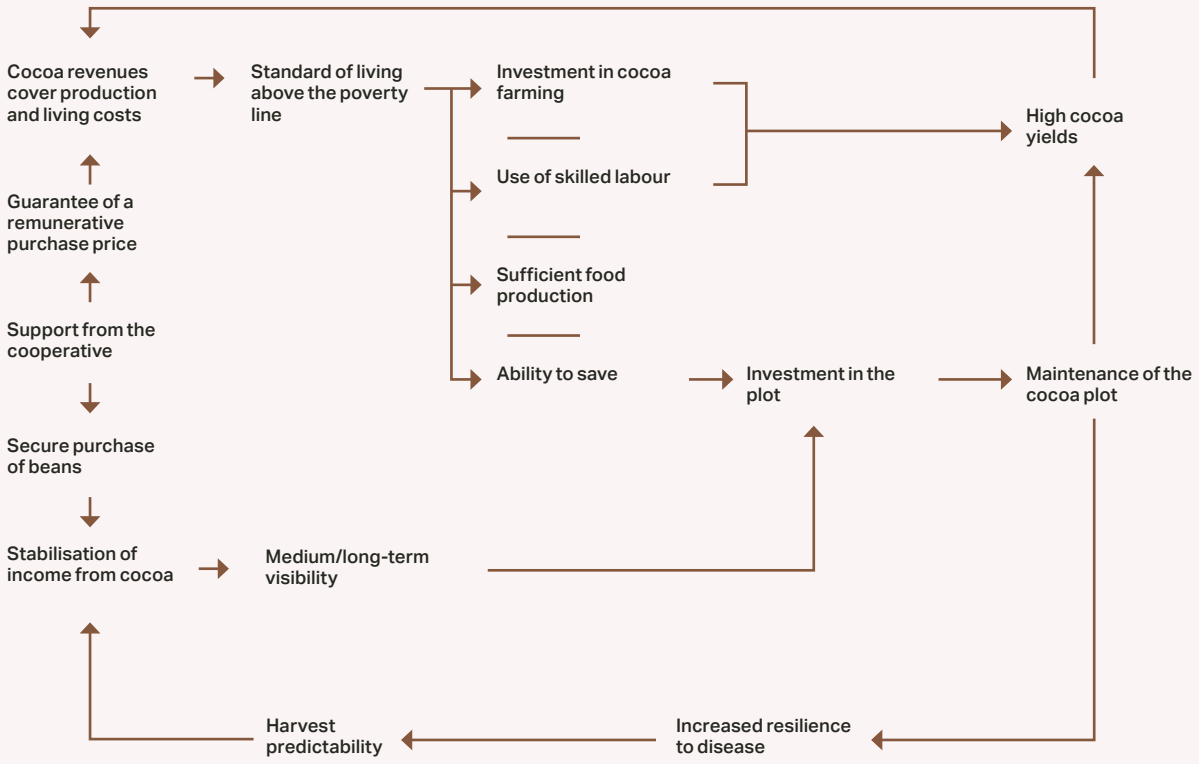
Moreover, in many countries, cocoa has been a traditional crop and a key part of the local economy for generations. Farmers often invest time, money and resources in cocoa cultivation and develop expertise in its cultivation and post-harvest processing. For many, abandoning this crop would mean losing their source of income, a way of life and the trees most probably planted by a previous generation. Furthermore, since cocoa is grown mostly in Africa in rural, remote and disconnected areas, a global vision of the sector remains inaccessible to the farmer, thus delaying their awareness of the issue.

The profitability of cocoa cultivation often depends on factors such as labour cost, market prices, the agricultural practices used and and weather conditions. Farmers can therefore continue to grow cocoa even if it is not profitable at some point, hoping that conditions will improve in the future.

Some farmers may be incentivised to continue growing cocoa because of agricultural development programmes offering financial incentives and guidance to improve crop productivity and profitability.

According to the BASIC study, this negative loop can be completely broken, taking the example of some Peruvian cooperatives that have entered a circular route, as shown in Figure 12, below.

FIGURE 12 Pathways and impact loops in certified cooperatives in Peru



Source: Le Basic, 2016.

4

CURRENT PRACTICES AND THEIR LIMITATIONS

4.1 COCOA ECOLOGY

In its natural state, the cocoa tree grows in the intertropical rainforest (especially in South and Central America). The tree needs heat (between 23 and 28°C) and requires high humidity (1 500 to 2 000 mm of precipitation per year) to be able to grow; dry seasons must last less than 3 months. Due to its sensitivity to water stress and strong winds, planting is easier under a canopy that will maintain humidity, freshness and, depending on the associated species, fertility, by transferring nutrients from the deep layers of the soil to the surface or by the fixation of nitrogen by certain species. The cocoa tree comes into production from about four years (growth phase requiring particularly shade) and experiences a production plateau between 8-12 years and 20 years; its production declines at between 25 and 30 years. In its natural state, it grows tall and provides very few pods. Insects mainly pollinate this plant.

THE MAIN COCOA GROUPS

According to the Cheesman classification (1944), three main variety groups are cultivated (Charvet, 2012):

- **Criollo**: fine and aromatic cocoa, sensitive to disease, so generally little used. It is particularly sought after as a specialty cocoa (low volumes of superior quality);
- **Forastero**: forms 80 % of the current world production, and is the easiest to grow because it is robust and resistant to disease; its potential yield is higher;
- **Trinitario**: a hybrid variety of the first two, forms 10-15 % of current world production.

DISEASES AND PESTS

The cocoa tree is prone to many pests and diseases, depending on the growing environment and the techniques used. These cause between 30 and 40 % of production loss globally.

Different species of pests affect the tree's development and production phase.

Nurseries and young cocoa trees are exposed to the greatest number of pests, which cause the most damage. Caterpillars delay development by destroying terminal buds; psyllids attack terminal buds and tender twigs; bark beetles bore tunnels in the stem, which greatly weakens the cocoa tree in its growth and productive state; and termites attack the base of young trees.

The adult cocoa tree is rather prey to mirids (4 different species), the number one scourge of cocoa trees, as well as green bugs and stem borers, which, without treatment, can cause serious plot losses. Damage by these insects results in certain plant sections drying out and can even lead to the plant's death in the event of a major attack.

These pests are most common in West Africa, but there are still others, including leafhoppers and sesiidae, especially in South America. In addition to insects, rodents (squirrels and rats in particular) consume ripe pods and destroy part of the crop.

There are two main phytopathogens that can spread within cocoa trees in West Africa:

- The first is cocoa swollen shoot virus disease (CSSVD). This viral disease, characterised by swelling in certain plant sections (stem, dry twigs, roots) as well as deformities to the pods and beans, can kill a cocoa tree in 3 years. Biting-sucking insects such as mealybugs in particular are responsible for its transmission.
- The second, which can be treated more easily, is brown rot, caused by a fungus attack (genus Phytophtora). It can cause up to 50 % loss of production if not treated. The infected pods are covered with brown stains and the beans are no longer marketable. This disease, although global, particularly affects Africa (Central Africa in particular, then it spreads westwards) because of a species of virulent fungus. As it is fungal in origin, moisture and dried pods increase this disease's opportunity to spread.

Good plot maintenance avoids creating space for the proliferation of phytopathogens. This includes regular gathering of rotten pods or uprooting plants contaminated by CSSVD.

4.2 FOCUS ON WEST AFRICA'S COCOA FARMING PRACTICES

CULTIVATION TECHNIQUES RECOMMENDED BY THE TECHNICAL SERVICES

The technical services of each producing country have official cocoa farming guides and manuals. However, their implementation by producer organisations depends on their means (and therefore on their members' ability to save and invest) and on supervision by technical services or NGOs.

To produce more pods (and therefore beans), full sun is a short-term ally. Thus farmers plant cocoa trees under cover (in forests classified fertile and available) and continue cultivation by felling trees on high peaks to allow light to penetrate the cocoa trees.

The literature also prescribes pruning cocoa trees in agroforestry, allowing a gain in productivity per hectare (from 430 to 710 kg/ha on average) by the proper use of nutrients and solar energy (Esche et al., 2021).

FIGURE 13 Recommended technical itinerary for cocoa in West Africa

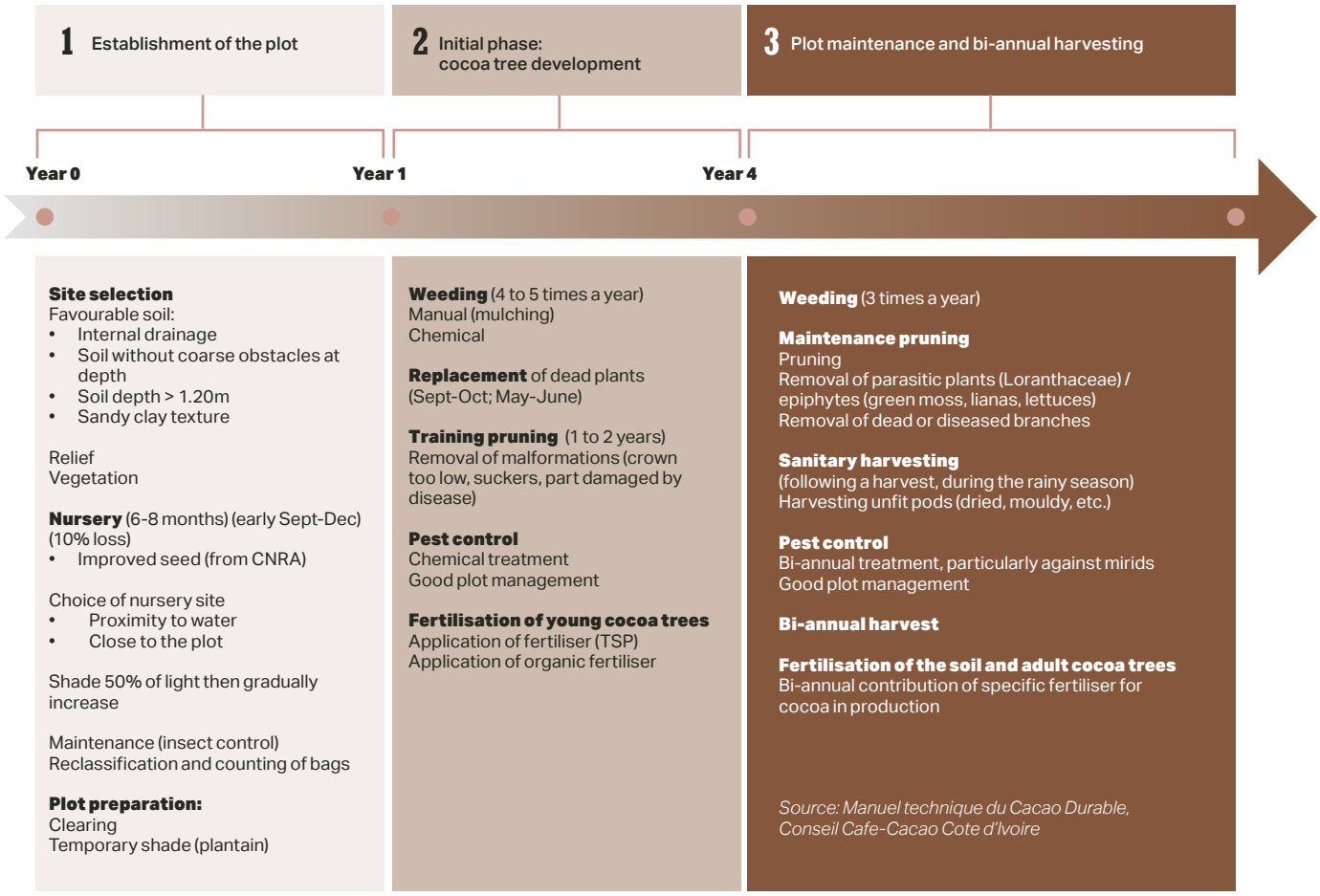
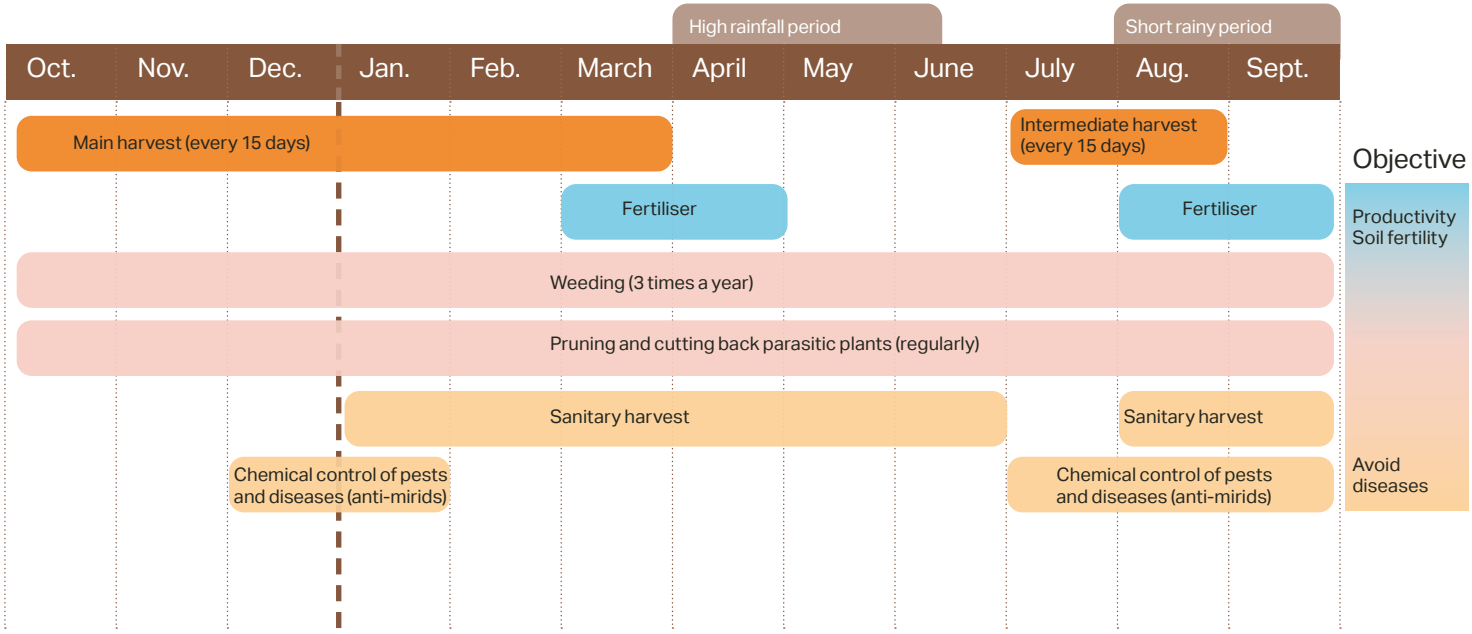
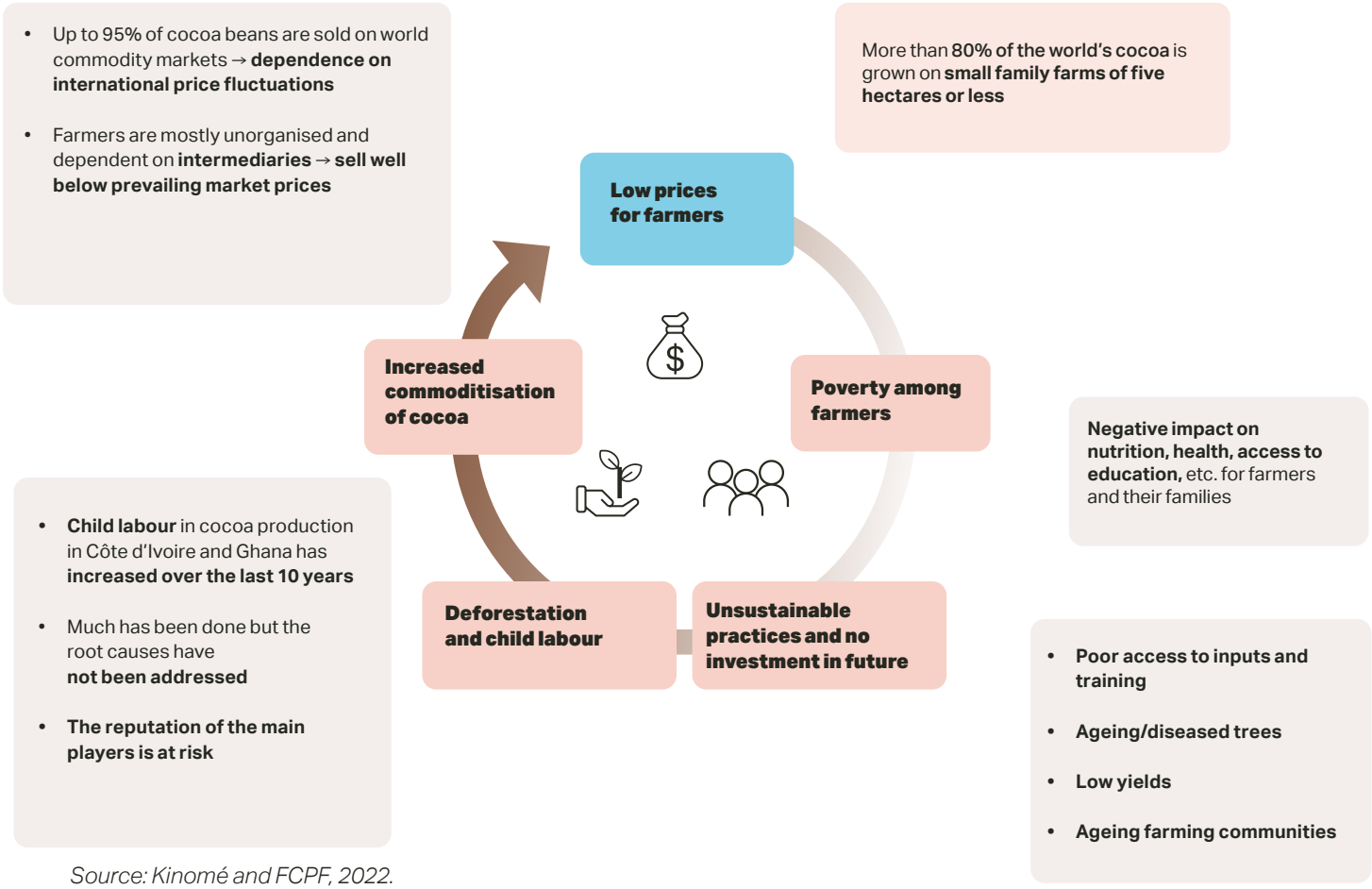


FIGURE 14 Annual agricultural summary for cocoa in West Africa



Source: Manuel technique du Cacao Durable Conseil Café-Cacao Cote d'Ivoire

FIGURE 15 The vicious circle of unsustainable cocoa



Source: Kinomé and FCPF, 2022.

