# Making agroforestry work at scale

## Economic modelling of cocoa-agroforestry solutions in Côte d'Ivoire

### Insights from economic research conducted by Cargill, PUR Projet and the 1 for 20 Partnership

## Key messages

- Understanding and modelling the impact of cocoa-agroforestry on farm economics is essential to build the business case for sustainable cocoa production, ensure agroforestry adoption by cocoa farmers and identify financial solutions to scale-up investments into tree planting.
- Our joined-up analysis shows that agroforestry holds potential to significantly shift farmer household income distributions such that more cocoa farmers meet poverty and living income benchmarks. Comparing projected revenue increases achieved through agroforestry scenarios at household level, adopting cocoa-agroforestry in Côte d'Ivoire has the potential to increase farmers household revenues from 9% up to 50% on average over 30 years.
- However, income increases through agroforestry will not alone lift the majority of these farmers out of poverty – the main factor for significantly raising farmers' income remains the cocoa revenues generated from land assets.
- Our economic models serve as a reference point for estimating the economic benefits agroforestry could present to cocoa farmer households across cocoa supply chains in Côte d'Ivoire.
- Smallholder cocoa farmers' incentives for engaging in agroforestry rely on a wide range of factors beyond the economics of the cocoa plantation. These include regulations, land use planning, land tenure and tree ownership, planters' beliefs and attitudes, commodity prices, or the existence and structuring of value chains for agroforestry products.
- Cocoa-farm economic modelling is a first step towards the design of bankable business cases, capable of attracting the necessary capital that will be needed to scale-up agroforestry implementation through financing the farmer, the value chain or landscapes more broadly.

# Background

**Cocoa production provides critical incomes to smallholder farming communities across Côte d'Ivoire. However, the production of cocoa in West Africa has significant environmental and economic challenges that threaten the livelihoods of producer communities. Cocoa alone is rarely sufficient to generate a living income for farmers or to support their families. Balancing production of cocoa with the well-being of farmers and the conservation and restoration of forests is among the most pressing challenges facing the cocoa sector in Côte d'Ivoire.**

**Analysing the economic viability of agroforestry models is essential to design financial solutions that will attract private investors and enable the scaling of agroforestry, with the view to achieve Côte d'Ivoire's forest restoration objectives.**

Côte d'Ivoire set the ambition to restore forest cover to 20% of the land area by 2030. This objective is framed in the country's National REDD+ Strategy (2017), Policy for Forest Preservation, Rehabilitation and Extension (2018) and the 2019 Forest Code. It was backed by the world's leading cocoa and chocolate companies through the signature in 2017 of the Cocoa & Forests Initiative (CFI), which defines core commitments, verifiable actions, and time-bound targets required to promote a deforestation-free cocoa supply chain.

Throughout these initiatives, the adoption of cocoa agroforestry at scale is recognised as a critical component that will help drive sustainable cocoa production while contributing to restoring ecosystems in cocoa production landscapes.

Agroforestry, broadly understood as the deliberate integration of trees on farms and across the wider agricultural landscape[1], not only enhances tree cover and carbon sequestration, it also holds potential to accrue new and additional economic benefits for farmers, and depend less on neighbouring forest resources. Agroforestry plantations are also more resilient to the impacts of climate change, and are less likely to drive further forest degradation[2].

The potential for agroforestry to increase cocoa farmers' incomes is generally raised as the premise for adoption and wider sector transformation. Yet few studies address the impact of agroforestry adoption on cocoa farm economics and implications for financing and sustainability of these practices[3]. Developing economic models can help design appropriate planting models and clarify costs and benefits. In addition, analysing the economic viability of agroforestry models is essential to design financial solutions that will attract private investors and enable the scaling of agroforestry, with the view to achieve Côte d'Ivoire's forest restoration objectives.

1 As per World Agroforestry (ICRAF's) global definition: https://www.worldagroforestry.org/about/agroforestry

2 Examples include: Mbow, C. et al. Agroforestry solutions to address food security and climate change challenges in Africa, Current Opinion in Environmental Sustainability, 61-67 (2014); Garrity, D.P., Akinnifesi, F.K., Ajayi, O.C. et al. Evergreen Agriculture: a robust approach to sustainable food security in Africa. Food Sec. 2, 197–214 (2010)

3 Abdulai I, Jassogne L, Graefe S, Asare R, Van Asten P, Läderach P, et al. (2018) Characterisation of cocoa production, income diversification and shade tree management along a climate gradient in Ghana. PLoS ONE 13(4); Cerda, R., et al. (2014) Contribution of cocoa agroforestry systems to family income and domestic consumption: looking toward intensification. Agroforest Syst 88, 957–981

# Farm economic models

**Modelling cocoa farm economics helps to assess the viability of various agroforestry scenarios, based on the socio-economic and agronomic characteristics of cocoa farms. Farm economic models have been used by several actors to inform the implementation of sustainable cocoa initiatives.**

Through the 1 for 20 Partnership, the United Nations Environment Programme (UNEP) and the European Forest Institute (EFI) work together to promote the wider adoption and investment in cocoa-agroforestry systems in Côte d'Ivoire. The Partnership promotes using economic analysis of agroforestry models to inform cocoa and forest stakeholders about the potential for scale-up of sustainability initiatives. An economic modelling tool was developed based on agroforestry pilot experiences.

Cargill, supported by some of its global customers, and PUR Projet partnered in 2018 to design and implement tailored, supply chain-based and community-led agroforestry and reforestation interventions with cocoa farmers and communities associated with their direct sourcing networks. Using data collected throughout these projects, PUR Projet has developed tailored models for increasing revenue.

Moving forward, **Cargill, PUR Projet and the 1 for 20 Partnership** collaborate to analyse their respective cocoa-agroforestry income projections, to assess the impact of agroforestry on household incomes across Côte d'Ivoire's cocoa production landscape. These different economic models include forward-looking statements predicting future performance and results. These statements should not be read as guaranteed or accurate outcomes.

## Projecting farm revenue from cocoa agroforestry

Assessing the impact on farmers' revenues and the overall economic viability of agroforestry projects requires building detailed scenarios based on available field data and scientific hypothesis. PUR Projet and the 1 for 20 Partnership developed modelling tools to project farm-level revenue projections for a range of cocoa-agroforestry scenarios. These models vary in scope and data, illustrating a variety of agroforestry approaches. The results help to understand, monitor and improve the economic impact of agroforestry on cocoa farmers.

