FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative

Climate Smart Cocoa Investment opportunities
Central America and Caribbean

World Cocoa Foundation
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USAID
FROM THE AMERICAN PEOPLE

World Cocoa Foundation

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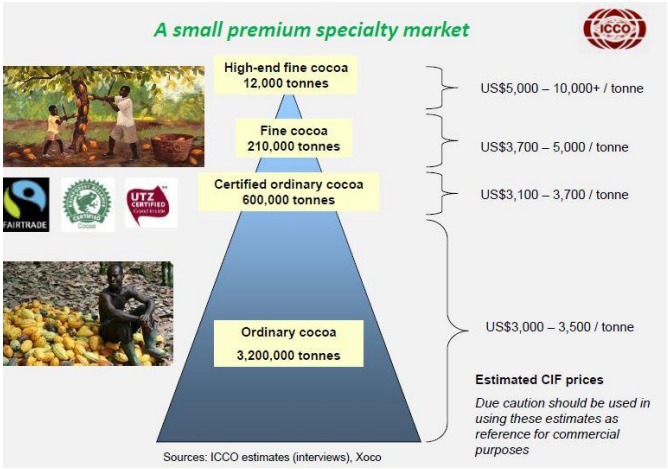
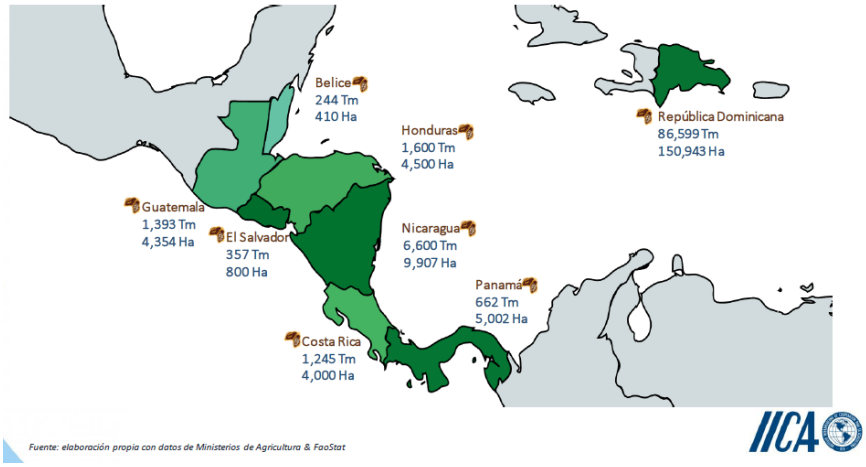
Introduction

The global demand for cocoa increases at an annual rate of 3% per year for conventional cocoa and 9% for specialty cocoa like fine aroma cocoa. Central America and Caribbean has the production potential for fine aroma cocoa. The fine cocoa market is found both in the known niches of Europe and North America and in the alternative chocolate markets in developing countries based on artisanal production of chocolates using high quality cocoa beans with fine aroma.



As production volumes of Central America (0.6% of the world market) and the Dominican Republic (10% of the production of Latin America) are low compared other regions of the world (Africa the world's largest producer), and as there is potential for production of high quality fine flavor cocoa in the region, the region is focusing on the special markets that offer better prices than the conventional trade. This requires modifications in the production, administration and relationship systems between actors in the cocoa value chain.



According to the cocoa chain analysis study carried out by IICA (2019), the supply of cocoa for export from this region is gradually increasing, however, this increase of volume is affected by low productivity, lack of modernization in cultivation techniques and investment in improving the farms. On the other hand, the negative effects of climate change and deforestation is threatening production and having an impact on the cocoa and chocolate chain, as Central America and the Caribbean region is highly affected by climate change, due to the more frequent incidence of droughts, hurricanes and the El Niño - Southern Oscillation (ENSO) phenomenon.