Cultivation practices play an essential role, both in terms of productivity and field sustainability. Many cultural patterns and practices coexist on a global scale. They can be classified into three categories: monoculture, mixed and agroforestry systems. While monoculture dominates in Côte d'Ivoire or Ghana, in South America it is agroforestry systems (complex or not) that are predominant (Sanial, 2019).

CURRENT MAJOR PRACTICES IN WEST AFRICA AND THEIR CONSEQUENCES

This section presents the limitations of current practices. Section 5.6 details good agronomic practices to maintain a good compromise between shade rates, cocoa productivity, and pest and disease management.

The dominant practice in West Africa is cultivating cocoa in full sun or under very light shade, as farmers need to maximise short-term yields. However, over the years the fields become less productive through the degradation of soils, ecosystems and trees. They are then abandoned in favour of new forest spaces (Angoran, 2018; Ruf, 1995; Tondoh et al., 2015).

The large proportion of ageing cocoa fields explains West Africa's decline in the yields observed, while the spread of CSSVD is leading to a reduced production capacity in other affected regions. The cocoa area of Côte d'Ivoire and Ghana is composed of a multitude of fields of different age classes, including non-renewable trees with decreasing yields. Productivity on CSSVD-infested plots decreases rapidly and the field dies within a few years. Farmers often cannot escape the vicious circle of low productivity and low income, leading to a lack of investment in their farms (no renewal, diseased cocoa trees, etc.) and the persistence of low yields (Hernandez et al., 2014; Hütz-Adams et al., 2016).

Orchard depletion and therefore the decrease in yield or production on a regional scale consequently result in a shift of cocoa plantations to new areas, where the creation of new fields, in general, will cause deforestation (Ruf, 1995; Gockowski and, 2011; Amiel, 2019b).

Faced with increasing deforestation in West Africa, as well as the impoverishment of land and people, states have formulated laws and official recommendations, research institutions and NGOs have produced many guides and conducted training courses, and private companies have used internal or external standards (see section on Sustainable cocoa).

CHOICE OF CROP BIODIVERSITY

Family farming in West Africa is extremely diverse. In the early years of cocoa farming, each household grows cereals, legumes, condiments and plantains for self-consumption.

Soil types and functionalities are very diverse, even sometimes within a single farm. Farmers adapt their production to their soil and thus cultivate a diversity of species and varieties. This diversity allows them to be not only more adaptable to the terrain's specificities but also more resilient due to the assurance effect: the more the ecosystem is diversified, the more stable the biomass production will be over time, even during major climate changes or disease. Thus, seed distribution is useful to farmers but should not be exclusive: farmers can then obtain seeds and plant materials from other farmers, from different plots or at the markets (CIRAD, 2022b).

VARIETAL SELECTION AND SEED AVAILABILITY

In the mid-1970s, the 'Ghana' variety belonging to the Forastero group was introduced to Côte d'Ivoire for its high production capacity in full sun. It gradually replaced the Amelonado cocoa that was already present. 'Mercedes', a hybrid variety the CNRA developed, withstands relatively low shade and has continually produced up to 3 t/ha during seed distribution since the beginning of the 21st century. These different selections have encouraged techniques called full sun and thus also favoured cutting shade trees on plots (Heymans, 2020; Iwaro, A.D. et al., 2006).

Today, the plant material present in Liberia and Sierra Leone is believed to have come from Ghana's varietal selection with low genetic variability (from 5 different parents). What is called 'French cocoa' in the sub-region represents cocoa from the Café Cacao Research Institute's (IRCC) research of the 1980s. The International Institute of Tropical Agriculture (IITA) develops hybrids that are mostly adopted by farmers through encouragement from private companies with the financial resources to (i) buy the seed, (ii) train farmers in GAPs and (iii) renovate non-productive plots.

Overall, Mercedes, Ghana, Tetteh Quarshie and French cocoa are not stable over time and have a high variability over the years of production. The 'Tetteh Quarshie' cocoa seems to be the most represented in West Africa (notably in Liberia, Sierra Leone, Guinea, Ghana and Nigeria).

One of the experts' major recommendations was to promote the distribution of self-compatible seeds (those not subject to cross-fertilisation) to facilitate the installation and renewal of plots and, when possible, to promote mixing varieties to minimise the risks related to pathogens and resource needs (water, sun, fertilisers, etc.) (Kofituo, 2022; Bastide, 2022). Public-private partnerships are also considered key to the future: research is a tool that can meet agronomic needs, giving companies the opportunity to invest in improving agricultural practices – for example, through the distribution of varieties resulting from research within their networks of affiliated producers.

Whether in terms of productivity, a resistance to diseases and pests or a resistance to climate change effects, experts recommend redoubling the efforts on agronomic methods (shade, amendments, appropriate size, etc.) because these are what result in short, medium and long-term impacts. As an example, from the fifth year after planting, it is possible to rectify non-productive species by grafting them with material from a productive tree in the plot (as identified by the producers).

SOCIAL AND SOCIETAL CONSTRAINTS ON COCOA PRODUCTION IN WEST AFRICA

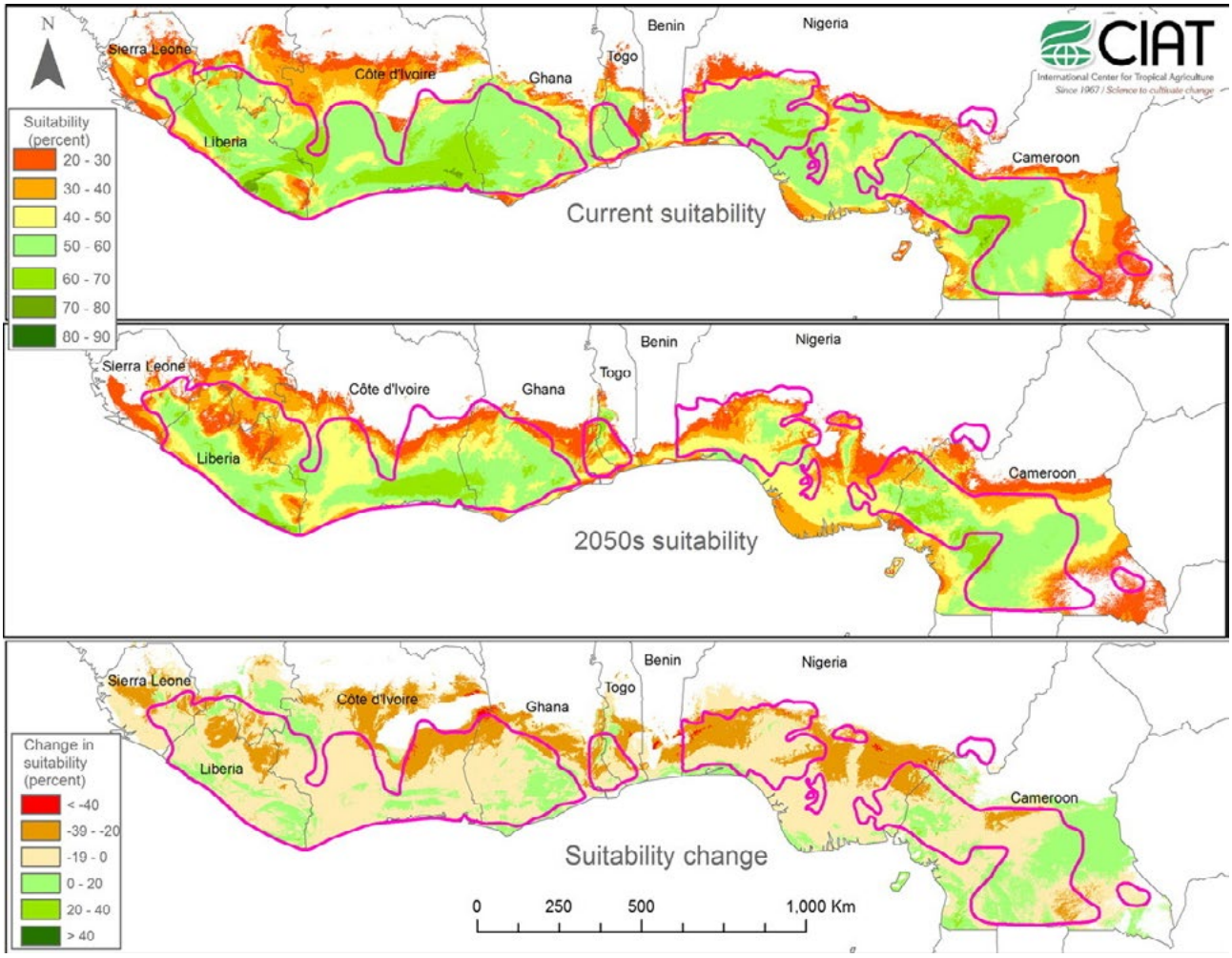
Cocoa farmers face a triple challenge: increasing their productivity over a smaller area, reducing pressure on forests and ecosystems, while improving their resilience to climate change. The social challenge is major because it concerns a large number of West African inhabitants. For example, in Ghana alone, more than 800 000 households derive their income directly from cocoa production (Malka et al., 2022).

The study conducted in Côte d'Ivoire among 295 farmers to assess the reasons for the mortality of the majority of shade trees planted amongst cocoa crops shows that farmers recognise the multiple benefits of shade trees, and are ready to devote time straightaway to planting and maintaining them. Two challenges have been identified for planting shade trees: (i) a lack of direct funding for actions, and (ii) a lack of technical support to address the disadvantages of agroforestry (Windlin et al., 2021). Also, in a study conducted in Ghana, the lack of funding is presented as the first obstacle to adopting an agroforestry system (including through labour financing), followed by the poor distribution system of forest equipment, the inconsideration of indigenous knowledge for the implementation of projects, and, lastly, the non-existent weather forecast system that is essential for plantations (Malka et al., 2022).

Despite an awareness of the need to adapt to climate change (including droughts and pests), the majority of farmers see agroforestry as an opportunity for income diversification and not as a system to promote cocoa production (Kinomé, 2022)

INITIALLY PRODUCERS PERCEIVE AGROFORESTRY AS A DIVERSIFICATION OF INCOME AND NOT ONLY A SYSTEM THAT PROMOTES COCOA PRODUCTION

FIGURE 16 Vulnerability of the cocoa sector to climate change



Source: Schrot et al., 2016.

4.3 CLIMATE CHANGE CHALLENGES

As explained above, the cocoa tree needs relatively specific climatic conditions in order to produce. As climate change effects intensify, cocoa cultivation could become increasingly complex. One of climate change's first impacts is rising temperatures. In addition, rainy seasons are likely to be shorter or less intense. The climatic hazards will also be more intense (drought, drying wind, flooding).

Rising temperatures lead to (WCF, 2018):

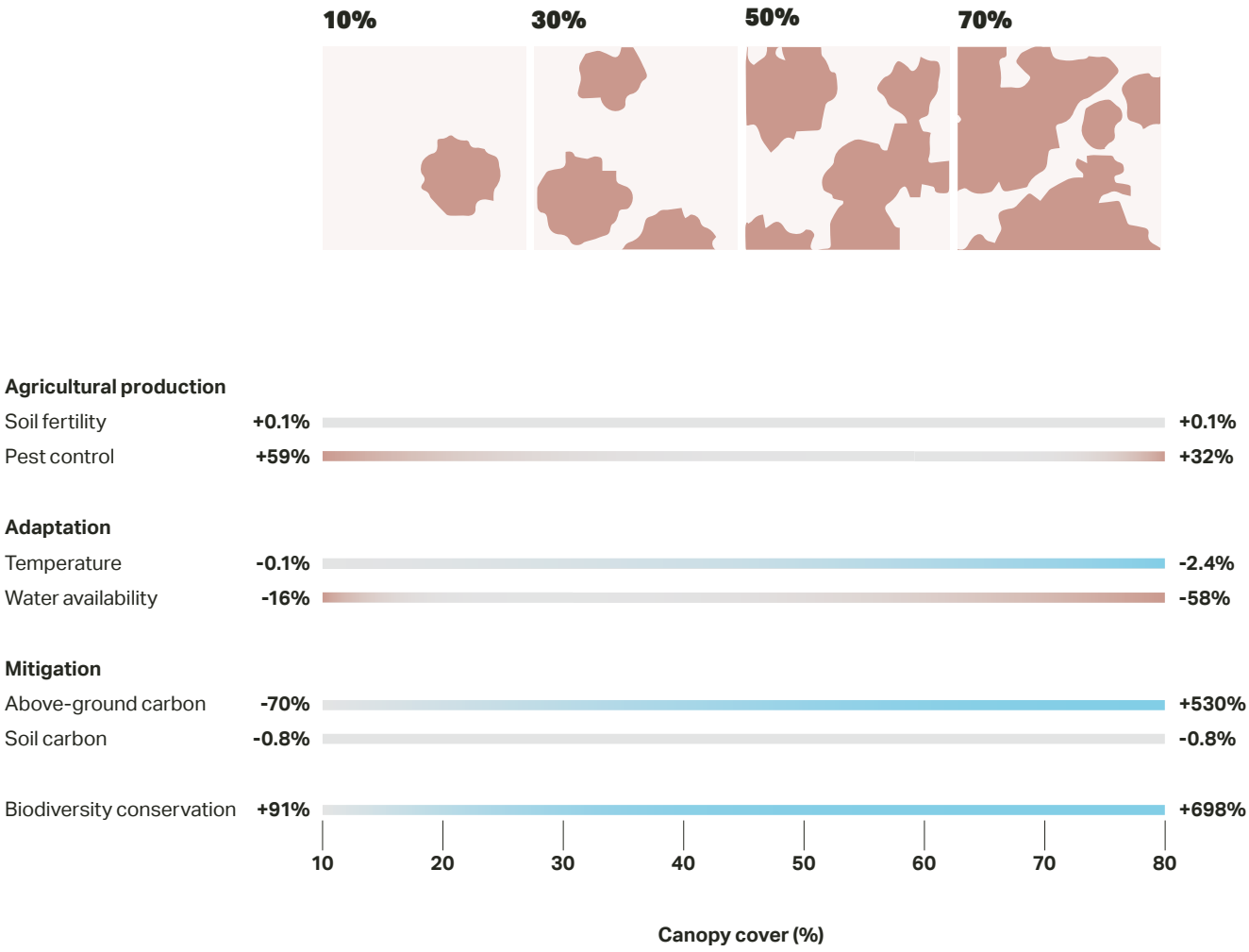
- increased mortality of plants, berries and flowers;
- smaller beans;
- decreased effectiveness of pesticides.

Variation in precipitation can result in:

- increased viruses and diseases (brown rot and fungal diseases);
- increased losses of flowers and pods;
- increased soil erosion and mineral leaching;
- a greater number of bushfires, endangering fields, biodiversity and human habitation.

In a recent study, CGIAR/CIAT published the map below (Figure 16), outlining the potential reduction in areas suitable for cocoa farming in West and Central Africa. The knowledge of such scenarios makes it possible to anticipate (i) the risk of displacement of production fronts to forest areas less impacted by the effects of warming, (ii) the imminent need to adapt current production practices to make them sustainable, and (iii) a reduction in their impact on climate change.

FIGURE 17 Agricultural production, adaptation and mitigation of climate change, the effects and conservation of agroforestry biodiversity compared to those offered by cocoa quasi-monoculture according to different shade levels (10-80 %).



In this context, cocoa agroforestry is considered one of the existing adaptation options, especially for those who cannot afford to invest in irrigation. More generally, it is even possible to speak of a compromise between cocoa production, shade rates and ecosystem services. In their attempt to quantify possible trade-offs in cocoa agroforests, Blaser et al. (2018) analysed the impact of different shade levels on agricultural production, climate adaptation, climate mitigation and biodiversity conservation. They argue that different levels of costs and benefits are achieved across the shade gradient, with improved cocoa yield at lower shade levels and high biodiversity gains at higher shade levels (Figure 17).

In Ghana, COCOBOD and researchers have already developed an adaptation strategy based on agroecological zoning.

BOX 1 A CASE FOR THE DIFFERENT CLIMATE IMPACT ZONES OF GHANA[a]

The Ghanaian cocoa landscape is currently divided into three areas of climate change impact on cocoa production capacity: the transform zone (the capacity of cocoa production in this area is expected to be highly unpredictable), the adjust zone (capacity requires systemic adaptation to ensure productivity at current levels) and the cope zone (capacity is relatively stable or relatively favourable to cocoa production compared to other areas). The transformation zone dominates Ghana's deciduous and semi-deciduous ecological zones; the "adjust zone" dominates Ghana's evergreen wetland ecological zone, as does the "cope zone". The economic impact on farmers with no adaptation strategy is expected to result in a 60 %-100 % reduction in cocoa revenues in the transformation zone, 30 %-50 % reduction in cocoa revenues in the "adjust zone" and 10 %-20 % reduction in cocoa revenues in the "cope zone". The difference in the climate change impacts on the various ecological areas of Ghana can be reduced depending on the model utilised for cocoa agroforestry. The intensity of the climate change impact informs the extent of the necessary shade recommendation. The following interventions are proposed for the different climate/ecological impact zones so that cocoa agroforestry can progress: 1) Adaptation zone: 15-25 trees/ha, which will provide 30-40 % shade coverage; 2) Adjust zone: 20-45 trees/ha, which will provide 40-50 % shade coverage; 3) Transform zone: 25-50 trees/ha, which will provide 50-70 % shade coverage, considering the diversity of shade species in the different climate impact zones in Ghana.

a This text is based on a contribution from two IITA cocoa and forestry experts who participated in the South-South Knowledge Exchange programme organised by the World Bank / FCPF.

Source: K.R. Kofituo and R. Asare, in World Bank, 2022.

5

SUSTAINABLE COCOA

5.1 DEFINITION OF SUSTAINABLE COCOA

ISO 34101-3 defines sustainably produced cocoa as 'cocoa beans produced in an economically viable, socially responsible and environmentally sound manner within an organism'. According to the ARS 1000, sustainable cocoa is cocoa, including economic, social and environmental aspects, that meets the present needs without compromising the ability of future generations to meet their own.

5.2 LAWS GOVERNING SUSTAINABLE COCOA AND ASSOCIATED OBLIGATIONS

The legislative framework also makes it possible to regulate cocoa production. It is either internal to the country (a law enacting the prohibition of child labour, orders regulating producer prices, compliance to allow certification, etc.) or external to the country (a EU regulation to avoid imported deforestation, US law on child labour, etc.), with neither necessarily targeting the same actors.