**Photo:** Village tree nursery in Nawa region, Côte d'Ivoire. EFI

# PUR Projet's agroforestry-parcel economic model

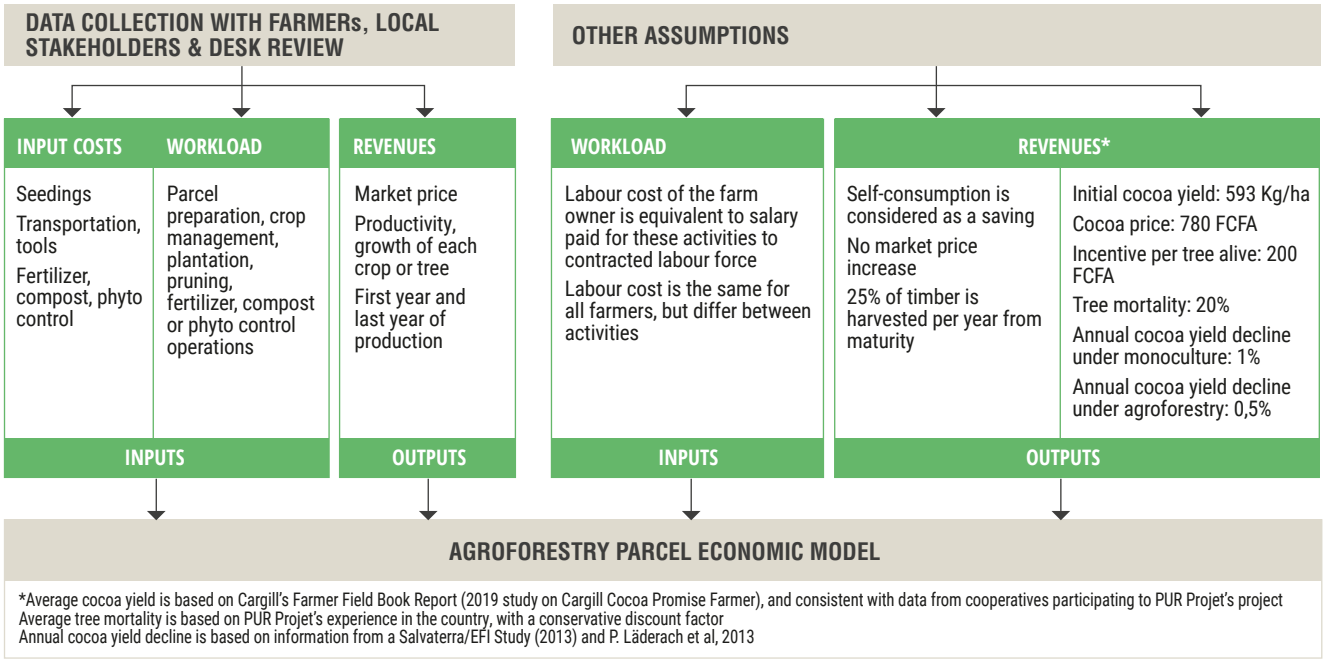
**Fundamental to the successful and long-term implementation of PUR Projet projects is the engagement of local stakeholders in the long-term economic benefits of agroforestry. PUR Projet works with local communities and stakeholders at the inception of each project, to design locally appropriate agroforestry models to be tested for their potential economic benefit to beneficiary farmers.**

An agroforestry-parcel economic model has been designed to consolidate primary data about agroforestry products data and allow for profit and loss forecasting at parcel level under different planting models.

The inputs section of the tool allows for selecting the agroforestry model, planting density, species and distribution and a baseline of cocoa yields. For modelling simplification purposes, the Model assumes a currently producing farm without rejuvenation. For the information on costs (inputs, tools, labour) and revenues, data is collected in the field through individual interviews (farmers, cooperatives, market actors, forestry and agriculture experts, timber companies and so forth) and cross-checked with an extensive literature review including research papers, market studies and information on supply-chain infrastructure. Modelling assumptions are based on this literature review and field experience.

The economic performance of a cocoa-agroforestry model for a farmer at parcel level is then calculated and compared to the baseline situation. In Côte d'Ivoire, this tool has been used to inform the design of PUR Projet's cocoa-agroforestry projects, with the goal of finding a balance between farmers' expectations and needs, best agricultural practices and income diversification.

**Figure 1.** Description of data collection and use for the agroforestry-parcel economic model tool.




*Average cocoa yield is based on Cargill's Farmer Field Book Report (2019 study on Cargill Cocoa Promise Farmer), and consistent with data from cooperatives participating to PUR Projet's project
Average tree mortality is based on PUR Projet's experience in the country, with a conservative discount factor
Annual cocoa yield decline is based on information from a Salvaterra/EFI Study (2013) and P. Läderach et al, 2013

## Result examples

**Currently, in Côte d'Ivoire, PUR Projet implements mostly a mix of two cocoa-agroforestry models, a boundary planting model and a full intercropping agroforestry model. On the boundary's parcels, fast-growth trees and leguminous trees are planted to increase soil fertility, provide windbreaks, and long-term income increase and diversification through sustainable timber harvesting (without damaging the cocoa parcel). Inside the parcel, fruit trees and slow growth timber trees are planted to provide medium term increase and diversification of income and food security through the fruit trees, and long-term increase and diversification of income through the timber trees.**

The following examples illustrate the economic impact of introducing two different cocoa-agroforestry models in cocoa farms in Côte d'Ivoire.

**The Model 1** scenario, with an average of 100 fast-growing timber and leguminous trees planted on the parcel boundaries, assumes that 25% (one boundary) of the timber planted on one farm could be harvested each year from maturity. In this approach, a sustainable timber-harvesting plan ensures that only 3 to 5% of timber is harvested each year at landscape or community level.

**Figure 2** shows the economic impact of introducing such a model, reaching a 31% increase in profit over 30 years for the farmer on this parcel. In this model, revenue increase is achieved in the long-term, from year 20 after planting. However, the cocoa farm resilience can be increased through the enhancement of ecosystem services.