	2013	2014	2015	2016	2017
Production area (ha)	174,256	174,863	179,142	179,215	180,116
Production volume (MT)	74,406	76,860	84,266	91,030	98,700
Productivity (MT/ha)	0.42	0.44	0.47	0.51	0.55
Consolidated data for SICA countries: Belize, Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama, Dominican Republic FAOSTAT and Ministries of Agriculture, IICA 2019					

In most part of this region, the production of cocoa is carried out in agroforestry systems managed by smallholders, which is a good starting point for achieving sustainability of the livelihoods of the population, as well as contributing to curb the advance of the agricultural frontier in conservation areas and protected areas. However, to face the challenges of climate change in the cocoa value chain in Central America and the Caribbean, it is urgent to promote Climate Smart Cocoa agroforestry systems, which can sustain the cocoa supply chain and generate more income through the diversification route to the producing families.

Countries	Number of cocoa growers	Cocoa production area (ha)	Average cocoa area per growers (ha)
Guatemala	9172	4,406	0.48
El Salvador	2315	1944	0.84
Honduras	3470	4463	1.28
Nicaragua	11,000	12,276	1.11
Dominican Republic	40,000	150,000	3.75
Source: Rikolto (2016); IESC (2016)			

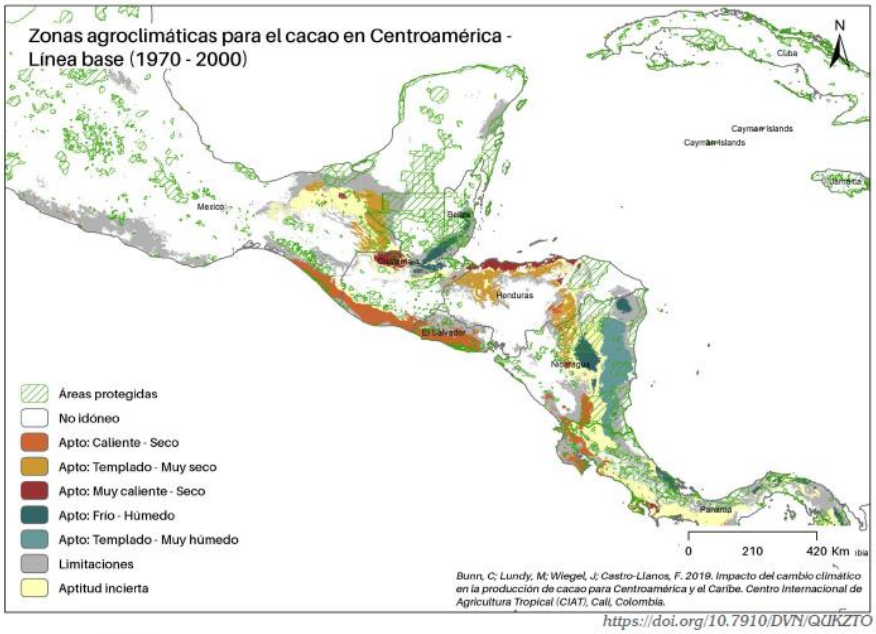
Investment decisions to promote Climate Smart Cocoa agroforestry systems can only be facilitated, if there are clear guidelines and indications for the investment opportunities for the promotion of climate-smart Cocoa. This document presents salient ideas and information to facilitate investment decisions to foster and scale sustainable and resilient cocoa in Central America and the Caribbean. Content of this document is derived from the results of current studies and analysis of the findings of the studies with key partners of the Climate Smart Cocoa Program led by World Cocoa Foundation.