NATIONAL LAWS AND PROGRAMMES

In Côte d'Ivoire:

- PPREF: The Forest Preservation, Rehabilitation and Extension Policy, adopted in 2018 with the addition of a new Forest Code the following year (2019 edition). The classification of forests by category suggests different actions according to their degradation rate and imposes a rehabilitating transition to agroforestry from one category to another, but always with the aim of stopping cultivation in forests. Agroforestry has an official status in these texts.
- NDC: Nationally defined contribution: This does not specifically mention deforestation related to cocoa but mentions agroforestry for the development of agriculture without expansion into existing forest land.
- PINA: National Investment Plan for Agriculture, including REDD+ actions (reducing emissions from deforestation in developing countries): reduce deforestation for cocoa cultivation by at least 80 % by 2030 (a reduction of 44 000 ha/year). The country also plans to implement payments for ecosystem services (PES) at the national level to support the implementation of agroforestry.
- Forest Investment Programme (FIP): The objective is to conserve and increase the forest stock and improve access to sustainable forest management revenue sources for selected communities in the target areas.

In Ghana:

- NDC aims to reduce greenhouse gas (GHG) emissions from cocoa by 45 %.
- GCFRP: Ghana REDD Cocoa Forest Programme: Cocoa is at the heart of the country's REDD+ strategy. The programme aims to improve yields through environmentally sound and smart agricultural practices, promotion of agroforestry and forest restoration, support for small-scale producers and the restoration of natural resources.
- Forest Investment Programme (FIP): The objective is to address the drivers of deforestation by focusing on improving forest management practices. Among the 3 projects of the Ghana programme, the first aims to strengthen agroforestry (and has most of the funds), and the other two aim to secure the participation of local communities and then the private sector in REDD+.

INTERNATIONAL LAWS

As an example, Europe is the world's largest consumer of cocoa products with a thriving industry (EUR 62 billion in turnover per year) and consumption of up to 10 kg/year/capita (CIRAD, 2022). Europeans are now responsible for 10 % of global deforestation through the import of agricultural and forest products (Conversation, 2022). France, the seventh largest importer of cocoa in the world, has also signed up to a National Strategy Against Imported Deforestation (SNDI) committing the country to be particularly vigilant about the traceability and ecological cost of soybean, palm oil and cocoa. The law defines imported deforestation as 'the import of raw materials or processed products, production of which has contributed, directly or indirectly, to deforestation, forest degradation or the conversion of natural ecosystems outside the national territory'. With objective 13, the SNDI aims to raise the requirement level of certifications, which must be improved in particular when considering deforestation in their indicators. The SNDI is part of the application of the European Union's new regulation.

5.3 NEW EU REGULATION TO COMBAT IMPORTED DEFORESTATION

On 6 December 2022, a provisional political agreement was reached between the European Parliament and the Council on a EU Regulation on zero deforestation supply chains.

This regulation aims to prevent the import of agricultural and forest products responsible for deforestation and forest degradation on a global scale and thus to reduce GHG emissions and biodiversity loss. The EU is one of the largest importers of products such as soybean, palm oil,

cocoa and timber, which can all come from illegally deforested areas. The Zero Imported Deforestation (ZID) Regulation aims to ensure that these products are produced in a sustainable and environmentally responsible manner.

Once adopted and enforced, the new legislation will ensure that certain essential goods placed on the EU market will no longer contribute to deforestation and forest degradation in the EU or anywhere else in the world.

Once in force, all companies concerned must exercise strict vigilance if they place various agricultural products including cocoa, as well as its derivatives, on the EU market or if they export from the EU.

The political agreement comes just 12 months after the Commission's 2021 proposal. The final version builds on the key features the Commission proposed, namely: combating deforestation, whether legal or illegal; stringent traceability requirements linking commodities to the agricultural land where they were produced; a country benchmarking system.

The new regulation lays down strict due diligence rules for companies wishing to place the products concerned on the EU market or to export them. Operators and traders must prove that the products caused 'zero deforestation' (products on land that has not been deforested after 31 December 2020) and are legal (comply with all applicable laws in force in the country of production). Companies will also be required to collect precise geographical information on the agricultural land where the products they supply were grown, so that they can verify their products' compliance.

Member States must ensure that non-compliance of the rules leads to effective and dissuasive penalties.

The list of commodities covered will be regularly reviewed and updated, considering new data such as the evolution of deforestation profiles. The Commission will implement a benchmarking system that will assess countries or parts of countries and their level of risk of deforestation and forest degradation (high, standard or low risk), while also considering the agricultural expansion related to the production of the 7 commodities and derivatives. Corporate bonds will depend on risk.

This system will also help guide EU cooperation with partner countries to halt deforestation, while paying particular attention to the situation of local communities and indigenous peoples.

Internationally, the EU will strengthen its engagement, both bilaterally with producing and consuming countries and in relevant multilateral areas, to ensure an effective implementation of the new legislation and to assist producing countries as appropriate. The new rules will not only reduce GHG emissions and biodiversity loss, but also ensure the livelihoods of millions of people, including indigenous peoples and local communities around the world who rely heavily on forest ecosystems.

The regulation entered into force on 29 June 2023. Rules will begin to apply for medium and large operators and traders from 30 December 2025. Micro and small enterprises will benefit from a further six months adaptation period (until 30 June 2026), as well as other specific provisions.

5.4 EXISTING STANDARDS AND LABELS

STANDARDS AND INITIATIVES

ISO standard 34101-3

What is noteworthy about the cocoa sector is that it now has an international ISO standard for sustainable and traceable cocoa, the first of its kind for agricultural products. This standard covers the organisational, economic, social and environmental aspects of cocoa cultivation, including strict traceability requirements, and provides greater clarity on sector sustainability. The effort required to improve the traceability was established with the aim of contributing to accountability in the global supply chain. Only cocoa produced according to this standard can be called 'sustainable cocoa'. This standard allows the physical segregation of batches during the various stages (including transport and storage) with a margin of manoeuvre of 10 % tolerated and administrative traceability (mass balance system).

ARS 1000 standard

This ISO standard is regularly debated in West Africa where a first regional standard was created. The main guidelines are:

- use of high quality seeds,
- sustainable cropping practices,
- limiting pesticide use,
- respect for workers' rights,
- product traceability from field to export,
- independent certification to ensure compliance with the standard.

This is the most important standard in West Africa. A more exhaustive summary is provided in the Appendix.

BIO-TRADE initiative

The BIO-TRADE programme aims to promote sustainable trade in organic products between developing countries

and the EU. This includes supporting organic producers and exporters by providing technical and financial advice to improve their products' quality and competitiveness in global markets. BIO-TRADE's analysis brings together knowledge of law and political science, evaluating rules, norms and debate. The programme is currently focused on Latin America and Asia (BIO-TRADE, 2022).

National initiatives

In 2021, France joined the European movement, ISCO (Initiatives for sustainable cocoa), to create national initiatives to engage states, industry, traders, distributors, civil society organisations and research organisations. ISCO aims to create spaces for exchanges and collaboration to find sustainable solutions for cocoa farming in the producing regions. Today, there are the French initiative for Sustainable Cocoa, Beyond chocolate (Belgium), GISCO (Germany), SWISSCO (Switzerland) and DISCO (Netherlands).

LABELS

Since the 1990s, voluntary sustainability standards have aimed to increase the yield per hectare and plot sustainability (environmental and economic). The main sustainability labels used in the cocoa sector are the Rainforest Alliance (resulting from the UTZ-Rainforest Alliance merger), the Fairtrade label and the Organic/ Biological label. They are differentiated by their criteria of environmental performance, traceability and remuneration to producers

Label "Fair trade"

The labels certify that producers receive fair remuneration for their work, as well as funding for community projects. A pioneer and key player in the construction of sustainable agri-food, including in the world of chocolate, fair trade (FT) and its floor price remain subject to market fluctuations characterised by cocoa overproduction (even when equitable). The Fairtrade label requires responsible land management, including protecting forests, preserving biodiversity and limiting deforestation. The fair trade labels for cocoa include FT International (Max Havelaar), World FT Organisation, Fair for Life, SPP (The Small Producers' Symbol) and Biopartenaire (bio and FT). An AFD (French development agency) and FFEM (French global environment facility) programme, implemented by Commerce Equitable France and the NGO Agronomists & Veterinarians Without Borders (AVSF), has chosen to focus on promoting fair trade, including cocoa producers, in 6 West African countries such as Côte d'Ivoire, Ghana and Togo. This programme, called Equity (https://programme-equite.org/) has conducted numerous technical and economic studies, as well as pilot initiatives to test agroecological and sustainable practices.

Label "Rainforest Alliance / UTZ certification"

This certification focuses on sustainable forest management, sustainable agriculture and a better quality of life for workers and local communities. The label is committed to protecting forests by limiting deforestation and promoting sustainable land management. Eligibility criteria include protecting biodiversity, sustainable forest management and restricting the use of environmentally harmful pesticides. In Côte d'Ivoire, Rainforest Alliance-(RA) certified beans accounted for 10 % in 2016 (BASIC, 2016). It is also the label with the most demanding criteria in terms of combating deforestation and ecosystem conservation.

There are some similar measures between the FT and RA labels:

- Prohibition of illegal deforestation;
- Compliance with national and international laws and regulations for biodiversity conservation;
- Promotion of agroforestry and crop rotation;
- Protection of endangered species;
- Promotion of responsible forest management to preserve ecosystem services.

Label "Organic/biological"

The organic certification makes it possible to impose standards on cocoa that respect the environment of biodiversity. However, current EU and US standards do not fully consider the territory's environment and history. The eligibility criteria for the organic label **do not specify any restrictions** on deforestation. However, there are several organic labels (European, American, Japanese, etc.) that require sustainable natural resource use and the preservation of biodiversity.

In addition, certified organic raw materials depend on demand and supply; unfortunately, the price tends to decrease due to the small increase in demand and a clear increase in production (IDDRI, 2019).

These certifications are not mutually exclusive and the same farm can be certified under several labels to maximise its chances in the international market. However, obtaining certification is initially restricted by a farm's available budget and/or prioritising the expenditure. Today, the labels mentioned above seem to contribute to an improvement in the impact of cocoa farming on the environment without having a strong enough framework to stop the destruction of forests.

FIGURE 18 Summary of cocoa standard performance

	Environmental criteria					
	Forest definition and deforestation thresholds	Forest degradation	No planting on peatland	HCS	HCV	Respect for legal and/or customary status
RA 2020 (sustainable agriculture)						
Fairtrade 2019						
ISO 34101						

	Social criteria		Application of certification		
	FPIC	Labour law and ILO rules	Traceability	Independent audit	Access to certification for small producers
RA 2020 (sustainable agriculture)					
Fairtrade 2019					
ISO 34101					

Source: CST Forest 2022.

5.5 DYNAMICS OF COCOA CERTIFICATION

According to CST Forest's (Forest Scientific and Technical Committee) report, the main standards (Universal Trade Zone or UTZ, Rainforest Alliance, Organic Agriculture, Fairtrade) certified between 26.8 % and 44.2 % of the global cocoa area in 2018:

- Just over 25 % of the world's cocoa area harvested was UTZ-certified in 2018, representing an estimated 1.6 million tonnes of UTZ-certified cocoa production harvested from more than 3 million hectares of cocoa trees;
- 10 % was Fairtrade-certified (536 556 tonnes of cocoa;
- 6.1 % was Rainforest Alliance certified (404 253 tonnes);
- 2.7 % was according to different organic farming standards.

It should be noted that certified production is not necessarily sold as such and is not always associated with the guaranteed premium or minimum price.

5.6 REVIEW OF AGRONOMIC PRACTICES ASSOCIATED WITH SUSTAINABILITY

Sustainability practices must be looked at holistically, considering the landscape within which cocoa farming takes place. From this viewpoint, two practices are particularly relevant:

- Agroecology: this places cocoa cultivation in the ecosystem in which it develops. The principles of agroecology consider the interactions between the different ecosystem components, such as soil, water, plants, animals and microorganisms. This approach optimises natural resources and minimises the negative impacts on the environment. Thus, several major components of agroecology are involved in cocoa farming: rational natural resource use, crop diversification, respectful farming practices and the general economy of a family's farm.
- Agroforestry: part of agroecological practices and at the heart of many sustainable cocoa approaches, this is detailed as a practice in its own right.

5.6.1 AGROECOLOGICAL PRACTICES

SUSTAINABLE NATURAL RESOURCE USE

Agroecology promotes the sustainable and rational use of natural resources such as water, nutrients and biological resources. For example, reusing rainwater for irrigation can reduce dependence on surface water sources, while using compost and manure to fertilise soils can increase nutrient availability and reduce chemical fertiliser use.
The WCF 2018 manual proposes several techniques:

- **Permanent soil cover:** With the combination of crops that limit soil erosion, maintain moisture and provide nutrients to the soil (*Gliricidia spp.*, groundnut *Arachis hypogea*, cowpea *Vigna unguiculata*);
- **Mulching and adding compost:** add natural fertilisers, so limiting weeding and maintaining humidity;
- **Drainage systems:** construct trenches to control excess water (which leaches minerals).

DIVERSE CULTIVATION

Other crops such as fruit trees, vegetables and food crops can supplement the cocoa crop, which are essential to making a plot sustainable. This (i) minimises climate change impacts by cultivating species that react differently to climate differences, (ii) diversifies the producer's sources of income (cash crops, food crops, timber, etc.), and (iii) limits changes by increasing the protection to the plot (shade trees or legumes).

For example, the World Cocoa Foundation (WCF) promotes mixing cocoa trees with high value-added species such as pepper as well as some shade species to be integrated within or around the plot:

- Allanblackia: produces seeds with oil;
- Terminalia spp: its wood is used in medicine;
- Prunus africana: timber, used as firewood and for some medicines;
- Cashew: its nuts have value and it is resistant to drought.

RESPECTFUL CULTIVATION PRACTICES

Also known as good agricultural practices (GAPs), crop practices such as crop rotation, composting and integrated pest management can be used to reduce chemical fertiliser use and pesticides. For example, crop rotation can help reduce reliance on chemical pesticides to control plant diseases, while composting can increase nutrient availability and improve soil structure.

FARM ECONOMY

Agroecology also incorporates the importance of the farm's economic viability. Beyond the positive impacts on the environment (at landscape level: preservation of habitats; at plot level: improvement of agricultural biodiversity), crops must also be economically profitable. This is an important condition for reinvesting in the maintenance and development of sustainable plantations. The sale of products other than cocoa, either semi-processed or diversified (fruits, handicrafts, etc.), is thus an encouragement to supplement cocoa revenues and to remedy external shocks, such as a worldwide drop in the cocoa price or a natural disaster destroying part of the crops.

> According to the Centre for International Cooperation in Agricultural Research for Development (CIRAD), one of agroforestry's many advantages is the possibility of co-benefiting trees' carbon absorption, and thus triggering new modes of operation (voluntary carbon market) by moving from a storage of 10 $TeqCO_2$/ha for cocoa monoculture to 75 $TeqCO_2$/ha in agroforestry (CIRAD, 2020).

5.6.2 AGROFORESTRY

To go beyond the intensive model that involves a continuous expansion of cultivated areas, agroforestry is often presented as one of the credible solutions to renewing Africa's ageing cocoa trees. As an example, in Central America and despite the variability of conditions and plots, a cocoa tree in agroforestry can reach 1 100 kg/ha/yr of cocoa without fertiliser or up to 900 kg/ha/yr in Cameroon after 20 years of operation (Jagoret et al., 2014). A cocoa tree grown in an agroforestry environment can benefit from trees protecting it and limiting the consumption of inputs (shade, hosts of auxiliaries), nourishing it (capture of airborne nitrogen) and allowing the farmer to diversify his income (timber, fruit, medicinal, etc.) (Jagoret et al., 2020). Current research indicates that shaded cocoa production also has ecological benefits, for example improved water retention, a biodiversity (habitats for fauna and flora) allowing for increased pollination, as well as improved resilience to climate change (Windlin et al., 2021). Thus, cocoa grown in agroforestry offers a range of benefits, particularly on an economic level: lower input costs, generating money during the 'hunger gap' through timber, diversifying income through fruit sales. These benefits are due in particular to the multi-scale impacts of agroforestry: on the plot creating shade, on the farm where this type of agriculture creates a diversification of resources, and on the terrain where it provides an

TABLE 3 Different agroforestry models promoted by the ARS 1000 standard

Models	Features	Objectives	Woody shrub species used
1. Trees inside the cocoa plantation	The model comprises two types of tree species: • Layer 3 forest species • Layer 2 forest species Number of trees: 25 to 40 per ha • Minimum 3 species, including at least 1 from layer 3	• Establishing shade • Biodiversity • Diversifying sources of income • Carbon sequestration • Climate change adaptation	• 3 forest timber species • Layer 2 forest species • Layer 1 woody species
2. Trees in and around the plantation	• Model 1 and planting or maintaining rows of trees around the plantations (width to be determined according to the available space)	• Model 1 objectives, plus: - Demarcation of plantations with trees - Fighting bushfires - Barrier against	• Layer 3 forest species • Layer 2 forest species • Layer 1 woody species • Species for barriers
3. Hedged areas	• Planting or maintaining rows of trees around the plantations (width to be determined according to the available space).	• Demarcation of plantations with trees • Fighting bushfires • Barrier against CSSVD	• Species for barriers
4. Improved fallow area with trees	• Combination of shrub legumes and forest trees	• Agroforestry arrangements for the installation of future cocoa trees	• Leguminous species • Layer 3 forest species • Layer 2 forest species

ecosystem service. This opportunity could thus complement the farmers' remuneration and secure a more sustainable and responsible production.

In the ARS 1000 standard, agroforestry is recommended as one of the practices to be promoted as part of sustainability. At the end of 2022, the experts working in Côte d'Ivoire proposed different modalities to refine these recommendations[3] (see Table 3).

DYNAMIC AGROFORESTRY

Dynamic agroforestry (DAF) is defined as a spatially and temporally well-planned system that mimics a highly productive juvenile forest through key management practices. Key management practices can enable farmers to increase cocoa productivity while restoring their degraded land. According to the experts queried during the study, DAF would be the agroforestry option to be prioritised for an effective increase in yield (observation of plots at more than 2 tonnes/ha/year on different territories).

AGROFORESTRY AND COCOA PRODUCTION: WHAT IS COMPROMISED?

In the context of cocoa-based agroforestry, the question of shade level requires balancing several parameters: the cocoa yield, the longevity of cocoa, other crops and the fight against pests and diseases through the management of shade and air circulation. In studies that CIRAD conducted in Cameroon when faced with this balance between the average cocoa yield and the longevity of cocoa, an optimum was measured, proposing a land area of between 30 % and 55 % as the optimal level (Box 2). In this optimum 30-55 % zone, the rate of 30 % to 40 % was found to be particularly interesting, resulting in good yields even after 40 years. This balance, which could solve many challenges of agroforestry and full sun agriculture, is only possible, however, with the farmer's full involvement in terms of plot development and maintenance.