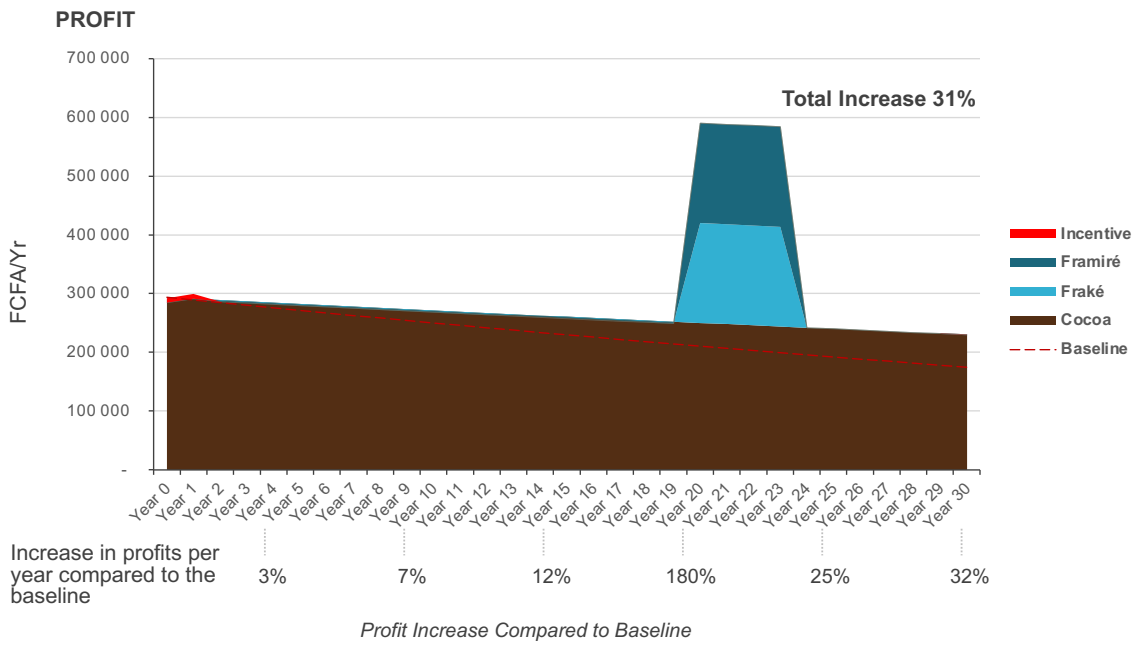



**Figure 2.** Agroforestry-parcel economic model for Planting Model 1 on farm borders.

**The Model 2 scenario**, with an average of 100 trees planted on the cocoa farm (20-25 inside the parcel and the rest on the boundaries), combines fast-growth timber trees and leguminous species on the parcel boundaries with fruit trees and slow-growth timber trees intercropped with cocoa. The harvesting plan for borders is similar to Model 1. Trees planted inside the parcel will remain for a longer time and provide shade to the cocoa plants. There is income from fruit trees from year five after planting. High value and slow-growing species can be harvested after 30 years when the cocoa plot needs rejuvenation, thus avoiding damage to well-producing cocoa trees.

**Figure 3** shows the economic impact of introducing such a model, reaching a 48% increase in profit over 30 years for the farmer on this parcel. In comparison with Model 1, this model allows for medium-term revenue increase thanks to fruit trees[4].

Both models include an important focus on support to market access, education and capacity building to guarantee sustainable harvesting and economic benefits for farmers.

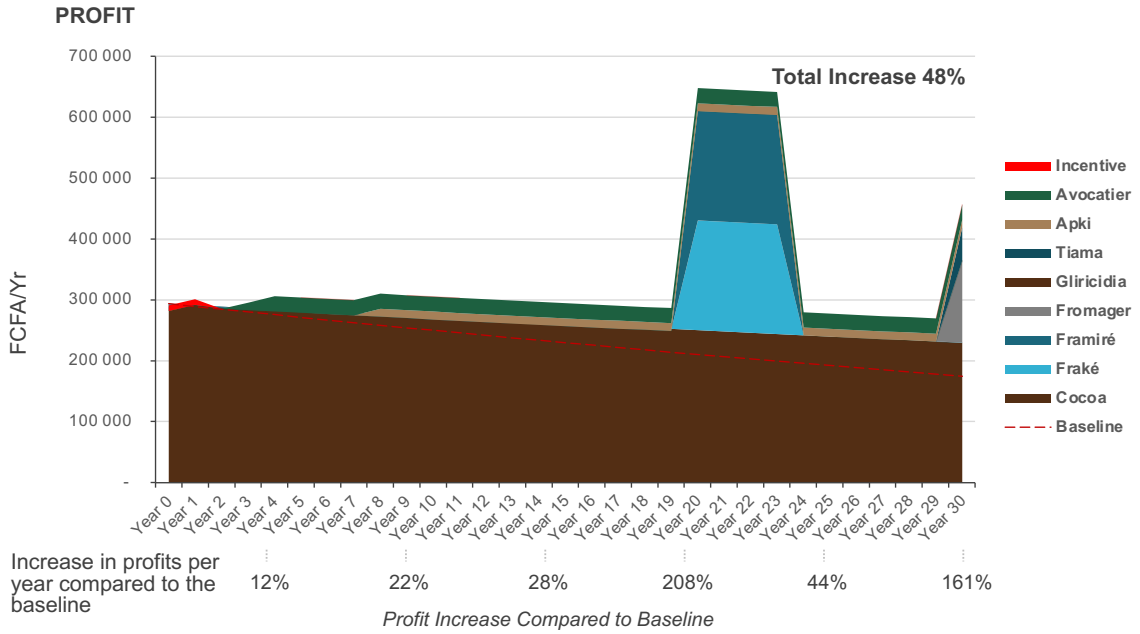



**Figure 3.** Agroforestry-parcel economic model for Planting Model 2 – Borders and intercropping.

4 Different studies have shown similar increase in revenues following implementation of cocoa agroforestry systems (although results differ based location, methodology and designs): (Armengot et al, 2016, Nunoo & Owusu, 2015, Neupane & Thapa, 2001)