Lessons from Climate exposure study

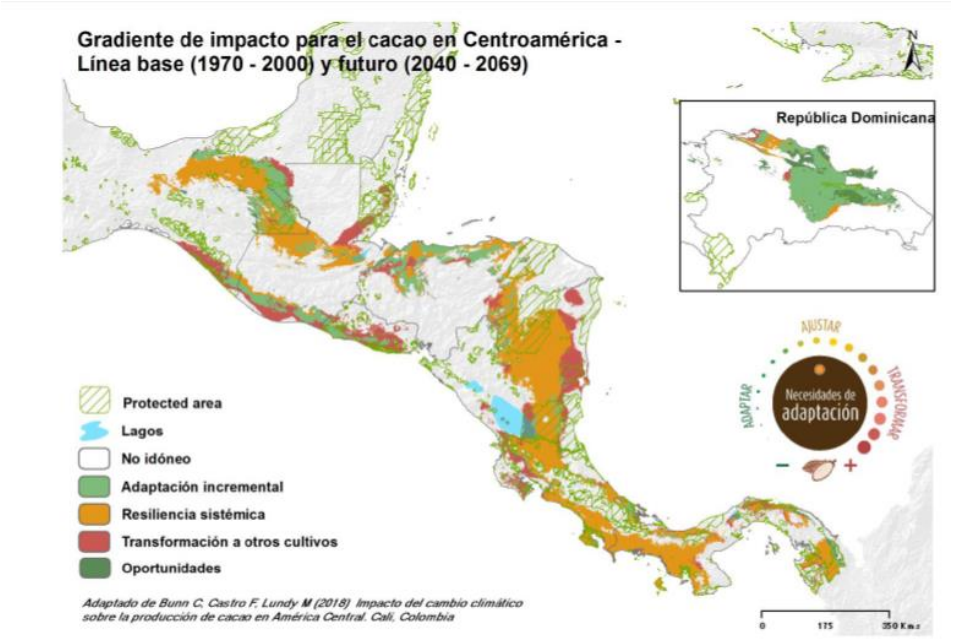
What could be the impact of climate change on cocoa in the Central America and Caribbean region?

In the atlas "Climate Change Impact on Cocoa Production in Central America and the Caribbean," developed by CIAT in collaboration with WCF and Rikolto, the question was answered by using "machine learning" models such as Random Forests. By using such a model, the probability of suitability of cocoa for the baseline (1970 – 2000) and the future (2020 – 2049/2040 – 2069) was estimated. Data with the presence of cocoa (location of cocoa farms) and climatic variables related to precipitation, temperature, and evapotranspiration (evaporation from the soil and transpiration, or the exhalation of water vapor, from plants) were used for training the models.

The first result of this modeling exercise helped to define and elaborate maps of the different "Agro-climatic Zones" of Central America and the Caribbean suitable for growing cocoa, both for baseline and future climate scenarios. The maps present areas suitable for growing cocoa categorized by the following agro-climatic zones: hot–dry, temperate – very dry, very hot – dry, cold – humid, and temperate – very humid.



From the differentiation of suitability of these zones during different periods of time, impact gradients of cocoa growing territories are estimated, which indicates the degree of effort that would be needed to continue cultivating cocoa in a sustainable manner. The study defined four different categories of impact gradients: opportunities, incremental adaptation, systemic adaptation, and transformational adaptation. For example, the maps show large areas of transformational adaptation (loss of suitability) on the Pacific coast of El Salvador and Guatemala and large areas of systemic adaptation in Central and Northern Nicaragua. For Dominican Republic, the maps show large areas of incremental transformation and a significant area of opportunities where cocoa cultivation can be expanded.



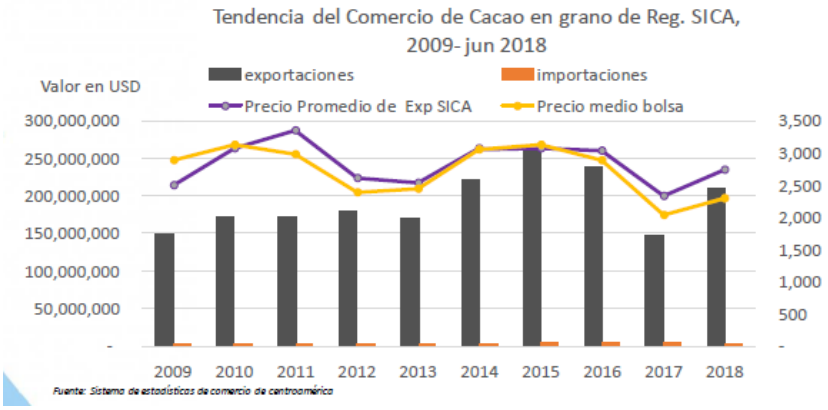
How could cocoa farmers in this region adapt and become resilient to the changes that lie ahead?