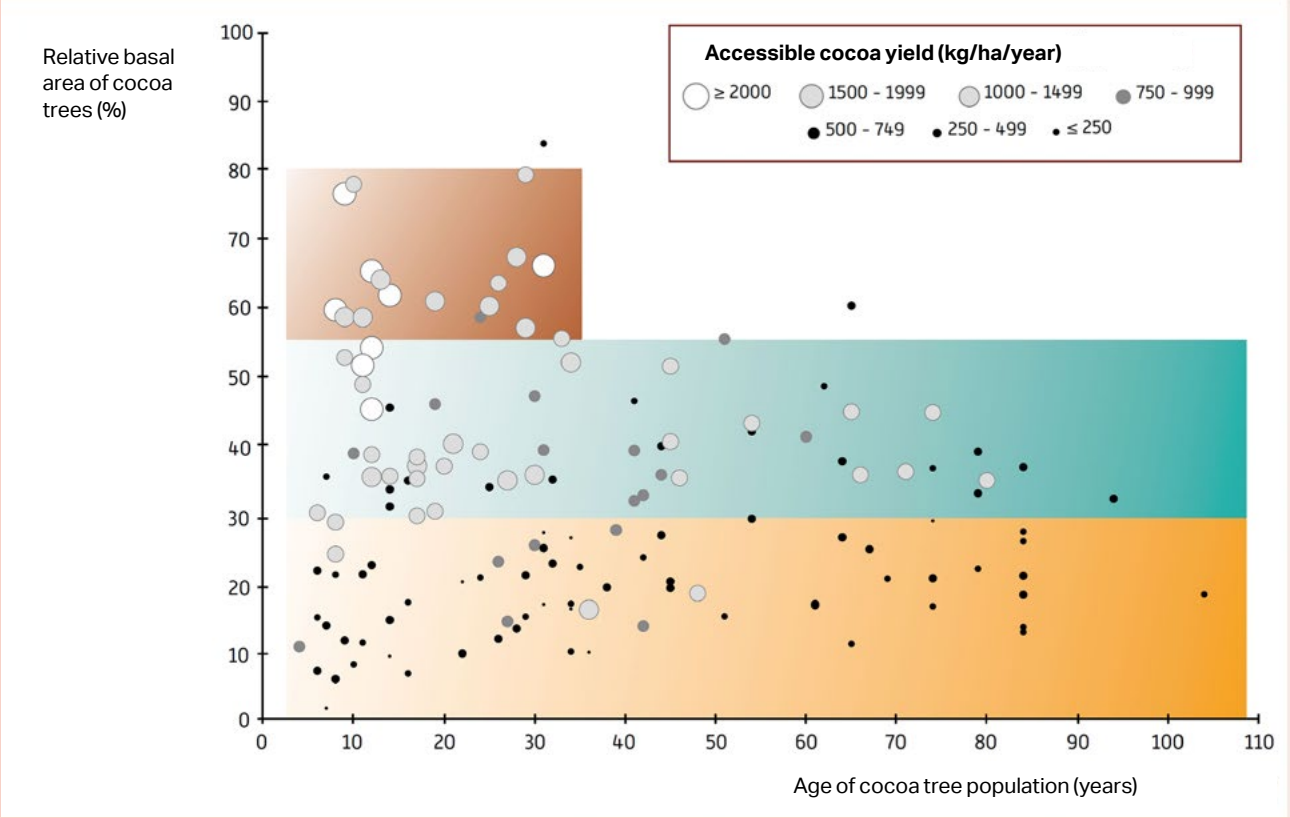
When the World Bank prepared a guide to good practices in the context of cocoa exchanges between Latin America and West Africa, critical points were identified at the various cocoa tree production phases to ensure that the system is sustainable. The table below summarises these particular points of attention, which are grouped according to the three phases of the technical itinerary presented previously.

3 Coffee and Cocoa Council and FIRCA, 2022: Workshop to define technical standards for agroforestry in cocoa farming, 1-4 August 2022, Hôtel le Rocher, Yamoussoukro.

BOX 2 BALANCING COCOA LONGEVITY AND ITS YIELD ACCORDING TO THE SHADE LEVEL (MEASURED AS A FUNCTION OF THE COCOA TREES' LAND AREA).

40-55% land area of a cocoa tree stand - a good compromise between cocoa yield and the longevity of a cocoa tree stand.

In this study carried out in Cameroon (Central Region), each point on the graph represents a stand of cocoa-based agroforestry systems and the size of the point is proportional to the commercial cocoa yield, ranging from less than 50 kg/ha to more than 2 t/ha.



In the middle of the graph **(blue)**, stands of cocoa-based agroforestry systems have optimal characteristics. Yields are close to or greater than 1 t/ha of cocoa and this performance has lasted well over 40 years. These stands have 137 mixed trees per hectare. The relative basal area of cocoa trees ranges from 30 to 55% – on average, cocoa trees represent 9.3 m^2 and mixed trees 11.4 m^2.

In the upper part of the graph **(brown)**, cocoa cultivation is not sustainable. These stands are simple, they have 70 mixed trees per hectare. The relative basal area of cocoa trees is greater than 55% – that of cocoa trees is 8.6 m^2 on average, while that of associated trees is 3.8 m^2. Yields can exceed 2 t/ha, but these cocoa trees do not last more than 30 to 40 years because they are difficult to maintain, even with the use of chemical inputs such as fertilisers.

Conversely, in the lower part of the graph **(orange)**, cocoa cultivation is sustainable but low yielding. These stands are complex, with 176 mixed trees per hectare. The relative basal area of cocoa trees is less than 30% – cocoa trees represent 5.1 m^2 and associated trees 24.4 m^2. Yields range from less than 50 kg/ha to 750 kg/ha.

Source: Saj et al., 2017; Jagoret et al., 2020.

At the time of plot establishment:

Step/activity	Good practices
Year 0 **Developing the site**	• Ensure consideration of the farmer's production objectives and the balance between short-term income and deferred income; • Then infer the plantation's long-term planning and design. In addition to economic considerations, several scenarios guide the choice of associated species (CCC, 2015): • Improved 'fallow' land (a plot planted with fast-growing legumes and used a few years later for growing cocoa); • Selected trees (trees left by the producer at the creation of the plantation for their utility); • Planted trees (trees planted in the cocoa orchard at the time of its creation); • Preservation of local species (trees that appeared spontaneously and were maintained for specific needs); • Boundary planting (trees planted along the contours or boundaries of a plantation); • Protective strips (fence or barrier with trees or shrubs planted to serve as protection or a sanitation barrier).
Selection of planting site (new orchards)	• The site must have zero deforestation; • Ecosystem protection: establishing plantations away from wildlife shelters, not cutting down trees in the forest to establish new plantations, creating protected areas by planting trees and other plants along river banks, maintaining vegetation cover, using diverse and indigenous trees (CHED, 2016); • Integrated water resources management: keep some distance between the plantation and water sources, prevent chemical runoff from causing water contamination, avoid dumping waste into waters, handle and store manure/fertilisers/agrochemicals correctly to avoid contamination (CHED, 2016); • Choose relatively flat terrain; • Vegetation: as far as possible, maintain local tree species for shade. If there are well-known adverse effects (such as disease or parasites), then the farmer should avoid certain species; • Be sure to consider the conventional characteristics expected of cocoa soil (water retention properties and good drainage, clay-lime, organic matter content, pH: 5.0-7.5) and environmental ones (annual precipitation between 1 500 mm and 2 000 mm; periods when the precipitation is less than 100 mm per month, which must not exceed 3 months)
Preparation (new orchards)	• Cleaning: no burning; • Erosion prevention: if the inclination of the slope is high => dig trenches perpendicular to the flow of water; Plant fast-growing herbaceous species in trenches; • Weeding: integrated management, no herbicides (agroforestry practice should reduce weed pressure); • Pegging: spacing compliance (3 m x 3 m or 3 m x 2.5 m).
Seed choice	• A mix of the 'French' (resistant to shade and longevity of plants) and 'Ghana' (high yield) varieties is preferred to take advantage of both and ensure a harvest despite potential climate damage (Heymans, 2020).
Planting (for new orchards)	• Respect size of planting holes. This is a key element for good rooting and growth of cocoa trees and associated trees. Recommended dimensions: 60 cm x 60 cm x 60 cm (minimum 40 cm); • Soil quality is also important to feed the young plants. It is recommended to return the surface earth to the base of the hole. • Do not overcrowd after planting. • In addition to bananas, plant legume species such as fast-growing Gliricidia to provide shade; • Use nutrients and produce biomass. • Prioritise mulching from leaf scraps. • Plant complementary trees (fruit, nuts, wood, etc.) in an adequate spacing for future shade and density objectives.

Step/activity	Good practices
Mulching	• Spread dry plant materials around the base of the cocoa plant towards the end of the rainy season. (CHED, 2016).
Planting (case of rehabilitation)	• Identify and replace any old or diseased cocoa trees with at least 800 cocoa trees/ha; • Open spaces (areas already empty or soon to be left so after removal of old cocoa trees) offer the opportunity to plant other species (fruit trees and timber). Locate the holes of light while respecting spacing of species to ultimately achieve the optimal shade sought (Climate Focus, 2020); • Weed and clear areas where plantains are dead or sick and low-yield cocoa has been removed; • Plant on plot boundaries.

Then, during the cocoa trees' development (within 4 years):

Step/activity	Good practices
Temporary shade management	Thin or eliminate weak, malformed, diseased or low-yield banana trees that are no longer desired on the plot.
Gap filling	If thinning and regular felling of trees to manage shade creates large openings, fill these with young shoots intended to: • diversify age classes (cocoa or other priority species); • ensure long-term continuous production, and/or integrate new species or varieties to diversify production (Climate Focus, 2020).
Soil cover	Size is important to facilitate cohabitation between species. To form the size of the cocoa tree, regularly remove the malformed stems and dry twigs with a pruning shear or sharp knife to have a single stem with a 5-pointed crown. If the crown is low, leave 1-2 dry twigs on the crown; if the crown is well formed it is necessary to regularly remove the dry twigs with a flush cut. The pruning is conducted in years 3 and 4 (CCC, 2015; CHED, 2016).
Size	Size is important to facilitate cohabitation between species. To form the size of the cocoa tree, regularly remove the malformed stems and dry twigs with a pruning shear or sharp knife to have a single stem with a 5-pointed crown. If the crown is low, leave 1-2 dry twigs on the crown; if the crown is well formed it is necessary to regularly remove the dry twigs with a flush cut. The pruning is conducted in years 3 and 4 (CCC, 2015; CHED, 2016).
Weed management	Focus on soil cover and manual weeding (3 to 4 times a year). Gradual closure of the canopy will also control weeds.
Pest management	Adopt good cultivation practices (weeding, shade adjustment, branch size, etc.) to avoid insect infestation (caterpillars, psyllids, leafhoppers, bark beetles, termites) (CHED, 2016).

Finally, during the cocoa plants' maintenance and production phase:

Step/activity	Good practices
Temporary shade management	• At maturity, the shade will be around 30 %; the trees must be managed accordingly. • Wood harvesting and continuous regeneration of shade and diversity: during this phase, the producer begins to selectively harvest wood thus benefitting from long-term investments. Specimen replacement and filling of emerging openings as a result of selective harvesting must be planned; • The grower can initiate the plan to replace trees, remove dying or underperforming individuals, and plant replacement seedlings in the gaps.
Maintenance and pruning	• Regularly clear the cocoa trees of dry twigs and parasitic plants and epiphytes, as well as dead or sick branches and stems. • Removal of dry twigs: with pruning shears or a machete for twigs at hand and with a pruning shear or pruning knife for higher dry twigs, cut regularly at the trunk (flush cut); • Size of parasitic plants: red flowers and berries/yellow flowers and blue fruits): cut or tear regularly with a pruning knife or a machete until they are completely removed from the plant by cutting the parasitized branch just below the loranthus (3 to 5 cm) to avoid leaving a cut that could bloom again.

The application of these agricultural practices still encounter certain obstacles (otherwise they would still be applied) such as, among others:

(i) The funding/income is not enough to hire skilled labour, or even decrease a part of the temporary harvest to allow for the replacement of old plots;

(ii) Beliefs and training slow the farmers' application of more sustainable practices (agroforestry associated with vulnerability to diseases). This is why farmers' schools and technical training are essential.

Today, we have many tools to pool efforts and implement recommendations (see Chapter 6, Needs and toolkit available for action).

6

NEEDS AND TOOLKIT AVAILABLE FOR ACTION

From the consultations conducted and the feedback from other cocoa projects in West Africa, it was possible to list the needs that often recur with practitioners, field operators and producer organisations. These needs are as follows:

Needs	Questions
Field implementation techniques	What are the technical routes to install or support the transition to sustainable agroforestry cocoa farming? What is the trade-off between cocoa production, shade and agricultural diversification? How to manage shade? What choice of species and crops to associate with cocoa in the context of sustainable agroforestry? Are there technical guides for the implementation of sustainable plots?
Traceability and transparency	What tools and methods to trace cocoa and monitor deforestation risks including disturbances under the canopy?
Environmental protection and rights	How to ensure the conservation of forests and biodiversity around the plots? How to ensure respect for the rights of local communities?
Financing	How to finance the first years of the transition to sustainable cocoa farming? How to manage the risk at the local producer level?
Property risk management	As agroforestry and sustainable cocoa farming in general require long-term efforts, how can the farmer be assured of reaping the benefits?

6.1 TECHNICAL IMPLEMENTATION NEEDS IN THE FIELD

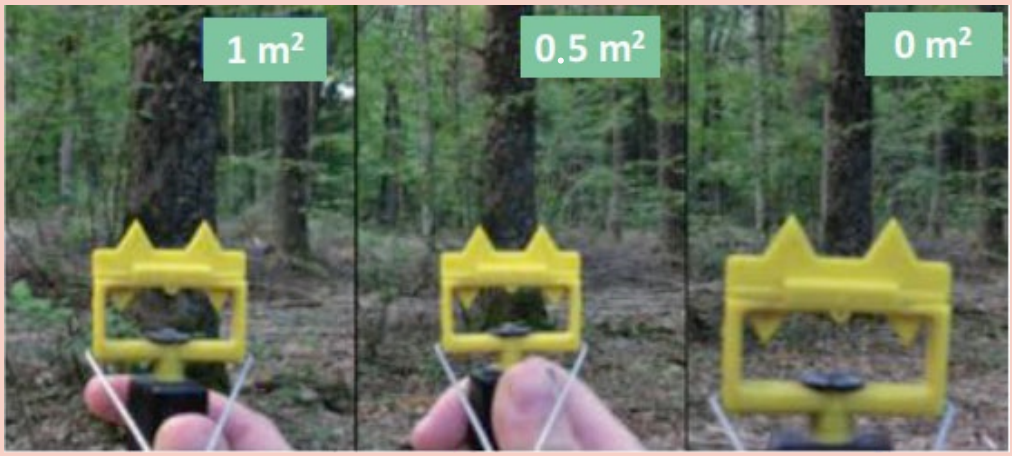
Tool	Involved regions	Author(s)	Year	Themes	Useful links	Uses	Comments
Cocoa Agroforestry Library	World	Mighty Earth	2021	Scientific articles on cocoa agroforestry French, English, Spanish	https://www.zotero.org/groups/2785774/cocoa_library/library	Lessons learned and useful links for plot installation (scalability, sustainable practices, etc.)	Current literature to co-construct sustainable cocoa projects
Good practice cocoa guide	West Africa, Côte d'Ivoire	Cuts International		Control of cocoa production stages Staff management of cocoa farms Pest management & agro-chemistry Ivorian regulatory requirements Cocoa processing steps	https://www.allianceforproductquality.de/wp-content/uploads/SPS-Manual-CIVfr.pdf	Training on improving the quality of cocoa beans for cooperatives, exporters (complete sector) Capacity building on export quality to obtain a premium price Start of a cocoa processing workshop	Higher physical quality of beans can generate a financial means to finance sustainable techniques Section 1: p.13-77
Guide on respect for the rights of indigenous peoples and local communities	World	AFI - Accountability Framework Initiative	2019	Definitions and legal requirements on respect for the rights of peoples Land law, land use and property Food security Self-governance Right to culture	https://accountability-framework.org/wp-content/uploads/2020/06/DO_Respect_Droits_PACL-v2.1.pdf	To be considered when setting up a project involving territories and local populations	To co-construct sustainable cocoa projects and preserve the environment
Roadmap to a sustainable cocoa sector in Liberia	Liberia	Liberia National Cocoa Public-Private Partnership Platform	2022	Guide to develop the cocoa sector in Liberia in a sustainable way	https://www.idhsustainabletrade.com/uploaded/2022/01/Liberia-Roadmap-4.3.pdf	To be used during the development of an emerging sector (as with cocoa in Liberia)	

Tool	Involved regions	Author(s)	Year	Themes	Useful links	Uses	Comments
Managing Soils for Increased Productivity and Decreased Deforestation in Cocoa, A training manual for field officers	West Africa (Ghana, Côte d'Ivoire, Nigeria, Cameroon)	Cocoasoils, Asare R. and J.P. Nlend-Nkott	2020	Producer Plot Diagnostic Tool Pruning Weeding Good use of pesticides Integrated disease and pest management Planting shade trees Mat management Organic nature of soil Good application of mineral fertilisers	Available through IITA	Gradual transition for agriculture to enable the transition from the conventional to agroforestry	Accompanying trajectory from sunny plot to agroforestry
Cocoa trees: a collection of farmers' knowledge on the interactions between companion trees and cocoa trees in Côte d'Ivoire	West Africa	Nitidae	2022	Tree species for use in AF plots	https://www.nitidae.org/files/3d5cd5ec/les_arbres_des_cacaoyeres_recueil_de_connaissances_paysannes_sur_les_interactions_entre_arbres_compagnons_et_cacaoyers_en_cote_d_ivoire.pdf	Installation of an AF plot Diagnosis of a plot for choice of species to be conserved	
Agroforestry systems for cocoa production: valorisation and transition	Côte d'Ivoire	Nitidae	2019	Highlighting the land area (cocoa/timber production) Aid for measurement on cocoa plots	https://www.nitidae.org/files/9cdad243/un_referentiel_dynamique_developpe_par_nitidae_pour_des_systemes_agro_forestiers_de_production_du_cacao_valorisation_et_transition.pdf	Installation or rehabilitation of plots in agroforestry	Management of shade and biodiversity of cocoa species The NGO recommended the proportion of 5 m^2/ha (i.e. 10 tC/ha) to trigger a payment for ecosystem services. Nitidae also recommends gradually moving towards the threshold of 8 m^2/ha, which would correspond to diversified agroforests, with 30 % cover.
Climate-smart Agriculture in Cocoa, a training manual for field officers	Ghana	WCF – World Cocoa Foundation	2018	Climate-smart agriculture Establish a plot Pest Management Shade Tree Management Soil and water management	https://www.worldcocoafoundation.org/wp-content/uploads/2018/08/climate-smart-agriculture-cocoa-training-manual.pdf	Installation or rehabilitation of plots according to climate change challenges	Easy-to-use plugs p. 84: water management and irrigation p. 93: culture association
Organic Certification Audit Preparation Manual	World	AVSF		Assistance in preparation for obtaining organic certification	https://www.avsf.org/fr/posts/2835/full/manuel-de-preparation-a-la-certification-biologique	Support for cooperatives in transition	

The question that often arises for practitioners in the field and producers concerns the right compromise between cocoa production (dependent on the density of cocoa per hectare and productivity per tree), shade and biodiversity. Recent publications (Sanial, E., 2018; Jagoret, P., 2020; Nitidae, 2019) confirm the interest of two indicators: land area to manage shade rate and cocoa production, and the classification of associated species into remnant, spontaneous and planted species concerning the diversity of associated trees (Box 3).