# The 1 for 20 Partnership economic-modelling tool

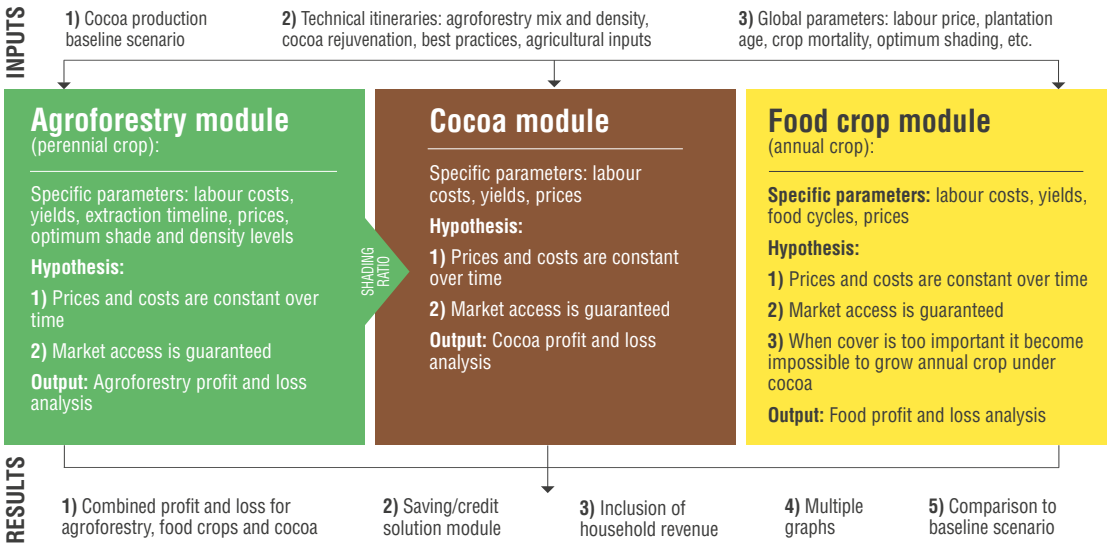
**The 1 for 20 Partnership designed a multi-crop economic-modelling tool aimed at forecasting the profitability of agroforestry scenarios from the farmer's perspective. This helps determine the attractiveness of the agroforestry scenarios, areas for improvement, and the prospects for their successful scale up in the absence or limited availability of subsidies.**

The modelling tool compares farmers' revenues against a baseline scenario to assess costs and benefits of agroforestry implementation over 25 years. The baseline used in the tool is that of a conventional full-sun cocoa plantation of 20 years of age, with low and declining yields[5]. The modelling tool is modular and accommodates a wide range of scenarios. Agroforestry scenarios are generated using data on the agroforestry path, density, trees mix, prices, plantation age and best farming practices such as rejuvenation, inputs, etc. Additional data and parameters are defined in specific modules related to different crops: a cocoa module, an agroforestry module for perennial crops (timber trees, wood-energy trees and fruit trees) and a food module for annual crops. This input is used to calculate the profits and losses for each crop category. The combined profit and loss profile allows an assessment and visualisation of revenue gaps and cocoa-agroforestry benefits for farmers, against the baseline. Several additional parameters allow for calculating diverse ratios, financial performance indicators or to include household revenue and a saving/microcredit product (Figure 4).

The modelling tool is based on agronomic and economic data collected from agribusiness companies with insights from technical partners, agroforestry experts, research centres and field missions to cocoa production zones.

The model has been used to analyse various agroforestry models under cocoa regeneration scenarios, and to propose financial solutions for scale-up[6]. The impacts of agroforestry on various models currently implemented in Côte d'Ivoire are also assessed, with a view to inform the Conseil du Café Cacao (CCC) and the Cocoa and Forest Initiative's technical discussions.

**Figure 4.** Description of the main building blocks of the 1 for 20 Partnership economic-modelling tool for agroforestry.




5 The modelling tool's baseline is based on the extensive work of Assiri, A. et al. (2009). Les caractéristiques agronomiques des vergers de cacaoyer (Theobroma cacao L.) en Côte d'Ivoire. *Journal of animal and plant sciences*, 2, 55-66

6 EFI and UNEP (2018) Production durable de cacao en Côte d'Ivoire : besoins et solutions de financement pour les petits producteurs

## Result examples

**The following examples illustrate the economic results at plantation level of the introduction of a mix of fruit trees, wood-energy trees and timber trees in a cocoa plantation of South-West Côte d'Ivoire.**

**The Model 3 scenario** illustrates the results of the introduction of a mix of 40 trees, including timber trees, fruit trees and wood-energy trees in an existing 20-year-old plantation. Results are based on field data from an existing agroforestry project led by a major cocoa actor in the country. Wood-energy trees are planted during the first year and replanted every four years after harvesting.

**Figure 5** shows that to maximise the uptake, sustainability and risk profile of agroforestry practices, farmers' net revenues should be equal or superior to potential revenues in a business as usual situation (as illustrated by the baseline) as soon as possible. In scenario 3, the profitability of cocoa agroforestry is only significant after 10 years, which makes it a difficult case for investment. In the early years revenue is marginally lower than the baseline due to space created to introduce non-cocoa trees.

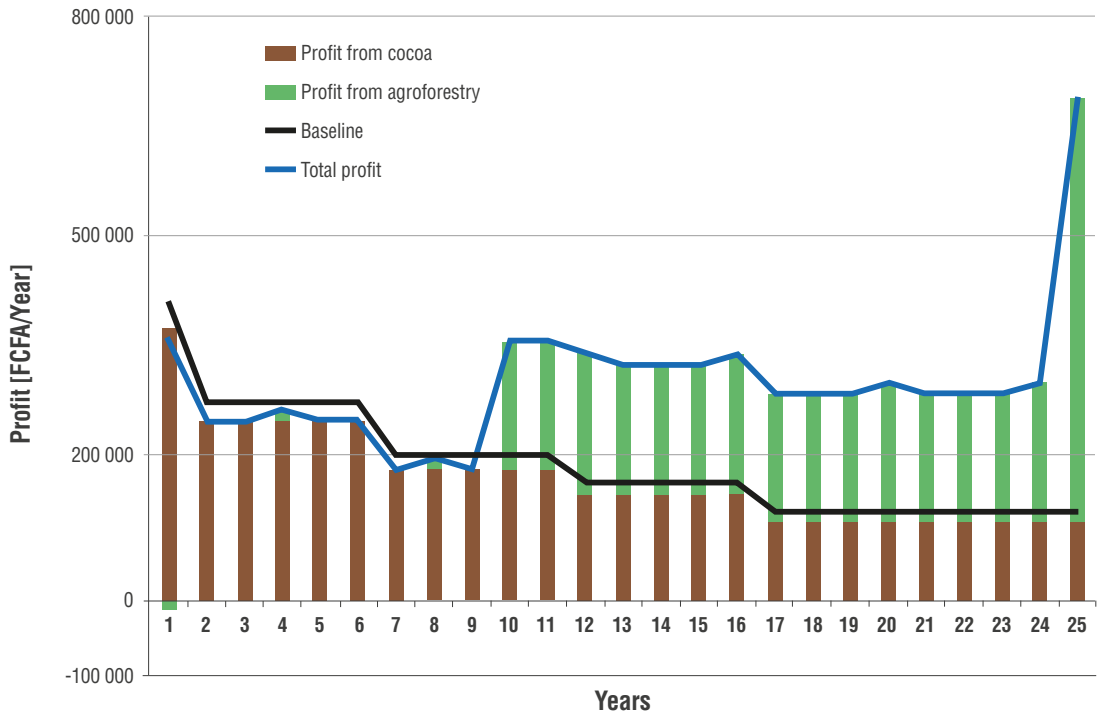



**Figure 5.** Model 3- Agroforestry in an existing old growth cocoa plantation showing profitability after 10 years making it difficult to create incentives for both farmers and investors.