Given the uncertainty inherent in the projections of the future and the increase in climatic variability throughout the region, the results of the modeling exercises were discussed with over 100 key cocoa sector actors of the region. Via intensive discussions across the region, a set of recommendations of known and validated practices were identified, which can increase the economic benefits and social benefits of farmers under a wide range of possible changes in future weather conditions. They are practices 'without regrets', that is, they increase resilience in the face of several future scenarios and, in addition, generate benefits in the short term, since the cost of adaptation is relatively low compared to the results that can be obtained, which encourages its implementation on a large scale.

Práctica actual	Práctica adaptada al clima	Costes resultantes	TIR/VAN En comparación con SCS
	Fertilizante orgánico y manejo integrado de plagas		
Fertilizantes químicos. Sin manejo integrado de plagas y enfermedades	Insumos orgánicos y certificación de producción orgánica. Preparación de fertilizante natural en la finca y manejo integrado de plagas. Cosecha un 10% menor, pero incremento en el precio de venta del 49%	Reducción en los costes de establecimiento Coste de certificación Menor coste de insumos Coste de trabajadores aumenta	+50% TIR +307% VAN
	Sistema agroforestal rediseñado		
Producción con sombra	Sistema con alta diversidad de especies. La sostenibilidad a largo plazo del sistema aumenta al añadir árboles con una estructura funcional. La cantidad cosechada disminuye	Coste de trabajadores aumenta Coste de insumos aumenta en un 90%	+33% TIR +285% VAN
	Semillas mejoradas		
Semillas convencionales	Variedades de cacao híbridas o mejoradas de fuentes fiables. Cosecha un 128% mayor y mayor resiliencia	Aumento en los costes de establecimiento en un 50% Aumento en los costes de cosecha y postcosecha	+27% TIR +382% VAN

Lessons from strategies to foster Climate Smart Cocoa

The baseline report on the cocoa landscape of the countries of Central America and the Caribbean reflects that Dominican Republic has the most advanced and mature cocoa value chain of the region. Nicaragua and Honduras are gaining experience in grain exports to the European and United States market. On the other hand, El Salvador and Guatemala have a significant processing industry that includes commercial relations for the importation of cocoa beans with a certain level of quality from other countries in the region.



In each of the cocoa producing countries of Central America and the Caribbean, there are platforms of convergence of the private public sector made up of public institutions (led by the ministries of agriculture and agricultural technology institutes), producer organizations and private sector companies to energize and boost the sector.

The SICACAO regional platform brings together various actors from the region with the objective of improving the Central American cocoa sector, through the impact on public policies that benefit the competitiveness and sustainability of the sector.

During 2018-19, the Climate Smart Cocoa working groups formed by key partners of WFC and Rikolto analyzed strategies for the promotion of Climate Smart Cocoa in each of the partner countries (Guatemala, El Salvador, Honduras, Nicaragua and the Dominican Republic). In a consultation with key actors, present and future actions to promote climate-smart cocoa were identified. Each actor also identified their competencies, and the enabling and limiting factors to develop them.

Based on the analysis of the information generated through consultations with relevant actors, a proposal for Regional Guidelines for the Promotion of Climate-Smart Cocoa was developed with emphasis on small producers and their organizations involved in the value chain.

Further analysis of the information generated a proposal of actions for each of the guidelines to foster and scale Climate Smart Cocoa. The proposal of actions by the actors in different territories of the region, nested within the regional guidelines o agreements now provide a framework of joint planning and public monitoring for the process of fostering and scaling Climate Smart Cocoa in Central America and the Caribbean.