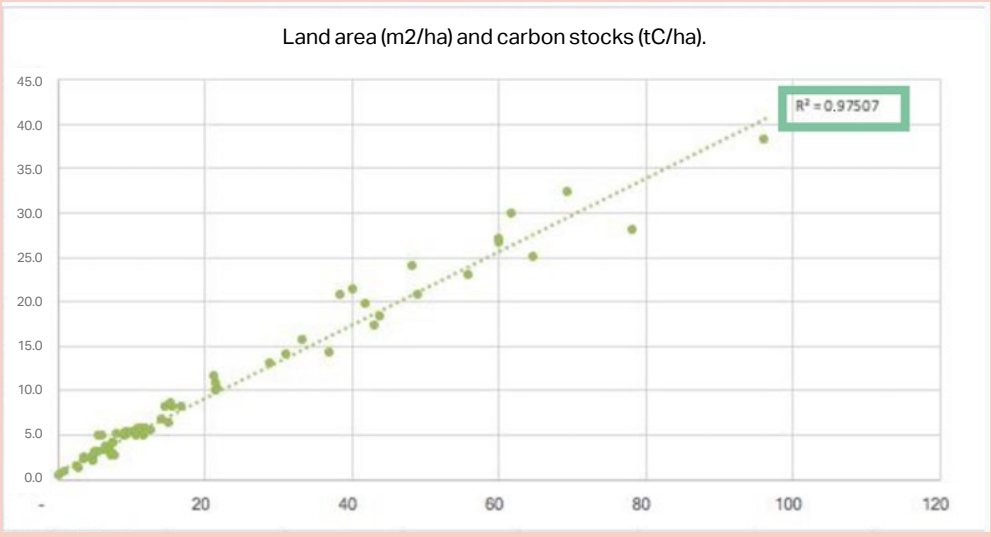
BOX 3 LAND AREA, A KEY INDICATOR

The land area of a tree (g) is the area of the trunk that rises to breast height (1.3 m). It is measured in m^2. Stand land area (G) is the sum of tree-covered areas on 1 hectare of land. It is expressed in m^2/ha.



Current studies show a correlation between land area and shade level (Jadan et al., 2015; Silva et al., 2020).

In addition to the shade level, a study conducted by the NGO Nitidae in eastern Côte d'Ivoire showed a close relationship between the land area and carbon stocks. Based on evidence from its fieldwork, the NGO recommended the proportion of 5 m^2/ha (10 tC/ha) to trigger a payment for the ecosystem service. However, the NGO also recommends gradually moving towards the threshold of 8 m^2/ha, which would correspond to diversified agroforests, with 30 % cover. One of the three criteria of Côte d'Ivoire's official definition of a forest is precisely 30 % cover.



Source: Nitidae, 2019.

6.2 TRANSPARENCY AND TRACEABILITY NEEDS

Tool	Involved regions	Author(s)	Year	Themes	Useful links	Uses
Guidelines to ensure risk assessment, traceability	World	Accountability Framework Initiative (AFI)	2019	Definitions and tracking to build a robust traceability system	https://accountability-framework.org/wp-content/uploads/2021/08/DO_Gestio_Chaine_Approvision-v2.1.pdf	Compliance with rules and best practices for traceability and risk assessment.
Starling	World	Airbus, Earthworm Foundation		Mapping system for accurate observation of changes in forest cover	https://www.starling-verification.com/	Conduct joint massive satellite monitoring of deforestation with the governments of Côte d'Ivoire and Ghana and the private sector.
CIV Cocoa and coffee producers card	Côte d'Ivoire (CIV)	CCC	2022-23	Traceability system back to the producer to track the quantities sold and prices received	https://news.abidjan.net/articles/715076/distribution-annoncee-des-cartes-professionnelles-des-producteurs-de-cafe-cacao-de-la-zone-de-divo	Use by producers, buyers and control bodies to obtain accurate and quantitative data.
Sentinel Images (20 m) TropiSCO Software	World (but currently not West Africa)	Natural Centre for Space Studies (CNES), GlobEO Cesbio	2022	Weekly forest cover loss maps from Sentinel-1 satellites	https://www.tropisco.org/	Monitoring changes in forest cover or floor. Can be useful during a reforestation or land-use project.
Sentinel-1 and Global Forest Watch images	World	Airbus, Agrosatellite	2022	Monitoring of forest cover losses from Sentinel-1 satellites	https://www.globalforestwatch.org/	Monitoring of changes in forest cover or floor. Can be useful during a reforestation or land-use project (for a fee).
RA policy for cocoa traceability chain	Côte d'Ivoire, Ghana, Nigeria, Cameroon	Rainforest Alliance	2022	Obligations and guidance for traceability	https://www.rainforest-alliance.org/wp-content/uploads/2022/07/SA-P-AF-6-V2.3EN-Politique-concernant-la-Certification-des-Exploits-Agricoles-et_de-la-Chaine-de-Trac ¢ abilité-pour-le-Cacao.pdf	To be used to certify RA cocoa and also as a reference for traceability.
Understanding the specialty cocoa market	Europe	CBI	2020	Specialty cocoa, quality cocoa	https://www.cbi.eu/market-information/cocoa-cocoa-products/speciality-cocoa/market-potential	Advocate for the importance of high quality cocoa for the current market and farmers.

6.3 ENVIRONMENTAL PRESERVATION NEEDS

Tool	Involved regions	Author(s)	Year	Themes	Useful links	Uses
Image box on child labour, hunting, dangerous practices	West Africa	Cocoa Initiative		Prevention of child labour in the field Rights of children Prevention of hazardous practices (sharp objects, fire, chemicals, game hunting)	https://www.cocoainitiative.org/sites/default/files/resources/Boite-à-images-Lutte-contre-le-TE_ICI_2019_small.pdf	Raising awareness in cooperatives; Awareness of West African societies' perception of children.
Free, Prior, Informed Consent: Definition, key elements and use	World	Accountability Framework Initiative (AFI)	2019	Definition, rules of use, areas of application and key elements in local communities' rights	https://accountability-framework.org/wp-content/uploads/2020/06/DO_CLIP-v2.1.pdf	New land use or natural resource, land conservation and licensing.
Guidelines for training rangers in the fight against poaching in and around protected areas	World	PAMS Foundation	2016	Biodiversity, poaching Theories and practical cases – human rights training modules, protected area management, wildlife protection for field staff	https://www.internationalrangers.org/wp-content/uploads/Anti-poaching-Training-Guidelines-French-Directives-anti-braconnage.pdf	Training for rangers to protect biodiversity and stop poaching.
HCV / HCS (high conversation values / high carbon stock) method	World	HCS Approach	2020	Methodology for differentiating forest areas and areas with high conservation value	https://highcarbonstock.org/	The methodology was developed with the aim of ensuring a practical approach to implementing commitments to end deforestation.
Various tools to encourage wildlife protection and biodiversity	World	SWM program		Legal Implementation tools to reduce illegal hunting More sustainable diet guide, etc.	https://www.swm-programme.info/fr/knowledge-hub	During the implementation of a wildlife and biodiversity conservation project. Numerous tools to involve local communities in decisions and the application of new modes of operation.
Wildlife conservation projects	World, Focus on Cameroon and Congo Basin	Zoological Society of London		Toolkit for taking wildlife into account in production forest management activities Recommendations/instructions/ ready-to-use templates for loggers and their partners	https://www.zsl.org/what-we-do/projects	For forest operators and their partners wishing to conserve biodiversity in forests; Legal context.
Tool for the protection of humans and wildlife damaging crops	World	CIRAD	2014	Toolbox to preserve human activities with wildlife	https://ur-forets-societes.cirad.fr/content/download/4361/35171/version/1/file/DOC_OUTILS_Final_1510_basse_resolution.pdf	For the protection authorities.

6.4 FUNDING NEEDS

The implementation of sustainable practices has, potentially, initial costs that the farmer cannot bear in full. Without going for a complete subsidy, it is necessary to meet this demand through technical assistance (training), financing in kind (equipment) and cash (labour, for example). In this context, several cocoa projects utilise a method of mixed financing, composed of grants (from public or private projects, matching a grant or not) and loans (microfinance, for example):

- Grants are awarded directly by a development agency to a project. These grants are significant resources but insufficient to meet the magnitude of the needs. However, public funds can have a leverage effect on other private financing as part of the spread of sustainable practices.
- Matching grant. This mechanism consists of a development bank offering financing for projects that respect a specific set of specifications. Companies that propose the project must also commit a minimum amount of capital. These programmes finance up to 50 % of a project that companies conduct if sustainability requirements are met. Several donors can be solicited: AFD, Walloon Air and Climate Agency (AWAC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), BNP Foundation, Programme de promotion de l'exploitation certifiée des forêts (PPECF), Precious Forest Foundation, etc.
- Loans: These are granted by a private fund dedicated to financing sustainable agricultural practices or are provided by microfinance. Côte d'Ivoire has some pilot projects, such as the partnership between Advans and the Equity 2 programme (AFD/FFEM)[4].
- Purchase of carbon credits: This mechanism works rather like a method of remuneration for services rendered (strengthening conservation and reforestation), which enables tree planting to be financed on farmers' cocoa farms.

According to Eticwood, the following are some funding opportunities:

Organisation	Author(s)	Themes/scope	Useful link	Financing scheme
Farm-fit	IDH, USAID	Aims to improve business relationships with small producers or support innovations to develop new services to producers.	https://www.idhsustainabletrade.com/farmfit-fund/	Mixed financing system
ABCfund (AgriBusiness Capital Fund)		Investing in smallholders and small-to-medium-sized enterprises (SMEs) in developing countries to support sustainable and inclusive agricultural value chains.	https://www.ifad.org	Mixed financing system
AgriFI		The fund aims to increase returns and income. It is characterised by adherence to strong social and environmental criteria, support for value chains that create additional jobs, improving food security, and strengthening the social and environmental practices.	https://www.agrifi.eu/	Mixed financing system
Agri3fund	HDI	Contributing to a sustainable and efficient agriculture; Preventing deforestation and boosting reforestation; Improving rural living conditions.	www.idhsustainabletrade.com	Mixed financing system

4 For more details on the financial needs of cocoa producers in Côte d'Ivoire, consult the report entitled Feasibility study: 'Cocoa Agroecological Transition Fund in Côte d'Ivoire' – Equity Programme (programme-equite.org).

Organisation	Author(s)	Themes/scope	Useful link	Financing scheme
FISEA	Proparco	Capacity building for firms; Technical support to project creation.	www.proparco.fr/fr/page-thematique-axe/fisea	Mixed financing system
Land Degradation Neutrality (LDN) Fund	Mirova	Support for projects that generate added value for producers and investors through: • agricultural practices increasing yields and quality; • sustainable certification (Fairtrade, Rainforest Alliance or FSC); • payments for ecosystem services such as carbon credits ; • processing equipment for producers and linking cooperatives with international buyers.	https://www.mirova.com/fr/	Mixed financing system
&Green		Inclusive agriculture and forest protection The objectives of the &Green Fund are to: • catalyse USD 2 billion by &Green; • protect, conserve or restore 5 million hectares of rainforest; • benefit 500 000 households through increased yields and incomes, job creation, etc.	www.andgreen.fund/	Mixed financing system
Livelihoods3F		Aims at raw materials produced by small agricultural producers that concentrate on many environmental, social and logistical issues: cocoa, palm oil, mint, vanilla, sugar, carrageenan and water. It invests in large-scale projects that enable farmers to produce more and of a higher quality through sustainable farming practices. The aim is to strengthen the link between family farms and business supply chains. In addition, the projects benefit society as a whole through the preservation of biodiversity, management of water resources and sequestration of CO_2.	http://www.livelihoods.eu/	Mixed financing system
Gold Standard	WWF	Carbon certification and socioeconomic development of local communities	https://www.goldstandard.org/	Voluntary carbon market financing scheme
VCS	Voluntary Carbon Standard (VCS)	Carbon certification based on GHG quality	https://verra.org/programs/verified-carbon-standard/	Voluntary carbon market financing scheme
CCB	Climate Community Biodiversity (CCB) & VCS	Benefits to the climate, local communities and biodiversity; Agriculture, forestry or land-use projects.	https://www.climate-standards.org/ccb-standards/	Voluntary carbon market financing scheme
FT Climate Standard	Financial Times (FT) international and gold standard	Supporting communities and smallholders to produce fair 'carbon credits' with democracy, transparency and a guarantee of a minimum price for carbon credit.		Voluntary carbon market financing scheme

6.5 PROPERTY RISK MANAGEMENT

The rights related to property ownership are the right to use this property (usus), to benefit from the fruits this property produces (fructus) and to dispose of this property as the owner wishes (abusus). When this is applied to a tree, the owner will therefore have the right to use it, to receive the profits it generates and to dispose of it. In a context of agroforestry deployment, the question of tree ownership arises when regarding both the status of the forest tree planted on a farm and the natural tree located in a forest area (Kinomé and FCPF, 2022).

In some West African countries, such as Côte d'Ivoire and Ghana, many laws regulate the ownership of land, trees and forests. Nevertheless, the lack of awareness by local farmers makes it difficult for them to understand the regulations and multiplies the interpretations given to the texts; this can lead to disputes and influence the practices of agricultural and forestry actors.

TABLE 4 Tree and land tenure opportunities for agroforestry

Field of action	Opportunity
Customary land tenure (or socially legitimate land systems): This often constitutes a hindrance on the adoption of agroforestry today (species of trees belonging to communities, planting trees considered as a means of claiming land and therefore prohibited to migrants, etc.).	Very flexible and legitimate in the communities. It could be modified to include agroforestry through, for example, state-sponsored arrangements. This is the case, for example, in Ghana, where the government is considering a mechanism for sharing timber revenues between the landowner and the migrant.
Land formalisation: State recognition of customary laws and ownership; tools can enable landowners to exercise their rights.	National laws have changed a great deal in recent years. They prepare for the stabilisation of land use and grant land certificates to reduce competition on land use (see the example of the REDD+ la Mé project in Côte d'Ivoire).
Conditional land tenure and long-term leasing: State granting of secure long-term rights for harvesting specific tree products, in exchange for the application of good practices in natural resource management.	State control of the transfer of its own land that could force a conversion to agroforestry.
Community land management: The participatory process to establish rules for land-use management. Organisations could support this as facilitators.	A way to bring together actors (such as shepherds and farmers) for the adoption of agroforestry. Opportunities exist to examine the adequacy of customary rules with agroforestry, while engaging stakeholders in respecting the boundaries between conservation and development.

Source: FAO and ICRAF, 2019.

7

LESSONS LEARNED AND RECOMMENDATIONS

7.1 GENERAL RECOMMENDATIONS TAKEN FROM A REVIEW OF OTHER PROGRAMMES AND STUDIES

Thematic recommendations are listed below. References are given for further study.

At the agronomic and technical level

Recommendations	Source
Integration of farmers' knowledge into agroforestry promotion schemes	Sanial, 2019b
Integration of local needs (demand for food products, non-timber forest products) and producers' motivation to engage in projects adapted to their social, economic and natural environment.	Climate Focus, 2020 Gockowski et al., 2010
Establish a training programme for farmers based on sustainable practices adapted to the local context (agroforestry, preservation of the specific landscape's forests).	World Bank, 2022 Climate Focus, 2020
Regeneration of ageing cocoa orchards in agroecology.	Asare & David, 2010
Replanting of orchards affected by swollen shoot in agroforestry and/or agroecological systems.	Asare & David, 2010 CCC, 2015
Integration of tree legumes in agroforestry systems	CCC, 2015
When the regulatory context allows, promote seedlings from grafted cocoa plants for greater robustness and to guarantee productive stems; grafting onto old stems also allows extending the cocoa tree's commercial cycle while waiting to be able to replant.	As a reminder
Large-scale communication (public-private partnerships) to halt child labour and deforestation.	As a reminder

Transparency and traceability management

Recommendations	Source
Defining common performance indicators for every programme so that all actors are accountable.	Mighty Earth, 2019
All companies that have made zero deforestation commitments must keep them and suspend relations with suppliers of cocoa from recent deforestation (before 2017).	Mighty Earth, 2019
Each player in the chocolate value chain must publish the origin of their supply (intermediaries and cooperatives).	Mighty Earth, 2019
Deployment of mobile payments to ensure traceability to the farmer.	Mighty Earth, 2019
Continue the mapping efforts conducted in the producer countries, and initiate them as soon as the chain is installed for the countries starting to produce (Liberia in particular).	As a reminder
When new plots are installed, use mapping to guarantee traceability as soon as they are put into production and to facilitate placing the traceable cocoa on the market.	World Bank, 2022

Environmental protection

Recommendations	Source
Integration of farmers' knowledge into AF promotion schemes.	Sanial, 2019b
Recruitment, training and remuneration of field workers responsible for the preservation of protected areas and forests.	Mighty Earth, 2019
Pre-conservation area mapping (HCS HVC).	Rainforest Alliance, 2020
Technical support to cocoa farming development to avoid the destruction of biodiversity habitats.	As a reminder
Strict adherence to rules to curb encroachment on protected areas.	World Bank, 2022
GAP training, agroecological techniques, financing the conversion to organic farming.	As a reminder
Act against illegal gold mining and poaching in conservation areas.	As a reminder

Financing

Recommendations	Source
Need for cooperation between actors on the ground, funders, politicians, industry, NGOs and local civil organisations.	World Bank, 2022
Developing public-private partnerships in producer countries to meet needs.	World Bank, 2022
Better remuneration of producers by increasing the price per kilo (depends on cocoa processors).	Cocoa Barometer, 2019
Communication on the percentage of agroforestry and full-sun cocoa as a selling point for buyers.	As a reminder
Export tax mechanism to finance mapping/geo-referencing (USD/tonne exported not geo-referenced).	Mighty Earth, 2019

Policy and regulations

Recommendations	Source
Need to involve local populations in establishing new regulations that consider their needs and their role in conservation.	
Regular and solid field control (publicly and privately co-financed) for identification of illegal cocoa trafficking from deforested areas.	Mighty Earth, 2019
Forested countries must establish and enforce strong laws to preserve their forests before their disappearance (Liberia, Sierra Leone, Guinea, etc.)	As a reminder
Conservation and sustainable cocoa interventions need to be coordinated at government level to pool financial resources (allocation of areas according to means and actors).	As a reminder
Establishment of standards that require all cocoa farming to move to agroforestry and prohibit all previously deforested areas to be labelled (any combined label); need to effectively monitor standards to ensure these are upheld.	Comparison of labels
Support maintenance of existing diversified agroforestry systems (rather than encouraging simplified cocoa/wood combinations or a move towards monoculture).	As a reminder
Need for cooperation between actors on the ground, funders, politicians, industry, NGOs and local civil organisations.	As a reminder

7.2 POSSIBLE WAYS TO DEVELOP SUSTAINABLE COCOA

7.2.1 SITUATION 1: AREAS WHERE COCOA FARMING BEGINS

In these areas, programmes can be started on a sustainable basis from the outset: respect for zoning, choice of sustainable technical routes, appropriate accompanying measures, preparation for the enhancement of cocoa and other favourable niche products.