**The Model 4** illustrates the introduction of a similar tree mix combined with the replantation of the old cocoa field with Mercedes cocoa. Cocoa regeneration is spread over four years and combined with food crop production. An additional 20 trees can be introduced compared to the previous model due to the spatial optimisation. Wood-energy trees are planted at initial year and replanted four years after first harvesting.

**Figure 6** shows that cocoa regeneration and food crop significantly improve the farmer's revenue streams over baseline and allows for optimising agroforestry models. This results in greater profitability and options for structuring financial solutions. The model suggests an important advantage in combining crops with different revenue cycles such as food, timber, fruit or energy trees. The diversification allows to compensate for crop-specific revenue gaps. This example illustrates the fact that profitability of the agroforestry model can also be improved by increasing revenues from cocoa production and optimising tree distribution in the cocoa plantation.

These farm economic models are an important reference point for estimating how the baseline incomes of cocoa farming households change as they adopt agroforestry.

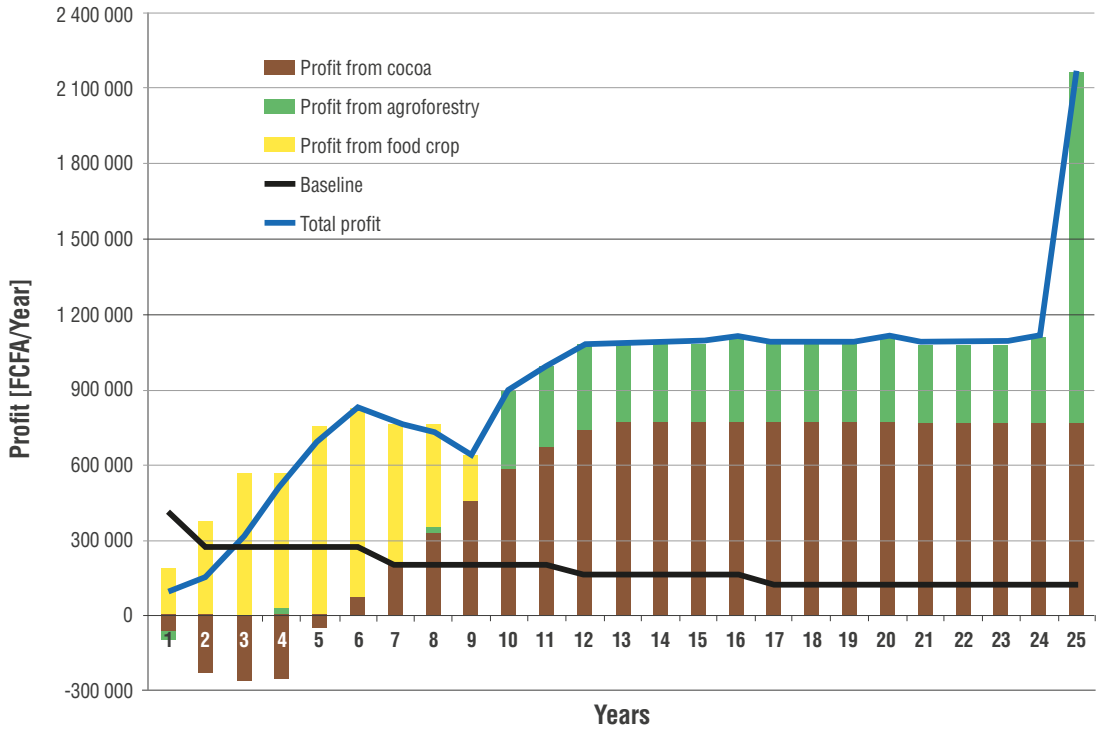



**Figure 6.** Model 4- Agroforestry coupled with cocoa rejuvenation compared to the baseline scenario – food, timber, fruit trees or fast-growing trees for bioenergy are combined with new generation of cocoa trees. Profitability increases greatly.

# Estimating baseline incomes of cocoa farming households

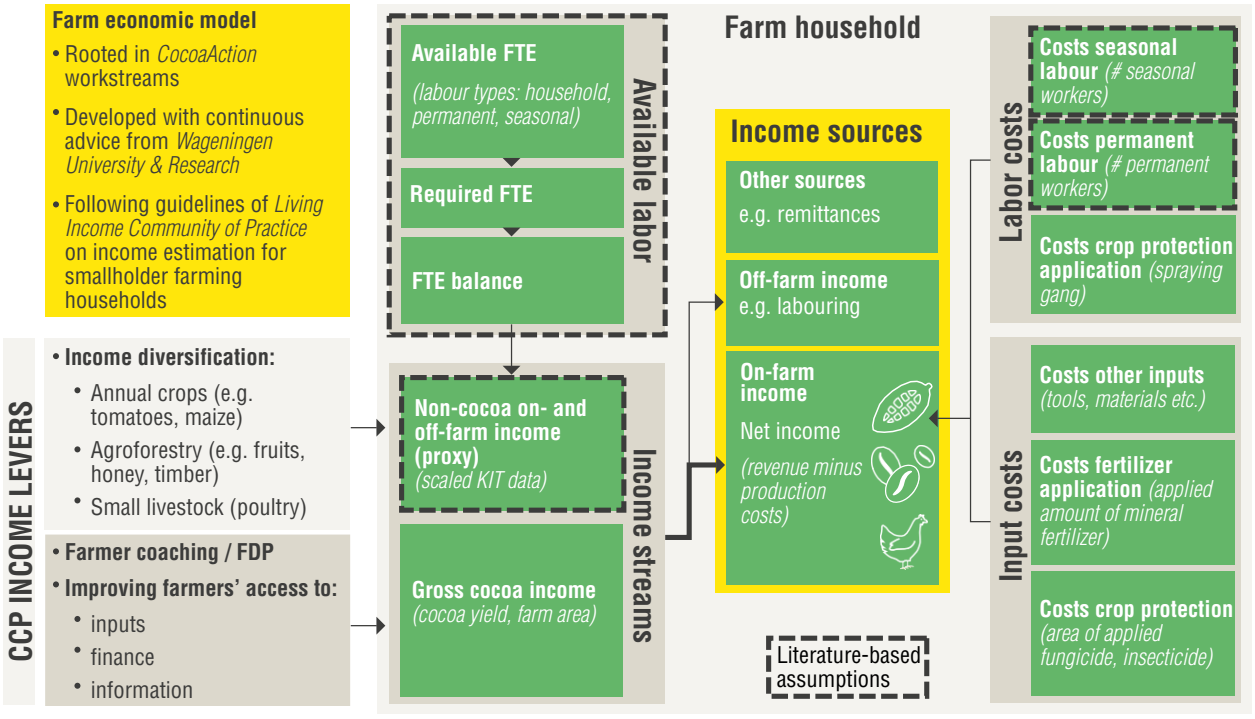
**In 2018 Cargill developed a Farm Economic Model (FEM) that provides an overall understanding of baseline incomes of cocoa farming households in its supply base.**