Eight regional guidelines to foster and scale Climate Smart Cocoa in Central America and the Caribbean

1. *Generate methodologies and information for decision making of the actors to foster and scale Climate Smart Cocoa*

   Development of methodologies and tools for a wide range of actors so that they can develop skills and capabilities to foster and scale Climate Smart Cocoa based on differentiated risks and investment profiles.

2. *Develop training and technical assistance processes for the formation of human capital that intervenes in the value chain of climate-smart cocoa*

   Development of training and technical assistance processes to improve decision-making capacity of producers and their organizations for productivity, adaptation and resilience to climate change.

3. *Promote sustainable and resilient climate-smart cocoa agroforestry systems to increase productivity and income*

   Implement Climate Smart Cocoa as an integrated landscape management approach to improve productivity and to generate capacity for adaptation and resilience to climate change for the families and the organizations who implement it.

4. *Provide productive, disease tolerant and climate resilient planting materials with established identity for the successful production of cocoa agroforestry systems.*

   Develop a robust supply chain for high quality planting materials, certified by competent authorities and based on results of research on genetic improvement and characterization of cocoa planting materials by national and regional organizations.

5. *Develop climate monitoring and early warning systems that reduce the risk of climate change of the value chain*

   Generates and use climate information for decision-making and early warning, as to improve risk management so as to reduce the risk of climate change and climate variability in the cocoa value chain.

6. *Facilitate processes that improve the quality and competitiveness of the products of the agroforestry systems with cocoa*

   Production of high quality cocoa is an opportunity to differentiate from the conventional cocoa through certifications and traceability, and to access specialized market niches, achieving better prices and prizes for product quality.

7. *Promote marketing and investment initiatives that improve access to markets and financial services for the activity of the cocoa sector*

   To promote marketing and investment initiatives, it is necessary to mobilize national and foreign investments in the cocoa growing territories to drive the development of the value chain, improve productivity and profitability.

8. *Facilitate public private spaces and alliances that favor the development of and strengthening the climate smart cocoa value chain*

   Most of the actors participating in the cocoa chain mentioned in this report consider it important to develop the competence to create alliances between actors (local, national or international) for strengthening the sector.

Lessons from Climate Smart Cocoa pilots

Climate Smart Cocoa curriculum for Central America and the Caribbean

In the study "Impact of climate change on cocoa production in Central America and the Caribbean", the likelihood of cocoa suitability for the baseline (1970 - 2000) and the future (2020 - 2049/2040 - 2069) was estimated. From these data, the impact gradients of the cocoa cultivation territories located in Dominican Republic, El Salvador, Honduras, Guatemala and Nicaragua were estimated, indicating the degree of effort that would be needed to continue growing cocoa sustainably.

In national workshops held in Dominican Republic, El Salvador, Honduras, Guatemala and Nicaragua, more than 100 key actors in the regional cocoa sector discussed the results of the study, and identified actions to address climate risks in each area of gradient of change impact climate. From the deliberations of the Workshops and posterior consultation of literature, a set of recommendations of known and validated practices were identified, which can increase the economic benefits and social benefits of farmers under a wide range of possible changes in future weather conditions.

Using the maps that described the agro-climatic conditions and climate impact gradient of the cocoa growing territories of the region, diversity of situations were identified for Honduras, El Salvador, Guatemala, Nicaragua and Dominican Republic. For each of the situation with a particular agro-climatic condition and a particular impact gradient, adaptation and mitigation practices were defined by local consultations and literature review.

All these data and information are currently hosted in an online information system, where one can consult the climatic conditions, aptitude and climate impact gradient of the territories and obtain a proposal of the practices for the adaptation to climate change for the cocoa growing countries of Central America and the Caribbean. The system also permits a user to develop a climate adaptation plan with budget, based on the climate risk of the territory and the level of implementation of the proposed practices.