To ensure a project's sustainability, emphasise the focus on long-term projects, with partnerships between public and private actors. Involving all stakeholders from the project's construction and design seems necessary, in particular when considering the population's wishes and needs, state representatives' commitment at the local level and at the level of decision-makers, support towards market access (partnerships with committed private companies) and regular support for farmers in improving farming and post-harvest methods.

7.2.2 SITUATION 2: AREA WHERE COCOA FARMING HAS ALREADY BEEN INTRODUCED BUT NEEDS IMPROVEMENT

The first step is to diagnose the situation to consider corrections, because improvements can be of different kinds:

- Techniques: for example, monitoring issues of too low or too high a density of cocoa trees, or the ageing of a large number of non-productive stems, presence of diseases, problems of plot aeration or excessive shade, etc.;
- Economic: low valuation of cocoa, non-linear forest products, fruits; market access problems; low quality due to poorly controlled post-harvest operations;
- Organisational: disorganised supply, unstructured producers.

Among the most common problems encountered, it is probably the wrong agronomic choice that has the most potential impact on the forest. With underproductive plantations caused by, for example, a high rate of non-productive stems (because of poorly selected pods), a planter may be tempted to compensate by expansion. In the same way, the short-term search for maximum yields through full-sun techniques can lead to the plantation being abandoned as a result of plant exhaustion and the clearing of new areas.

7.2.3 SITUATION 3: AREA WHERE GOOD PRACTICES ARE ALREADY IN PLACE

In these areas where sustainable agronomic practices are already in place, it may be interesting to enhance the area further with sustainable certification programmes that are recognised worldwide. Enhancement can also be developed by on-site processing of the first manufacturing steps (roasting, grinding, cocoa paste) to bring part of the added value to the territory, or in national chocolate factories where the bean becomes the finished product (chocolate bean to bar) when demand allows.

7.2.4 SUMMARISED ANALYSIS

STRENGTHS:

- Important sector in the country's economy: first agricultural export hub for many countries studied
- Farmers' Cooperatives Association
- Willingness to transition to sustainable cocoa within the sector
- Enhancement of sustainable cocoa through a certification system

WEAKNESSES:

- Too low a remuneration for producers
- Bottleneck in processing and distribution
- Low social acceptability of some sustainable practices
- Environmental impacts of current methods
- Lack of structure within sector
- Failure to respect certain human rights
- In some countries, a significant proportion of cocoa comes from classified forests

OPPORTUNITIES:

- Development of new traceability technologies
- Funding from international programmes such as REDD+
- Many tools to be mobilised to 'improve' the sector

THREATS:

- Climate change
- Smuggling between neighbouring countries
- Volatile market price with current global overproduction
- Poorly developed research by country

8

CONCLUSION

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In the world of cocoa, commitments, internal labels and corporate sustainability programmes are almost exclusively based on improving productivity (particularly through agricultural techniques). On the other hand, agricultural intensification shows little effectiveness in terms of conservation and protection of forests and biodiversity. Growing global demand since the 1970s and low productivity per hectare have driven a production increase, especially as a result of an expansion of cultivated areas from 4 million to more than 10 million ha worldwide. For at least half of the area, this expansion was possible at the expense of natural forests favoured by the 'forest revenue' and also the generalisation of full-sun crops that require cutting down the upper layers (IDDRI, 2019). This is why the main issue of sustainable cocoa associated with the preservation of forests is traceability to the plot, since even certification labels like Rainforest Alliance and Fairtrade have not been enough to reduce forest degradation.

Also, many sustainability practices exist and need to be adapted according to the areas and the plot history (cocoa, crops, forests). The implementation of GAPs, the establishment of agroforestry systems and agroecology are major technical recommendations. Diversifying income through a variety of crops and activities (processing) is essential to move towards greater resilience for producers. Today, many national and international programmes and projects integrate tools and recommendations at local and national levels. Prior consultation with the various actors who have worked subsequently on the development of agricultural sectors would save time and efficiency for project leaders.

In this perspective, the challenge of economic incentives at the producer level for environmental conservation is unavoidable. The implementation of GAPs and virtuous agroforestry systems generate additional costs that are currently too poorly compensated but which other payment mechanisms, such as carbon credits or environmental services, could supplement.

The global cocoa demand continues to grow and provides sales opportunities for cocoa-producing countries. In December 2022, CIRAD identified four ambitions for sustainable cocoa sector development for the next 10 years:

I. rehabilitate cocoa trees through the mobilisation of agrobiodiversity;
II. contribute to developing markets that combine production sustainability and quality;
III. carry out research to discover, maintain and promote the genetic diversity of cocoa trees; and
IV. strengthen cocoa producers' autonomy and capacities.

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LIST OF INTERVIEWS CONDUCTED AS PART OF THE STUDY

Bastide, 2022:
Excerpt from a telephone interview with Philippe Bastide on 21 December 2022 on the theme 'agroforestry, genetics and cocoa farming methods in West Africa', conducted by the Kinomé team.

Beligné, 2022:
Interview with Vincent Beligné on cocoa in Côte d'Ivoire and the Taï-Grebo-Krahn-Sapo landscape, 17 November 2022 by Kinomé.

Gola, 2023:
Interview with Alade Adeleke on the Gola landscape of PAPFor, 25 January 2023 by Kinomé.

Kofituo, 2022:
IITA Cocoa Varieties Researcher Rich Kofi Kofituo interviewed on 17 January 2023 by Kinomé

WABiCC WABiLED, 2022:
Interview with Eugene Cole, Adeleke Wale and Nohou Ndam on the WABiCC WABiLED programme, 21 November 2022 by Kinomé.

WCS, 2022:
Interview with Andrew Dunn and Imong Inaoyom on the Landscape WCS Cross River as part of PAPFor, 30 November 2022 by Kinomé.

WWZ, 2022:
Interview with Neus Estela, Delphine Ayerbe and Koighae Toupou on the WWZ landscape, 16 November 2022 by Kinomé.

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APPENDIX

APPENDIX 1: THEMATIC REFERENCES AND USEFUL LINKS

During the exchanges, the various stakeholders expressed the need to compile, in one place, the different literature sources useful to landscape managers and forest conservation projects located in areas where cocoa production exists. This non-exhaustive summary addresses the study's main themes.

Topics	Involved regions	Reference	Author(s)	Year	Title	Useful links	For further reading
Cocoa agroforestry, cocoa productivity	Costa Rica Côte d'Ivoire Ghana Cameroon	Deheuvels, 2011	Olivier Deheuvels	2011	*Compromis entre productivité et biodiversité sur un gradient d'intensité de gestion de systèmes agroforestiers à base de cacaoyers de Talamanca, Costa Rica*	https://agritrop.cirad.fr/587332/1/DEHEUVELS.pdf (in French)	Shade Cocoa Agronomy, p.23 - AF Production, p.34 -
Agroforestry cocoa, Possible associations, Non-timber forest products	Côte d'Ivoire	Nitidae, 2022	Nitidae	2022	*Les arbres des cacaoyères, Recueil de connaissances paysannes sur les interactions entre arbres compagnons et cacaoyers en Côte d'Ivoire*	https://www.nitidae.org/files/3d5cd5ec/les_arbres_des_cacaoyeres_recueil_de_connaissances_paysannes_sur_les_interactions_entre_arbres_compagnons_et_cacaoyers_en_cote_d_ivoire.pdf	49 p.
Agroforestry cocoa	Côte d'Ivoire	Sanial, 2019	Elsa Sanial	2019	*À la recherche de l'ombre, géographie des systèmes agroforestiers émergents en cacaoculture ivoirienne postforestière.* Université Lyon 3, CIRAD. 340 p.	https://scd-resnum.univ-lyon3.fr/out/theses/2019_out_sanial_e.pdf	
Agroforestry cocoa, smallholder practices	Côte d'Ivoire	Sanial, 2019b	Elsa Sanial	2019b	*À la recherche de l'ombre, géographie des systèmes agroforestiers émergents en cacaoculture ivoirienne postforestière. Dissertation defence* - Université Lyon 3, CIRAD. 340 p.	https://www.nitidae.org/files/de5c2772/a_la_recherche_de_l_ombre_geographie_des_systemes_agroforestiers_emergents_en_cacaoculture_ivoirienne_post_forestiere.pdf	pps.20 and 24
Standards, Corporate Sustainability Programme	World	BASIC, 2016	BASIC	2016	*La face cachée du chocolat, une comparaison des coûts sociaux et environnementaux des filières conventionnelles, durables et équitables du cacao*. 20p.	https://www.coordinationsud.org/document-ressource/face-cachee-chocolat-basic-2016/	
Cocoa economy, distribution of value and costs in producer countries, decent income differential	Côte d'Ivoire, Ghana, Cameroon	FAO and BASIC, 2020	FAO and BASIC	2020	FAO and BASIC. 2020. *Étude comparative de la répartition de la valeur au sein des filières européennes de cacao-chocolat, Résumé Exécutif.* Paris. 16p.	https://lebasic.com/wp-content/uploads/2020/06/BASIC-DEVCO-FAO_Etude-chaine-de-valeur-Cacao-Resume-Executif_Exemplaire-Anticipe_Juin-2020.pdf	pps.8 and 14

Topics	Involved regions	Reference	Author(s)	Year	Title	Useful links	For further reading
Standard, production management, traceability	World	ISO, 2019	International Organisation for Standardisation	2019	ISO 34101-1: 2019: Sustainable and traceable cocoa — Part 1: Requirements for cocoa sustainability management systems	https://www.iso.org/obp/ui/#iso:std:iso:34101:-1:ed-1:v1:en	
National sustainable cocoa initiatives					Activity report 2021/2022 – Initiative Française pour un Cacao Durable (IFCD)	https://www.vie-publique.fr/sites/default/files/rapport/pdf/286664.pdf	
Referencing sustainable cocoa studies and initiatives					International Coca Initiative	https://www.cocoainitiative.org/knowledge-hub/resources?type=30	
Cocoa and deforestation recommendations	Côte d'Ivoire, Ghana	Mighty Earth, 2019	Mighty Earth	2019	Behind the wrapper: Greenwashing in the chocolate Industry	https://www.mightyearth.org/wp-content/uploads/Chocolate-Report_english_FOR-WEB.pdf	p.12
Summary of research on sustainable cocoa Socioeconomic, gender, adaptation and climate change mitigation, production systems, governance, transformation and sensory analysis		Swiss Platform for Sustainable Cocoa, 2022	Swiss Platform for Sustainable Cocoa	2022	Book of Abstracts – latest Research of Swiss Research Institutions	https://www.kakaoplattform.ch/fileadmin/redaktion/dokumente/ISCR_2022_Book_of_Abstracts.pdf	Summaries of analytical contributions and solutions that ISCO research partners have developed in recent years

Topics	Involved regions	Reference	Author(s)	Year	Title	Useful links	For further reading
Best agronomic management practices and sustainable fertiliser use in West African cocoa production	West Africa	IITA, 2022	Leonard Rusinamhodzi (IITA, Ghana), Stefan Hauser (IITA, Nigeria), Ekatherina Vasquez Zambrano (WUR, Netherlands), Richard Asare (IITA, Ghana), Bernard Vanlauwe (IITA, Kenya), Ken Giller (WUR, Netherlands)	2022	A stepwise approach to achieve the best agronomic management practices and sustainable fertilizer use in West African cocoa production	https://www.iscrsymposium.org/wp-content/loads/2022/12/25_05122022_1400_pasteur_Leonard_Rusinamhodzi.pdf	
Mapping areas of opportunity for agroforestry	Côte d'Ivoire	Cocoasoils, 2021	Cocoasoils	2021	*Cartographier les zones d'opportunité pour l'agroforesterie cacaoyère en Côte d'Ivoire*	https://cocoasoils.org/wp-content/uploads/2022/01/202112_Mapping-Potential-for-Cocoa-Agroforestry-Report_10-FR-online.pdf	
Traceability system	Côte d'Ivoire	Vasquez et al., 2022	Ekatherina Vasquez, Wageningen University & Research, The Netherlands Lotte Woittiez, Joost van Heerwaarden, Arun Pratihast	2022	Innovative digital data collection in collaborative cocoa fertilizer trials	https://www.iscrsymposium.org/wp-content/uploads/2022/12/24_05122022_1400_pasteur_Ekatherina_Vasquez.pdf	
Traceability system	Cameroon	Nitidae, 2022	Nitidae	2022	*Traçabilité, transparence et durabilité dans la filière cacao au Cameroun*	https://www.nitidae.org/files/b4aa5b8c/tracabilite_transparence_et_durabilite_dans_la_filiere_cacao_au_cameroun_presentation_.pdf	

APPENDIX 2: COCOA-RELATED ACTIVITIES IN PAPFOR PROJECTS

GOLA LANDSCAPE

drafted by Mamadouba Yaya Soumah

General information	
Countries concerned	Sierra Leone, Liberia
Landscape name	Transboundary Forest Landscapes of the Greater Gola
Activities carried out on the project's environmental axis	Sustainable cocoa farming
Activities carried out on the project's social axis	Working with almost 2 000 farmers from 3 major associations, promoting the improvement of cocoa farmers' livelihoods, reducing child labour, promoting young people and women's rights to land and crop ownership
Number of people benefitting from the project(s)	1 766 farmers in the Gola forest in Sierra Leone and 105 cocoa farmers in the Gola forest in Liberia
Project-hosting associations /NGOs	The Ngoleagorbu Cocoa Producers' Union (GOCFU) brings together three farmers' associations (the G Cocoa Producers' Association): Gaura Cocoa Farmers Association (GACFA), comprising 446 farmers (22 % women) from 13 communities/villages in the Gaura Chieftaincy; the Tunkia-Koya Cocoa Farmers Association (TunKoCFA), comprising 470 farmers (15 % women) from 34 communities; the Malema Cocoa Farmers Association (MACFA), comprising 850 farmers (27 % women) from 35 communities in the Malema Chieftaincy.
PAPFor partner associations / NGOs	Royal Society for the Protection of Birds (RSPB), Society for the Conservation of Nature of Liberia (SCNL), Conservation Society of Sierra Leone (CSSL)
Past actions carried out in relation to cocoa	
Major success 1	Creation of a farmers' union from the three associations, bringing together nearly 2 000 farmers from 82 communities
Tools/materials to illustrate success 1	Technical support and advice to rehabilitated/abandoned cocoa farms; clearing, pruning, mulching then replanting with new plants that are a shade-tolerant cocoa species
Major success 2	Incomes for farmers from the premium and European markets
Tools/materials to illustrate success 2	Agreement on the use of old farms and degraded areas for cocoa growing, planting to promote agroforestry in cocoa-growing areas
Major challenge 1	Willingness to continue to support
Reasons for major challenge 1	Short-term projects such as WABiCC (5 years), WABiLED (4 years), PAPFor (4 years) (long-term projects last between 7 and 15 years)
What changes have been made for future projects?	Key components for cocoa farmers: promote land-use planning and deforestation-free agriculture
Major challenge 2	Lack of collaboration between actors in the agriculture and forestry sectors
Reasons for major challenge 2	Shortage of projects that promote collaboration and develop synergies between the initiatives
What changes have been made for future projects?	Design an innovative project with a key component on partnerships: border activities in line with the agreements, greater collaboration between cocoa farmers, explore local processing, green fertilizers, avoid the use of chemicals
Other comments	Include a small research component on human-wildlife conflict resolution

Current Projects	
Major success 1	There is a growing awareness of the need to promote cocoa-forest coexistence/cohabitation and the willingness of the EU-PAPFor and USAID-WABILED to support this promotion.
Tools/materials to illustrate success 1	Consultation reports on the current situation of the cocoa-forest coexistence in West Africa, organise a conference validate the report and plan the next steps.
Major success 2	The EU-PAPFor and USAID-WABiLED partnership is addressing the study of collaborative cocoa-forest coexistence
Tools/materials to illustrate success 2	Focus is needed on the main remaining forest landscapes: Gola, TGKs, OKKPPS, WWZ, Cross River
Major challenge 1	Limitation of funding, weak implementation of the 'cocoa zero deforestation' programme in Côte d'Ivoire, Ghana and Nigeria/Cameroon
Reasons for major challenge 1	Lack of follow-up and pragmatism, limited involvement from the private sector
What changes have been made for future projects?	Lack of strategies from ECOWAS/EUMOA, MRU/UMR, and national and landscape levels regarding the implementation of a cocoa-forest coexistence.
Major challenge 2	Short-term regional initiatives such as EU-PAPFor and USAID-WABiLED
Reasons for major challenge 2	Gaps in funding
What changes have been made for future projects?	Long-term projects, strong policy/strategy with an implementation component, greater collaboration between projects
Other comments	Promoting collaboration between the forestry, mining and agricultural sectors
Cocoa Landscape/Forests Context	
Major cocoa/forestry programmes	Shortage of links with agriculture for forestry projects and likewise forestry components in agricultural projects. A greater promotion of collaboration between the two is needed.
Inception issues: How was the cocoa sector envisaged? And as an answer to what issue?	There has been an emphasis on production, without considering the need for a balanced approach to energy production and forest and biodiversity conservation.
Solution considered: How is the promotion of good practices related to existing cocoa areas a solution?	Dialogue with mining, forestry and agricultural projects is taking place to promote backfilling after mining, no water pollution, no use of chemicals, no forest clearing to grow cocoa in the mining area, the use of green manure, mulch and improved cocoa varieties that tolerate shade, and to promote smart agriculture.
Is there a challenge to acquire different techniques to grow cocoa?	Lacks of support in the area
What are the challenges associated with climate change in the area?	The need for smart agriculture and the use of climate-resistant varieties.
Is there a regulation regarding the ownership of trees in the area?	There is no regulation on tree ownership. In the Mano River Union, however, the landowner is currently seen as the owner of the trees.
Are there any technical problems with cocoa farming?	Problems are found at all levels: there is a shortage of seed supply, little land security, and few new techniques or improved production. The number of extension workers is limited, cultivation is one of slash and burn, there is a shortage of drying techniques, and marketing is a problem.
What methods of cocoa cultivation do you implement?	Traditional, burning, planting the seeds that can be obtained and felling trees as there is no knowledge of agroforestry. However, cocoa varieties are improved in disadvantaged areas.
Do you encounter technical problems with forest conservation?	Yes, there is a shortage of drying, storage and commercial techniques.