## Cargill's Farm Economic Model

**The Cargill FEM inputs data collected on a regular basis at farm and household level from 32 335 cocoa farmers in Cargill's direct sourcing networks in Côte d'Ivoire. It also draws on data and insights referenced in peer-reviewed or scientific articles, for example to establish credible assumptions about non-cocoa incomes at household level.**

The data includes details on farm size, household size, annual yields, price and input costs such as fertiliser, crop protection, application and labour costs (Figure 7).

Cargill's FEM helps identify how and where farmers benefit most from certain types of interventions, including the introduction and adoption of cocoa agroforestry.




© 2020 Cargill, Incorporated. All rights reserved.

**Figure 7.** Overview of Cargill's Farm Economic Model to estimate the household income of cocoa farmers, including income from cocoa, cost of production and other on and off-farm sources of income.

# Coupling insights on farm household income with agroforestry revenue projections

Based on the above-described PUR Projet and 1 for 20 Partnership cocoa-agroforestry projections, Cargill's model was used to estimate baseline income for 32 335 cocoa farming households and assess the impact of agroforestry on net incomes per household member across the cocoa supply chain[7].

Agroforestry scenario 1 features a tree boundary planting agroforestry project, as described in Figure 1. The average revenue increase over 30 years is estimated at USD 127 / ha.

Agroforestry scenario 2 features a mixed agroforestry project associated with the regeneration of the cocoa plantation, as described in Figure 6. The average revenue increase over 30 years is estimated at USD 1 189 / ha.

Cargill's FEM baseline assumes a median net income per household member of USD 1.05 (USD 2 733 per household per year), of which net income from cocoa production is about 70% and non-cocoa income is about 30%. Comparing projected revenue increases achieved through agroforestry scenarios 1 and 2 at the household level (Figure 8), daily net income per household member would increase from a median baseline income of USD 1.05 to USD 1.15 in scenario 1 and to USD 1.58 in scenario 2.

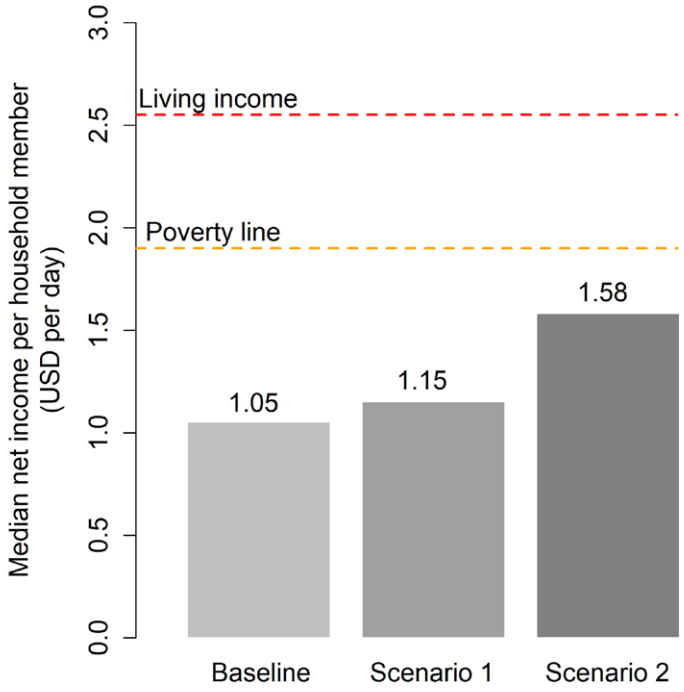



**Figure 8.** Comparison of median net income per household member of 32 335 cocoa farming households in Côte d'Ivoire for the baseline and scenarios 1 and 2.

7 We assume 100% of 32 335 farmers apply agroforestry follow either scenario 1 or 2.

Charting income distributions of the baseline and the two agroforestry scenarios (Figure 9), reveals that by implementing these scenarios the distribution hump would flatten and net incomes per household member shift towards poverty line (USD 1.90 per person per day) and Côte d'Ivoire's living income benchmark (USD 2.55 per household member per day[8]). While 7% of included farm households achieve a living income under baseline conditions, this proportion would increase in scenario 1 to 10% and in scenario 2 to 23%. While 15% of the households exceed the international poverty line in the baseline, this proportion would increase to 20% in scenario 1 and 38% in scenario 2.

As we coupled models that estimate baseline household incomes for 32 335 farmers (Cargill FEM) with agroforestry income projections of the 1 for 20 Partnership and PUR Project models, the distribution of net income per household member in cocoa supply chains shift: a larger portion of farmers meet international poverty and living income benchmarks depending on the agroforestry setup selected. Combining cocoa rejuvenation initiatives with agroforestry setups (scenario 2) can have even more positive income effects[9].