A wide range of users, cocoa growers, cocoa growers´ organizations, cocoa buyers and traders, investors, development agencies, local and national governments, multi-lateral development banks and other financial organizations can access the public online information system with no cost and carry out foresight analysis about climate exposure of the cocoa territories of the region and determine their climate adaptation profile and investment needs. This will be a first step for the actors interested in developing a business plan to foster and scale climate smart cocoa to build climate resilient cocoa value chain.

Tools for collective learning about Cocoa agroforestry systems

In Central America, cocoa production is concentrated in the hands of smallholders located within the vital Central American Biological Corridor. To help conserve natural resources and biodiversity, cocoa farming communities of this region have historically grown cocoa in agroforestry systems. But this model is now under threat due to low productivity, low cash flow and unsustainable livelihoods for farm households, threatened by climate change and climate variability.

Climate Smart Cocoa agroforestry systems are complex and must draw on multiple perspectives: 1) Cocoa farms as diversified production systems organized in energy flows, nutrient and water cycles, food webs and biodiversity, 2) Cocoa farms as sustainable livelihood system reflecting the interests, resources and social relations of household members and 3) Cocoa farms as competitive enterprises integrated into an inclusive business system capable of facing the challenges of the market.

The design and evaluation of such complex systems demand skills that can be provided via Web-based tools. Four such tools have been developed and are available for public use: 1) Tool to assess the current state of climate readiness of cocoa growing farms and families; 2) Tool to monitor and evaluate performance of newly established CSC agroforestry systems (green fields) and 3) Tool to monitor and evaluate performance of CSC agroforestry systems in transformation (brown fields) and 4) Tool to carry out cost-benefit and financial analysis of CSC Agroforestry systems.

Key actors of cocoa sectors of the region are already using and validating these tools with smallholders in Dominican Republic, El Salvador, Guatemala, Honduras and Nicaragua. These Web-based tools are projected to be used as platforms for collective learning, harnessing data, evidence and information about site-specific Climate Smart Cocoa agroforestry systems across the region.

The potential users of the tools are 10,000 small holders, 400 field technicians, 200 cooperatives, 20 cocoa enterprises, 40 public sector actors, 10 financial institutions and 20 development actors in Central America and Caribbean, presumably all interested in fostering and scaling Climate Smart Cocoa agroforestry across the region via public-private investments.

Private sector embracing Climate Smart Cocoa

Climate Smart Agriculture (CSA) is a new integrated approach to jointly address climate change impacts and food security. The concept of CSA was introduced in 2010 at the FAO Global Conference on Agriculture, Food Security and Climate Change, and has since been widely used. FAO speaks of "agriculture that sustainably increases productivity, enhances resilience (adaptation), reduces/removes greenhouse gasses (GHG) (mitigation) where possible," thereby enhancing achievement of national food security and development goals.

An article published in 2019 by the Learning Community indicated that the efforts to encourage private supply-chain actors to embrace CSA, should emphasize the following efforts: (i) offering granular, subnational-level climate-risk data that will allow companies to integrate CSA into their broader risk-management strategies; (ii) providing CSA information and resources that are tailored to companies' specific position within the supply-chain; and (iii) emphasizing the business case for CSA to make CSA uptake viable for companies that are held accountable to revenue goals.

Granular, subnational-level climate-risk data

Responding to the need of the cocoa sectors to have detailed climate-risk data, a climate exposure study of the cocoa growing territories of Central America and Caribbean was carried out in 2018-19. In this study, the likelihood of cocoa suitability for the baseline (1970 - 2000) and the future (2020 - 2049/2040 - 2069) was estimated. From these data, the impact gradients were estimated for all cocoa growing territories of Dominican Republic, El Salvador, Honduras, Guatemala and Nicaragua, indicating the degree of effort that would be needed to continue growing cocoa sustainably.

All these data and information are currently hosted in an online information system. A wide range of users, cocoa growers, cocoa growers´ organizations, cocoa buyers and traders, investors, development agencies, local and national governments, multi-lateral development banks and other financial organizations can access the public online information system with no user cost and carry out foresight analysis about climate risks of the cocoa territories of Central America and Caribbean.