Are you facing financial obstacles? Which ones?	Yes, loans for clearing farms, harvesting, drying and marketing.
Building for tomorrow	
What are the lessons learned in disease and pest management?	There is a need for more workers on the ground with an up-to-date knowledge of disease control, more funding to treat farms facing disease problems, to grow varieties with a low resistance to disease and adapt to climate change.
What lessons have been learned about biodiversity conservation?	Looking at the patterns of deforestation and cocoa production in Côte d'Ivoire, deforestation and high cocoa production overlap and are moving from eastern Côte d'Ivoire westwards. However, zero deforestation in cocoa producing areas does not work effectively.
What are the lessons learned about managing cocoa in the shade?	The number of cocoa seeds and plants that tolerate shade is very limited.
What are the lessons learned about land and tree tenure?	Tenure is predominantly male-driven, and young people and women tend to be excluded. The inclusion of young people and women in the land tenure systems of cocoa production must be promoted.
Do you have any comments or recommendations?	Privatise the forest to better conserve it, train and support farmers to protect the remaining forest plots, and plant more trees in degraded areas.

ZIAMA FOREST LANDSCAPE

drafted by Nohou Ndam

General information	
Countries concerned	Guinea, Liberia
Landscape name	Ziama Forest
Activities carried out on the project's environmental axis	Agricultural Council (Agroforestry & Agroecology), participatory land-use planning
Activities carried out on the project's social axis	Support for community development in villages bordering the Ziama forest: training, support for producer structuring, preservation of biodiversity
Project-hosting associations/ NGOs	GRET and Fauna & Flora International (FFI)
PAPFor partner associations/ NGOs	Guinean House of the Entrepreneur (MGE), ADCAP
Past projects in the cocoa landscape	
Description of actions on cocoa farming	Past projects: 2017 to 2021 FFI (DARWIN): the installation of cocoa nurseries, training on technical routes (cocoa, coffee, palm trees, pepper, timber), establishment of field schools for market gardening and distribution of ginger, cowpea, peanut, corn and rice seeds to groups; and 2020 to 2022 GEF/MANO: training and installation of agroforestry nurseries (cocoa, coffee, palm tree, pepper and timber), and establishing field schools for palm, cocoa, coffee and forest species to support groups.
Major success 1	Training on technical approaches to different forest and agroforestry methods
Tools/materials to illustrate success 1	Picture boxes, video, technical agricultural equipment
Major success 2	Training on the technical approaches to growing food crops (corn and rice) and vegetable crops (aubergine, chilli, tomato, okra), and composting

Tools/materials to illustrate success 2	Picture boxes, videos, technical agricultural equipment
Major challenge 1	Improvement of agricultural practices
Reasons for major challenge 1	To preserve the Ziama Biosphere
What changes have been made for future projects?	Monitoring and support for the intervention areas from past projects with a view to sustainability.
Major challenge 2	Increase crop yields and reduce the degrading effects on the forest
Reasons for major challenge 2	Improve living conditions in the villages bordering Ziama
What changes have been made for future projects?	Monitoring and support for the intervention areas from past projects with a view to sustainability.
Other comments	2019-2020 WA-BiCC (West Africa Biodiversity and Climate Change): training on technical itineraries (Robusta coffee and market gardening) and on the manufacture of bio-pesticides and establishing field schools (aubergine, peppers, okra, ginger, corn, cowpeas, rice, peanut, cassava, etc.). Several activities were carried out to improve the local population's living conditions and to preserve the Ziama Biosphere.
Current projects	
Major success 1	Studies of markets in the cocoa and pepper sectors, and agroforestry/agroecology
Tools/materials to illustrate success 1	Kobo toolbox survey and usage sheets
Major success 2	Sharing results of studies; identification of actors in the cocoa and pepper sectors, the village storage stores and those doing relay farming.
Tools/materials to illustrate success 2	Identification sheets
Major challenge 1	Know the constraints and assets related to these sectors and an improvement in their market
Reasons for major challenge 1	Support the actors in the cocoa and pepper sectors (training, structuring, etc.) to achieve quality products
What changes have been made for future projects?	Monitoring and support for the intervention areas from current projects with a view to sustainability.
Major challenge 2	Provide training to improve agricultural practices
Reasons for major challenge 2	To increase yields and produce quality products
What changes have been made for future projects?	Monitoring and support for the intervention areas from current projects with a view to sustainability and introducing agro-pastoral innovations
Other comments	There is much demand for Robusta coffee, oil palm, small cola, fishponds, lowland development, beekeeping, etc.
Cocoa/forest landscape context	
Major cocoa/forestry programmes in the landscape	Production, processing (fermentation and drying) and marketing
Inception issues: How was the cocoa sector envisaged? As an answer to what issue?	The sector has been envisaged to meet the actors' needs and to make them independent. However, the necessary techniques have not been mastered (cultivation, local processing), there is insufficient maintenance, there are attacks from enemies, disease and a lack of structuring into groups to support marketing. Organisation problems also need to be addressed.

Solution considered: How is cocoa farming or the promotion of good practices related to existing methods of cocoa farming considered a solution?	The promotion of good practices related to the existing methods of cocoa farming is one solution.
Is it a challenge or do you use a different technique to grow cocoa?	Different techniques are used for growing cocoa: choice of seeds, nursery installation, choice of location site, respect of densities (1 111 plants/ha or 1 333 plants/ha) due to spacing of 3mx3m or 3 mx2.5m), maintenance, protection against bio-aggressors and disease.
What are the challenges associated with climate change in the area?	These is an intensification in the agroforestry systems based on cocoa, coffee, pepper and palm trees in the villages bordering Ziama.
Is there a regulation regarding the ownership of trees in the area?	Yes, there are regulations on tree ownership in the area.
Are there any technical problems with cocoa farming?	Attacks by bio-aggressors, disease (rotting of pods), lack of knowledge on technical routes, insufficient manpower for maintenance work.
What methods of cocoa cultivation do you implement?	Direct sowing, nursery installation, site choice, respect of densities (1 111 plants/ha or 1 333 plants/ha) at a ratio of (3m/3 or 3m/2.5), and association with other crops (coffee, pepper, trees, banana, avocado, mango, guava, etc.).
Do you encounter technical problems with forest conservation?	Yes, technical problems are encountered in forest conservation (bushfires, abusive deforestation, encroachment on fields, carbonisation, traditional beekeeping, poaching, cultural nomadism, etc.). There is a shortage of free and cultivable areas around the Ziama reserve.
Are you facing financial obstacles? Which ones?	Yes, but the financial obstacles are met (lack of funding at actor level, high interest rate at the level of microfinance institutions – sometimes as much as 3 %).
Building for tomorrow	
What are the lessons learned in disease and pest management?	Regarding the sustainability of cocoa and forests: the choice of a good variety and planting site, respect of cultural standards, interviews and cocoa associations with other crops (agro-pastoral, agro-silvo-pastoral, etc.) are required.
What are the lessons learned about managing cocoa in the shade?	The lessons learned about shade include: A high density of shade reduces production, promotes the presence of disease (rotting pods) and bio-aggressors, and also parasitic plants (algae, lichens, ferns) on trunks; the plant has fewer branches. Low density shade results in good production, few diseases, bio-aggressive means, good branching of limbs and less likelihood of parasitic plants;
What are the lessons learned about land and tree tenure?	Temporary hydromorphic soils result in flooding during the rainy season, which is the time of fruiting and the maturity of certain pods, often cause rot and death by asphyxiation at the root system, and difficult access.
Do you have any comments or recommendations?	The cocoa plantations visited are ageing, are associated with other crops and trees (agroforestry), with a lack of soil fertilisation and phytosanitary treatment; the majority of plantations are on soils with temporary hydromorphy and low yield. Recommendations: technical training is needed, together with support for structuring, marketing products, the supply of quality seeds, training on the production of bio-pesticides and organic fertilizers, on the supply of fertilizing plants and on processing techniques at the local scale, plus storage and protection.

TAI – GREBO KRAHN – SAPO (TGKS) FOREST LANDSCAPE

drafted by Vincent Beligné

General information	
Countries concerned	Côte d'Ivoire (CI), Liberia (LR)

Landscape name	TGKS
Activities carried out on the project's environmental axis	Develop agroforestry systems Preserve residual forests
Activities carried out on the project's social axis	Proceed with local development plans for 6 villages in Côte d'Ivoire (+ 2 forthcoming in Liberia) and support for their implementation Support the development and formalisation of land-use plans (Liberia) Develop makoré and wild mango value chains (from the promotion of agroforestry to the production of makoré butter) Support the sustainable management of village forests
Number of beneficiaries affected by the project(s)	A few tens of thousands?
PAPFor-TGKS partner associations/NGOs	NOFNA (Our Forest – Our Future / local NGO in Zagné); YVEO (Yacoli Village Ecole Ouverte / national CI NGO); EF-CI (Earthworm Foundation, Côte d'Ivoire / country office of an international NGO); World Chimpanzee Foundation / country offices of an international NGO in CI & LR); LISUPED (LR); FACE (LR); WHH (Welt Hunger Hilfe / international NGO in LR)
Current projects in the cocoa landscape	
Description of actions on cocoa farming	Development of agroforestry by considering a 'friendly' or 'companion' tree species of the cocoa tree that can allow the generation of additional income without decreasing income derived from the cocoa cultivation (e.g. makoré). Works very well in combination with plants that are used locally (small kola, wild mango, etc.)
Major success 1	Promotion of makoré as a cocoa a 'companion' tree, enhancement and processing of makoré butter
Tools/materials to illustrate success 1	More than 1 000 mature makoré trees identified and geo-referenced in the project's areas (in CI) & commercial outlets in Côte d'Ivoire guaranteed
Major success 2	Participatory approach to forest preservation, providing (several) opportunity(ies) for preservation
Tools/materials to illustrate success 2	Development of social interests for forest preservation (culture, sacred character, medicinal plants for human consumption, etc.) and the promotion of an economic interest in preservation – collection of non-forest wood products (NWFP), ecotourism
Major challenge 1	In Côte d'Ivoire, insufficient work on agronomic techniques (GAPs) for cocoa under the TGKS. In Liberia, apart from the public-private partnership (PPP) Sustainable Cocoa led for 2 years in Grebo-Krahn, there has been no great mastery of agricultural techniques.
Reasons for major challenge 1	In Côte d'Ivoire, agricultural practices in cocoa farming in the Taï area are the responsibility of ProCIV (GIZ Centre Innovations Vertes); the TGS only deals with the promotion of an agroforestry system to reintroduce makoré into the rural landscape. In Liberia, the livelihoods of village communities have relied on hunting, collecting NWFP (toothbrushes) and sawing (illegal activities in many situations), activities that are directed towards Ivorian and Ghanaian markets. Long political crises and very poor (or non-existent) road services have made access to learning new agricultural techniques very limited.
What changes need to be made for future projects?	Better integration of good agricultural practices in a holistic way, including agroforestry. Also agroforestry systems need to be promoted to restore fertility in cocoa farming (improving or regenerating aging orchards / creating plantations on previous non-forested areas), with Oceanian acacias and albizzias, etc.
Major challenge 2	Finding income alternatives for peripheral areas of conservation land.
Reasons for major challenge 2	Communities must be compensated for the loss of access to natural resources and/or spaces that could provide livelihoods (through the provision of alternative work, finance, etc.)

What changes need to be made for future projects?	Incentives must be improved for the exploitation of natural resources as well as for village forests, better integrating the customary provisions and modern regulations relating to forests and land. It is important to encourage innovative approaches in natural resource management and land-use planning.
Other comments	An additional challenge could be the reception of migrants by local populations who generate socio-political problems (land management and 'barter' of the labour force, etc.).
Cocoa /forest landscape context	
Inception issues: How was the cocoa sector envisaged? And as an answer to what issue?	In Côte d'Ivoire, the history of cocoa is more than a century old (read Cocoaïans by Gauz), begun in response to the colonial power's needs. The need for raw materials is now transferred to multinational companies of 'western' origin. The benefit to the country and the producers' welfare only comes afterwards. Although there may be reason to complain about poor pay for labour, cocoa has nevertheless become a 'fetish' crop in the country. Few farmers are unwilling to indulge in it when they have access to land in favourable areas. In Liberia, the agro-pedo-climatic context is not very favourable to cultivation (high rainfall and atmospheric humidity, desaturated soils), with palm and rubber trees being more suitable. Nevertheless, before the crises, cultivation developed in the border regions through the example of Côte d'Ivoire's sister populations, and by the opportunities for a better cross-border product flow (poor practicability of the national road network). In the current context, beyond the environmental restrictions (agro-pedo-climate), the irrepressible need for land for growing populations (birth rate + migratory flow) means that the cocoa 'pioneer front' has crossed the Cavally River. The pressure is so strong that the Liberian authorities are publicly concerned about it (including diplomatic exchanges taking place between Liberia and Burkina Faso, countries bound by free 'movement' – but not settlement – of people within ECOWAS), while observing that the same process that has prevailed in the west and southwest of Côte d'Ivoire, the 'barter' of land for non-native labour force, is developing in the indigenous communities.
Solution considered: How is the promotion of good practices related to existing cocoa areas considered a solution?	While wishing for an 'agro-ecological' evolution in these GAPs, often considered antagonistic with the 'intensification' that could partially answer the question of land pressure, cocoa farming remains a relatively safe speculation in areas with favourable context in the Ivorian south. It is also adapted to the 'individualistic' model of family farming that prevails in the sector, unlike palm and rubber trees.
Is it a challenge or do you use a different technique to grow cocoa?	In Côte d'Ivoire, there are many challenges: (i) the recovery of tired or ageing orchards due to growing in full sun, (ii) the regeneration of post-slaughter plantations related to the swollen shoot, (iii) the creation of new plantations on fallow or other non-forestry history / tree legumes, which may have an important role to play in agroforestry systems. There are also the challenges of improving the quality of the cocoa produced (organic transition, fermentation, drying, etc.), in connection with the improvement of the purchase price to the producer. In Liberia, the challenges are (i) respect of protected areas and High Conservation Value forests (subject to their prior mapping), and (ii) the immediate implementation of GAPs (to avoid reproduction of the 'CI model' that has failed and which the migrants want to 'import' with them).
What are the challenges associated with climate change in the area?	Climate change could have an improving effect on cocoa cultivation in Liberia (via a decrease in sometimes excessive humidity). In Côte d'Ivoire, on the other hand, the favourable areas will be reduced to the Taï area (the peripheral regions of the Taï National Park, partly linked to an ecosystem service effect of the park and forests of neighbouring Liberia) and the Abengourou-Aboisso-Agboville triangle to the southeast. Many other regions may gradually become unfavourable.

Is there a regulation regarding the ownership of trees in the area?	In Côte d'Ivoire, planted trees belong to the one who planted them or to the landowner; however, if the planter is simply the 'land user' then a 'contract of use' establishes that the landowner will own the tree planted. Inaccuracies exist as to the implementation of the Forest Code (particularly for the exploitation of the tree planted), and especially in connection with the proof of land ownership. Pre-existing natural trees are deemed to belong to the landowner according to most customs. They belong to the latter if he can prove his land ownership (certificate or title) or, otherwise, to the state (point of attention). Trees regenerated in assisted natural regeneration could be considered planted trees. In Liberia, customary ownership (to be verified) seems to give tree ownership to the landowner (individual or family).
Are there any technical problems with cocoa farming?	This is not an issue in Côte d'Ivoire; the agroforestry producers in our project area manage these problems. In Liberia, a significant part of the problems of the PPP Sustainable Cocoa (GIZ / Theobroma NL) has been linked to the difficulties of moving on roads that are often impassable. Also, selecting which trees are to be conserved has not been easy. Burning residual trees is often unavoidable with inevitable damage to trees that should be maintained. The production of cocoa seedlings as well as useful forest species also experiences delays.
What methods of cocoa cultivation do you implement?	The agroforestry system for maintaining or introducing 'companion trees' of selected useful species and adapting the system are done according to the partner producer's will.
Do you encounter technical problems with forest conservation?	In Côte d'Ivoire, the scarcity of wooded land conducive to cocoa farming is a challenge when implementing projects. In Liberia, the development of land-use plans enforceable against migrants by local people.
Are you facing financial obstacles? Which ones?	Indirectly, through the 'calibration' of planned activities (according to human and financial resources).
Building for tomorrow	
What lessons have been learned about biodiversity conservation?	• Awareness when supervising the development of cocoa farming; • Creating pilot sites using good agricultural practices; • Ensuring respect for protected areas and forests with high conservation value (corridor forests / forests periodically flooded along rivers, and rivers) in order to stem deforestation in Liberia; • Developing land-use plans and their formalisation in contracts that involve national structures in charge of the land (Rural Land Agency – AFOR – in CI / Liberia Land Authority – LLA); • Improving road infrastructure; • Training, support for cooperatives.
What are the lessons learned about managing cocoa in the shade?	Not having to cut down old trees to plant new ones is important, even if it poses technical problems (burning at clearing time); Leaving a fairly flexible framework (choice of species, densities, etc.) so that it is adaptable according to the farmers' plots; Forestry interventions (decoupling, progressive pruning, general pruning, etc.) are important; promoting planting is not enough; GAPs must not be limited to the periphery of protected areas, but must be included in a national promotion plan.
What are the lessons learned about land and tree tenure?	Temporary recognition of customary rules could mitigate the foreseeable slowness of implementing new forest and land regulations.
Do you have any comments? Recommendations?	The challenge of panning for gold and poaching for meat and ivory/hooves should be considered.