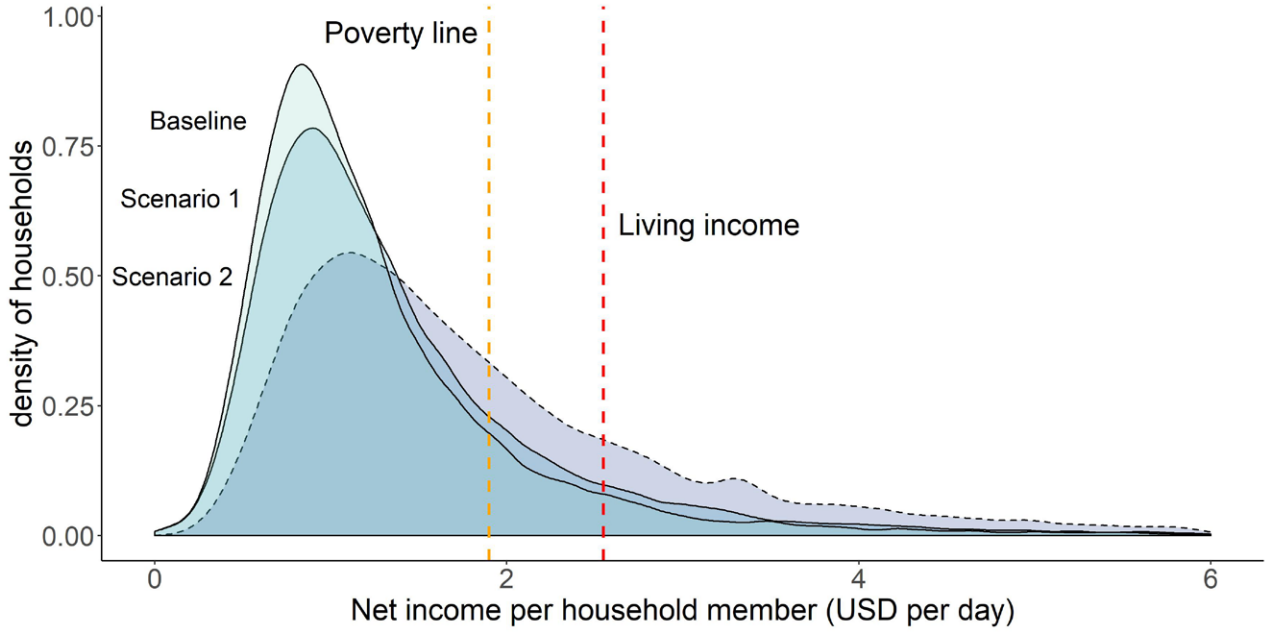



**Figure 9.** Densities of net income per household member across the population of 32 335 cocoa farming households in Côte d'Ivoire. Plotted are income distributions of the baseline and two agroforestry scenarios.

8 Living Income Community of Practice, https://www.living-income.com/ https://c69aa8ac-6965-42b2-abb7-0f0b86c23d2e.filesusr.com/ugd/0c5ab3_038eb662a02f4a849e8564258eb4815f.xlsx?dn=20200701_LI-LW_overviewTable.xlsx

9 EFI and UNEP (2018) Production durable de cacao en Côte d'Ivoire : besoins et solutions de financement pour les petits producteurs

# Viability of cocoa agroforestry within and beyond farm economics

**Our joined-up economic models suggest that adopting cocoa-agroforestry can be economically viable for cocoa farmers in Côte d'Ivoire, lifting 5 – 23% more cocoa farming households out of poverty. The additional income obtained through agroforestry could lead to 3 – 16% more households in the supply chain able to earn a living income. The marketing and commercialisation of agroforestry products hold good potential to increase incomes of cocoa farming households on average over a 30-year implementation cycle. Since adoption of agroforestry is promoted as among the key interventions to help address deforestation in Côte d'Ivoire, this is a promising prospect.**

Yet, our models suggest that income increases through agroforestry alone will not lift the majority of farmers in cocoa supply chains out of poverty. Absolute income benefits continue to be largest for farmers who already secure significant incomes from cocoa as they hold larger land assets and achieve greater cocoa yields. This is why further diversification of incomes beyond cocoa-agroforestry remains important. This observation needs however to be balanced with the environmental, social and other economic co-benefits brought by agroforestry, which will influence farmers' choices. Further conceptualisation and testing of innovative and inclusive financing and incentive schemes to strengthen the agroforestry business case for smallholder farmers are necessary to achieve scaled-up transformation toward agroforestry systems. This may include schemes that reward on-farm carbon sequestration or other environmental services generated.

Cocoa-farm economic modelling is a first step towards the design of bankable business cases, capable of attracting the necessary capital that will be needed to scale-up agroforestry implementation through financing the farmer, the value chain or landscapes more broadly.

**Photo:** Shade trees nursery for agroforestry project in Côte d'Ivoire. PUR Projet

## Data availability and quality

Economic modelling is a simplification exercise that is inherently limited by a choice of parameters and hypothesis. The models we developed build on best available data collected during fieldwork, farmer interviews and extensive desk reviews. However, farmers often do not have a clear overview of the time and input needed to manage and maintain agroforests.

There is also limited information of agroforestry trees species growth curves and optimal harvest cycles and a lack of credible and coherent data on local market value of agroforestry products.

Several factors can influence long-term projections of farm revenues and farmer's appetite to engage in agroforestry. These include cocoa price volatility, and uncertainties around how the Living Income Differential - the additional sum to be paid per each tonne of cocoa that should ensure the practical increase of the price received by farmers - will benefit farmers.

Peer-reviewed data on the behaviour of cocoa yields under agroforestry remains scarce. Cocoa yields are dependent on a multiple factors, such as farmers' knowledge and practices, cocoa variety, existing parcel characteristics and the health of existing ecosystem services.

Studies have shown increases in cocoa yields when shade coverage doesn't exceed 30%[10]. Studies also converge to demonstrate that agroforestry maintains favourable cocoa productivity over a longer time horizon[11]. Too much shade and subsequent moisture are known to affect cocoa yields.

Further research in these areas as well as transparent reporting and sharing of data across actors that study and promote cocoa agroforestry may help to further test and refine assumptions.

## Beyond farm and household economics

Smallholder cocoa farmers' appetite for engaging in agroforestry relies on various factors, many going beyond the mere profitability of diversified plantation models. Factors such as regulations, land-use planning, land tenure and tree ownership, planters' beliefs and attitudes, commodity prices, or the existence and structuring of value chains for agroforestry products deserve attention. These factors are complex to integrate into economic modelling tools and require additional sector-level analysis.

For example, the demand for non-timber forest products or wood energy is significant in Côte d'Ivoire. Commercial opportunities are present both in the domestic market as in export. Value chains do exist, but they are largely informal and need to be scaled and structured to help accrue stable economic benefits for farmers, while at the same time being able to meet the needs of the domestic market.

---

**10** Richard Asare et al. (2019) On-farm cocoa yields increase with canopy cover of shade trees in two agro-ecological zones in Ghana, Climate and Development, 11:5, 435-445

**11** Jagoret et al, (2011) Long-term dynamics of cocoa agroforests: a case study in central Cameroon, Agroforestry Systems 81(3):267-278; Obiri, B.D., et al. (2007) Financial analysis of shaded cocoa in Ghana. Agroforest Syst 71, 139–149; Ruf F., Zadi H. (1998) Cocoa: from deforestation to reforestation. In: First international workshop on sustainable cocoa growing. Smithsonian Institute. s.l.: Smithsonian Institute, 29 p. Workshop on Sustainable Cocoa Growing. 1, Panama City, Panama, 29 Mars 1998/3 Avril 1998.

The New Forest Code adopted in May 2019 provides new pathways for administering tree ownership of farmers and securing long-term rights, which is central to de-risking investments in cocoa-agroforestry.

## Financing agroforestry at scale

To stimulate the increase of investments in cocoa agroforestry to support a country's need to decouple deforestation from cocoa supply chains, and to access international market and non-market transactions for avoiding forest emissions and carbon removal, our economic modelling provides further insights into two key dimensions:

1. **Assessing options for value creation,** such as increased cocoa production, new agroforestry products, carbon credits, risk and volatility decrease, value chain optimisation, other environmental assets or benefits that can be monetised.
2. **Quantifying economic needs,** in terms of level, nature (such as services, input, or financial support) and timing.

The different financial solutions at farmers' level that can be identified, if needed, based on this two-dimensional analysis are input subsidies, price premiums, microcredit, forward contracts, price floor, offtake contracts for agroforestry products or prepayment.

To attract investors, profitable financial models for agroforestry need to be combined with: (1) the identification, management and mitigation of risks, (2) the alignment of incentives along the value chain, (3) the limitation of transaction costs and intermediaries and (4) the definition of clear roles and responsibilities between all actors involved.

Once those aspects have been clarified we can identify the most appropriate financial product and investor that fits the requirement in terms of time horizon, risk and return to scale agroforestry.

**Photo:** Pod counting.
Olaf Hammelburg, Cargill

# The way forward

**Understanding and modelling the impact of agroforestry on farm economics is essential to build the business case for sustainable cocoa production, ensure agroforestry adoption by cocoa farmers and identify financial solutions to scale up investments into tree planting. Yet a variety of technical and market factors need to be addressed to make agroforestry work at scale.**

**Agroforestry is an important component of ecosystem restoration and part of the national solution for protecting and conserving remaining forests.**

By investing in securing land tenure rights and tree ownership of farmers as well as land-use planning, cocoa supply chain actors can significantly incentivise the adoption of agroforestry practices through reducing the risks of illegal timber extraction. Clear land ownership is also an essential guarantee for investments by other value chain actors, such as the timber industry. In the South-East of Côte d'Ivoire, financing land tenure certificates at scale (cost ranging from USD 27-36/ha) proved to be a cost-effective measure to leverage investment into agroforestry by timber companies[12].

The more awareness of the benefits (economic, environmental and social) provided by agroforestry systems is developed, the more smallholder farmers will have an intrinsic motivation to set up these systems and the less financial incentive is needed. Setting up agroforestry systems requires technical competencies, inputs and services. Informing and training farmers, cooperatives, and local trading partners can therefore be an effective way to build local and autonomous competences essential to the success of agroforestry.

The viability of agroforestry systems relies in large part on the existence of established and stable markets for offsetting agroforestry products. Investment in agroforestry goes hand in hand with investment in associated value chains (timber, wood energy, fruits, oils, etc.), and the development of win-win partnerships. Currently, agroforestry represents the main supply opportunity to ensure the survival of the timber sector in Côte d'Ivoire. The demand, particularly domestic, for timber, fuelwood and local products is such that markets for agroforestry production are largely assured.

Innovative timber purchase agreements schemes set up between cocoa cooperatives and timber companies in the Mé region have proved the case for designing cocoa-agroforestry projects at scale taking into account other value chains in the landscape. In addition, there are many opportunities for the development of new value chains (such as for moringa or other non-timber forest products) and new markets, with high economic potential for various stakeholders (such as private investment in carbon offset).

Agroforestry is an important component of ecosystem restoration and part of the national solution for protecting and conserving remaining forests. Cocoa-agroforestry productivity and income gains in cocoa must be linked to the protection of natural forests. For this to happen, a more holistic approach must be adopted, integrating agroforestry into value chains and territories at national and local scales.

12 Legrand T. (2020) Analyse, bilan et perspective de la mise en œuvre des paiements pour services environnementaux (PSE) en Côte d'Ivoire

# About the authors

**Cargill** exists to nourish the world in a safe, responsible and sustainable way. Every day, we connect farmers with markets, customers with ingredients, and people and animals with the food they need to thrive in more than 125 countries. Cargill Cocoa & Chocolate provides high quality cocoa and chocolate more sustainably throughout the world and brings our customers peace of mind, integrity and excitement. Our Cargill Cocoa Promise underlines our central commitment to enabling farmers and their communities to achieve better incomes and living standards in harmony with the environment.

**PUR Projet** works with companies to regenerate the ecosystems upon which they depend. While developing socio-environmental projects to empower local communities, it helps companies strengthen their supply chains through agroforestry, land restoration and sustainable farming practices.

**The European Forest Institute** (EFI), through its **EU REDD Facility**, supports countries to improve land-use governance as part of their efforts to slow, halt and reverse deforestation. It also supports the overall **EU** effort to reduce its contribution to deforestation in developing countries.

The **United Nations Environment Programme** (UNEP) is the leading global environmental authority that sets the global environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system, and serves as an authoritative advocate for the global environment.

The **1 for 20 Partnership** is a collaboration between UNEP, EFI and the Ivorian Government aimed at supporting the mobilisation of resources at scale for the restoration of Côte d'Ivoire's forests.

**Cover Photo:** Trees. PUR Projet

**Disclaimer.** This publication has been produced with the assistance of Cargill, PUR Projet, the EU REDD Facility and UNEP. The views are of the authors' and do not reflect the position of their funding organisations.