CROSS RIVER LANDSCAPE

drafted by Inaoyom Imong

General information	
Countries concerned	Nigeria, Cameroon
Landscape name	Cross River
Activities carried out on the project's	Strengthening the management of Cross River National Park to improve the conservation of forest and wildlife.
Activities carried out on the project's social axis	Promoting sustainable, resilient cocoa agriculture and the sustainable harvesting of non-timber forest products, such as bush mango
Number of beneficiaries affected by the project(s)	The final beneficiaries of the action will be Cross River National Park and the 120 000 people living in the wider landscape, who will benefit from ecosystem services resulting from biodiversity conservation within the park and the adjoining forest areas.
Associations/NGOs carrying out the projects	Wildlife Conservation Society (WCS)
Associations/NGOs partners of PAPFor	Cross River National Park
Current projects	
Major success 1	Reduction in levels of hunting in Cross River National Park
Tools/materials to illustrate success 1	Spatial Monitoring And Reporting Tool (SMART) used to analyse the rangers' patrol data
Major success 2	Increase in the number of farmers' and women's groups applying improved farming techniques and sustainable harvesting to forest products; increase in the number of hectares of existing farmland where farmers introduce sustainable cocoa production; improved well-being of households in target communities
Tools/materials to illustrate success 2	Basic Necessities Survey (BNS) used to assess changes in household well-being
Major challenge 1	Difficulty in accessing sufficient improved cocoa seedlings to supply to farmers
Reasons for major challenge 1	High demand for improved seedlings from the Cocoa Research Institute of Nigeria (CRIN), the only cocoa research and seed development institution producing improved seedlings in Nigeria
What changes are being made for future projects?	WCS is procuring cocoa pods to establish nurseries for seedlings rather than purchasing scarce seedlings directly from CRIN.
Major challenge 2	Providing adequate economic incentives to farmers to ensure that they respect the conservation agreement and support the protection of Cross River National Park
Reasons for major challenge 2	The incentives provided by the project are currently limited to training and the provision of improved seedlings, which may not be sufficient.
What changes will be made for future projects?	Working with cocoa-buying companies to improve farmers' access to premiums and investigating possible links to high-value markets, including the feasibility of marketing gorilla-friendly chocolate from the landscape.
Cocoa/forest landscape context	
Main cocoa/well-boring programmes in the landscape	Extensive smallholder cocoa farming systems are driving rapid deforestation in the landscape due to unsustainable practices such as shifting cultivation and slash-and-burn techniques.
Inception issues: How was the cocoa sector envisaged? And as an answer to what issue?	An intensive cocoa farming system was developed to focus on improving the productivity of existing farms in order to discourage extensive cocoa farming.

Solution envisaged: How is the promotion of good practices related to existing cocoa areas considered a solution?	Improving the productivity of existing farms through planting improved varieties and applying sustainable practices reduces the incentive to clear more forest for expansion, thereby reducing deforestation.
Is it a challenge or do you use a different technique to grow cocoa?	There is limited access to improved cocoa seedlings and a lack of knowledge and skills to adopt sustainable farming practices.
What are the challenges associated with climate change in the area?	A decrease in land suitable for cocoa production as deforestation disrupts local weather patterns, potentially leading to higher temperatures and/or more intense dry seasons, forcing farmers to expand into new areas.
Is there a regulation regarding the ownership of trees in the area?	The traditional land tenure system in the landscape bestows ownership of the land and all its trees on the first community member to clear an area of intact forest. Planted trees, e.g. cocoa, belong to the owner of the farm.
Are there any technical problems with cocoa farming?	A standing government moratorium on logging prohibits the felling of trees for timber.
What methods of cocoa cultivation do you implement?	The phased replanting of aged farms with improved cocoa seedlings so as to increase productivity on existing farmland, thus dis-incentivising extensive farming.
Do you encounter technical problems with forest conservation?	Improving the effectiveness of law enforcement patrols and monitoring; reducing deforestation where unsustainable agricultural practices occur.
Are you facing financial obstacles? Which ones?	Funding to scale-up interventions in order to improve the sustainability of cocoa production.
Identifying solutions for sustainable cocoa and forests	Improving the productivity of existing cocoa farms through training farmers in best practices and increasing their access to improved varieties of cocoa is critical for limiting deforestation from extensive farming.
What are the lessons learned in disease and pest management?	Use proper spacing and improved varieties that are more resilient to pests and diseases, while discouraging the use of harmful chemical pesticides.
What lessons have been learned about biodiversity conservation?	Improved sustainability of cocoa production and limiting deforestation is enhancing the protection of Cross River National Park and biodiversity conservation within the park, while maintaining biodiversity corridors outside.
What are the lessons learned about managing cocoa in the shade?	Farmers adopt the use of shade trees for cocoa more easily when economic trees (such as Irvingia gabonensis) are promoted. Maintaining adequate shade is necessary for newly established young cocoa plants. especially in the dry season when there is a need to reduce water loss.
What are the lessons learned about land and tree tenure?	The traditional land tenure system in the landscape, which bestows ownership of an area of intact forestland on the first community member to clear it, encourages land grabbing and contributes towards deforestation.
Do you have any comments or recommendations?	Increasing economic incentives for smallholder farmers through an increased access to premiums will facilitate the transition to deforestation-free cocoa production.

APPENDIX 3: INTERNAL SUSTAINABILITY OF PRIVATE COMPANIES' PROGRAMMES (NOT EXHAUSTIVE)

Name of the programme	Company	Site	Objectives of the programme
Trace cocoa	Puratos	https://www.cacaotrace.com/fr	Internal traceability
Cocoa Horizons	Barry Callebaut	https://www.cocoahorizons.org/fr/le-programme	Cooperative training, productivity kits (EPS and distribution), traceability
Cocoa Plan	Nestlé	https://www.nestlecocoaplan.com/fr	Internal traceability, exclusion of cocoa from deforestation, shade-tree planting, GAPs training
Transparence Cacao	Cémoi	https://www.transparence-cacao.com/	Internal traceability, quality of beans, planter's quality of life
Cocoa life	Modelez	https://fr.cocoalife.org/	Creating a positive impact for producers and their communities
Cocoa for Generations	Mars	https://www.mars.com/sustainability-plan/cocoa-for-generations	Strengthening the fight against child labour and deforestation
Farming programme	Lindt & Sprungli	https://www.farming-program.com/en/#introducing-the-lindt--spr%C3%BCngli-farming-program	Improving the living conditions of producers
Ferrero farming value	Ferrero	https://www.ferrerosustainability.com/int/en/	Sourcing raw materials in a sustainable way
Cargill Cocoa Promise	Cargill	https://www.cargill.com/sustainability/cocoa/the-cargill-cocoa-promise	Training for farmers, internal traceability

APPENDIX 4: SUMMARY OF PROGRAMMES AND INITIATIVES (NOT EXHAUSTIVE)

Summary of programmes and initiatives

Topics	Involved regions	Project Initials	Programme, initiative name	Participating organisations	Useful links	Period	Project summary
Combating deforestation and restoring forest areas	Côte d'Ivoire, Ghana	ICF	Cocoa & Forests Initiative	Governments of Côte d'Ivoire and Ghana, and 35 companies in the cocoa sector. Coordinating with the Ministry of Water and Forests (MINEF) & IDH (Sustainable Trade Initiative) in facilitation.	https://initiativecacaoforets.ci/	2017	The initiative aims to eliminate deforestation and restore forest areas by prohibiting any further conversion of forestland for cocoa production.
Improvement of producer income	Côte d'Ivoire, Ghana	CIGHCI	Côte d'Ivoire Ghana Cocoa Initiative		https://www.cighci.org/	2021	The aim is to define a common (CI and GH) and sustainable cocoa strategy on this basis, with a view to sustainably increasing the prices cocoa farmers receive in their respective countries.
Protection of human rights and forced labour in cocoa	West Africa	ICI	International Cocoa Initiative	Agricultural cooperatives, cocoa traders, cocoa processors, cocoa and chocolate manufacturers and non-industry: civil society organisations, certification bodies, farmers' representatives	https://www.cocoainitiative.org/fr		The ICI Foundation's vision is of prosperous cocoa-producing communities, within a dignified, sustainable and responsibly managed supply chain, where child and human rights are protected and respected, and where child labour and forced labour have been eliminated.
For a prosperous and sustainable cocoa sector	World	WCF	World Cocoa Foundation		https://www.worldcocoafoundation.org/		Aims to train, educate and support communities living in the cocoa industry, support field programmes and scientific research, through the economic, social and environmental development of these communities.
Dialogue between distributors and traders for more sustainable production	World	RCC	Retailer Cocoa Collaboration		https://retailercocoacollaboration.com/		
Formal trade between producer countries and Europe	European Union and cocoa-producing countries		Cocoa Talks		https://knowledge4policy.ec.europa.eu/publication/cocoa-talks-eu-virtual-roundtables-sustainable-cocoa_e	2020	Establishing dialogue between actors

Topics	Involved regions	Project Initials	Programme, initiative name	Participating organisations	Useful links	Period	Project summary
Environmental and socioeconomic risks of cocoa	European Union	ISCO	Initiative for sustainable cocoa				The main cocoa traders, elected by the RCC members, are assessed on progress made in cocoa sustainability, covering topics such as deforestation, traceability, gender equality, farmers' incomes, and child labour and forced labour.
Strengthening stakeholder dialogues	France	IFCD	Initiative Française pour une Cacao Durable				
Enhancing excellent cocoa's value in the world	World	CoE	Cocoa of Excellence		https://www.cocoaofexcellence.org/2021-edition/2021-edition-national-organisation-committees		Strengthen and enhance the market value of cocoa beans
Combating child labour	Ghana and Côte d'Ivoire	Private and ILO		ILO, ADM, Barry Callebaut, Cargill, Ferrero, The Hershey Company, Kraft Foods, Mars Incorporated and Nestlé	https://www.ilo.org/wcmsp5/groups/public/---dgreports/---exrel/documents/publication/wcms_455685.pdf	2011-2014	Strengthening business coordination to combat child labour
Reducing emissions from deforestation and forest degradation	World	REDD+	Reducing emissions from deforestation and forest degradation	UN	https://redd.unfccc.int/	2011-2015	Financing projects to reduce deforestation and forest degradation
Combating the trade in illegally harvested timber	World	FLEGT	Forest Law enforcement, governance and trade	European Union Member States	https://europa.eu/capacity4dev/file/10545/download?token=8tClkaRs		Programme for Forest Law enforcement, governance and trade
Clear guidelines on the implementation, monitoring, verification and reporting of agricultural and forestry supply chains	World	AFI	Accountability Framework Initiative	Businesses, NGOs and governments	https://accountability-framework.org/	2019	Definition of the framework for establishing, implementing and monitoring commitments to ethical supply chains
Combating wildlife poaching	World	SWM			https://www.swm-programme.info/fr/		Community management programme to regulate hunting and prevent the looting of animal resources and tools from local communities

APPENDIX 5:
ARS 1000-1 REGIONAL STANDARD CONTENT SUMMARY:2021 (WORLD BANK, 2022)

Topics	Description ARS 1000-1:2021	Reference 1000-2:2021
Management System Improvement	For the Recognised Entity: Identification of opportunities for improvement. Setting and specifying the relevant performance targets and implementing the necessary measures.	10
Requirements relating to economic aspects	• Support and training for producers to build capacity in accounting, farm business management and access to financial products; • Skills of workers, plant materials and agrochemicals adapted and controlled to promote the agronomic performance of farms and good agricultural practices at each stage of production; • The Producers' Group / Producers' Cooperative must raise awareness among its producers on crop diversification, adaptation to climate change of its production and support them in this diversification.	11
Requirements relating to social aspects	• Ensuring respect for human rights; • Banning illegal child labour and forced labour; • Implementing gender and youth action plan; • Preventing discrimination, harassment and abuse; • Ensuring workers a written or oral contract with witnesses and regular remuneration; • Implementing an action plan on health and safety at work. The Entity provides protective equipment required for workers in hazardous conditions free of charge; • The Entity provides access to social security for workers; • Freedom of Association and Collective Bargaining Policy.	12
Requirements relating to environmental aspects	Minimising the negative impact and maximising the positive impact on the environment: • Preserving plant and animal habitats; • Preventing deforestation and combating climate change; • Protection of water bodies; • Health and environmental safety considerations related to agrochemical use.	13
Topics	**Description ARS 1000-2:2021**	**Reference 1000-2:2021**
Requirements for the registration of actors in the cocoa supply chain	Stakeholders in the supply chain must contact the Regulator / Legal Entity to be registered.	4
Quality requirements	Batches of cocoa beans must comply with specifications allowing them to be suitable for the manufacture of food products. Maximum limit to be respected on certain aspects (elements related to cocoa, flat beans, foreign bodies, moisture levels, sieving debris, colour, smell) as well as maximum percentage of mouldy, slated, attacked by insects or germinated beans.	6
Sampling	The sampling conducted to check compliance with the specifications of the quality requirements must be conducted in accordance with the ISO 2292 requirements.	7
Bagging / Packaging	Bags must be clean, strong enough, suitable for contact with food and properly sewn and sealed. Cocoa beans are shipped in new bags only.	8
Marking	Bags must display: the producing country, the product name, the product category, the product year of harvest, shipping marks, if applicable, any other applicable identification mark, including the verification type (Ex: ARS 1000) and net weight.	9
Test Report	The test report which records in an organised manner the data obtained from an assessment of specific parameters and describes the environmental or operating conditions must meet the requirements.	10
Principles of traceability	Traceability systems for sustainably produced cocoa must: document the history of cocoa or locate cocoa in the cocoa supply chain, contribute to identifying the cause of non-compliance and improve the appropriate use and reliability of information, as well as the actor's effectiveness and efficiency in the cocoa supply chain.	11

Objectives of traceability	Traceability objectives should be measurable, monitored, communicated to relevant internal and external stakeholders and updated, as necessary. The actor in the cocoa supply chain must keep documented information on the objectives of cocoa traceability.	12
Traceability requirements	Stakeholders shall ensure that the cocoa supply chain, including all operational units, meets the conditions set out in this Standard. The traceability system for sustainably produced cocoa must be verifiable, achievable, results-oriented and economically viable. It must provide documented information on cocoa throughout the cocoa supply chain, from cocoa farm to export (FOB) as well as locally for processors.	13
Physical traceability – Cocoa segregation	The Recognised Entity and the actors in the cocoa supply chain must demonstrate that measures have been taken to avoid the mixing of compliant cocoa with non-compliant cocoa.	14
Monitoring and improvement	The actors in the cocoa supply chain must monitor the effectiveness of the traceability system for sustainably produced cocoa. They must conduct an internal audit at least once a year to verify compliance with the requirements of this Standard. Corrective measures must be put in place in case of non-conformities.	15
Review	A review of the traceability, monitoring, corrective action and continuous improvement system will be conducted regularly.	16
Topics	**Description ARS 1000-3:2021**	**Reference ARS 1000-3:2021**
Regulator / Legal Entity Requirements	Guarantee and ensure the independence, impartiality and integrity of the regulator / body vis-à-vis the actors: • Obligation to have an impartial policy and to ensure its effectiveness; • Obligation to have an independent and integral Supervisory Board with identified competences.	4
System Development and Management	Establishing rules for the establishment and implementation of a certification system and its proper management by the Regulator / Legal body.	5
Information made available to the public	Ensuring accessibility of information relating to certification and certification bodies.	6
Complaints and appeals to Certification Bodies and Regulator / Legal body	Ensure the effectiveness of the complaint process and appeals against a customer, a Certification Entity or the Regulator / Legal body itself	7
Requirements for Bodies carrying out audits for certification	Establish rules governing Certification Bodies' activity, in particular concerning the audit cycle for sustainable cocoa; audit procedures; audit methods; methods of obtaining information during the audit; the audit duration; deadlines for resolving non-conformities; expiry of a certificate; requirements concerning auditors' competence.	8
Allegations and Third-Party Compliance Marks	Set rules for the benefit of Regulators / Legal bodies governing third parties' use of claims, trademarks or certificates.	9 & 10
Licensing and control	Establishing rules governing granting of an enforceable agreement governing use of certificates, marks of conformity or other indications of conformity.	11

PPENDIX 6: EXTRACTS OF SHADE TREE SPECIES AND AGRO-FORESTRY DEVICES ADAPTED TO COCOA FARMING IN THE PERIPHERAL AREA OF TAÏ NATIONAL PARK (CÔTE D'IVOIRE). SOURCE: VARLET AND KOUAME (2013).

Scientific name	Common name	Occupied strate	Life cycle	Interest for populations					Observations		
				FW	M	F	C	S	Literature	Population	Consultant
Teck grandis	Teck	3rd	Long secondary					X		Don't know behaviour	good
Mansonia altissima	Bete	3rd	Primary	X			X	X	compatible	good	good
Corylus avellana	Hazelnut	2nd	Long secondary?							good	good
Acacia mangium	Acacia	3rd	Middle secondary	X			X		compatible	Don't know behaviour	Not observed
Acacia auriculiformis		3rd	Long secondary	X			X	X	compatible	Don't know behaviour	Not observed
Albizia lebbeck		3rd	Long secondary	X	X		X			Don't know behaviour	Not observed
Albizia guachapele		3rd	Long secondary	X			X			Don't know behaviour	Not observed
Albizia zygia		3rd	Long secondary	X		X	X	X		Don't know behaviour	Not observed
Tieghemella africana	Makoré	4th	Primary	X		X		X	compatible		good
Cocas nucifera	Coconut palm	2	Long secondary			X		X			good

FW : fuelwood and charcoal
M : medicine
F : food
C : construction
S : sale

Scientific name	Common name	Occupied strate	Life cycle	Interest for populations					Observations		
				FW	M	F	C	S	Literature	Population	Consultant
Anacardium occidental	Mahogany	2nd	Long secondary	X		X		X			good
Cola nitida	Colatier	2nd	Long secondary			X	X	X	not compatible	compatible	good
Citrus sinensis	Orange tree	2nd	Long secondary			X	X	X			good
Persia americana	Avocado	2nd	Primary			X	X	X			good
Garcinia mangostana	Mangostan					X					good
Temporary shade for the first three years											
Carica papaya	Papaya		Long secondary			X		X			good
Manihot esculentum	Cassava	3rd	Long secondary			X		X			good
Sesbania ssp		2nd	Primary								good
Cajanus cajan		2nd	Long secondary			X					good
Musa paradisiaca		2nd				X		X			good
Ricinus communis		3rd									good
Bixa orellana		2nd				X					good

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