Providing CSC information tailored to territories with differentiated climate risk

Using the maps that described the agro-climatic conditions and climate impact gradient of the cocoa growing territories of the region, diversity of situations were identified for Honduras, El Salvador, Guatemala, Nicaragua and Dominican Republic. For each of the situation with a particular agro-climatic condition and a particular impact gradient, adaptation and mitigation practices were defined by local consultations and literature review.

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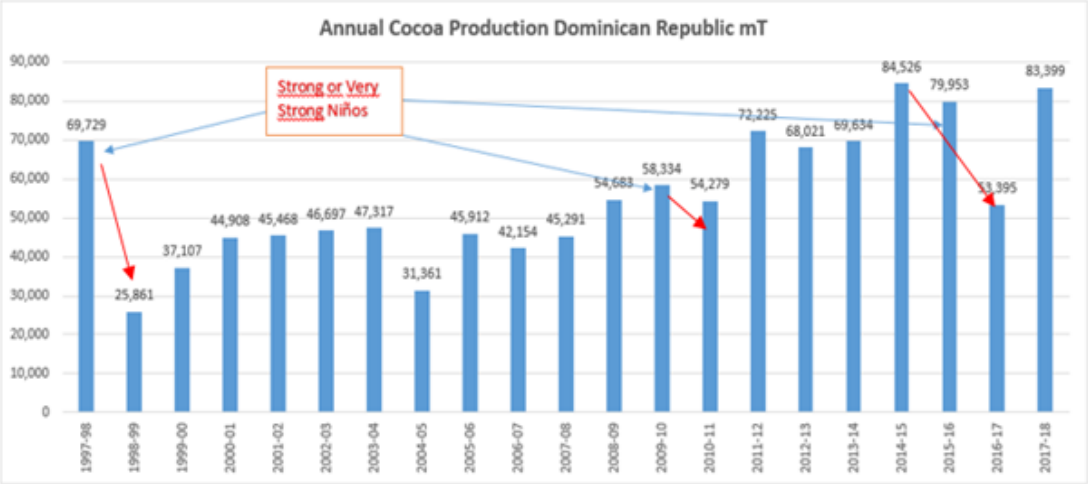
Developing business case for CSC to make CSC uptake viable

Consultation carried out the Learning community revealed that for private companies, investment in CSA is driven primarily by efforts to secure a reliable supply and to avoid risks to their reputations. Supply security depends largely on the quantity sourced (those sourcing smaller quantities are less likely to feel this impact directly) and the sourcing region (the impacts of climate change are experienced more severely in some areas than in others). In the case of companies sourcing products of especially high quality (like organic fine aroma cocoa), impacts can be pronounced even when volumes are low, if the regions that produce those goods are hard-hit by climate change.

In 2018, WCF held interviews with key actors of the cocoa sectors Dominican Republic, El Salvador, Honduras and Nicaragua including the cocoa and chocolate companies, to understand their priorities and investments in climate resilience for smallholder cocoa farmers. From the interviews and analysis we also learned that most actors are already tracking the impact of climate change on their security of supply.



Key actors of the cocoa sectors of Central America and Caribbean also expressed their interest to learn more about the range of options to strengthen farmers and suppliers' ability to adapt to a changing climate in order to sustain the cocoa supply chains of the region. There was also a common request for tools that can help both farmers and buyers understand the risks, identify actions to mitigate the risks and develop investment plans for scaling CSC in the region.

Our consultations with the cocoa sector actors reveal that private sector actors are diverse including small-scale growers, growers´ organizations, cocoa buyers and traders, large scale plantations owners, and out-growers. Because of their different positions in the cocoa supply chains they demonstrate variability, and requires specific business case analysis. To effectively engage with the private-sector for scaling of climate-smart cocoa in Central America and Caribbean, the actors must be understood and approached more specifically. In the following section we attempt to develop business case of Climate Smart Cocoa for some of the above mentioned actors, based on the data and information gathered during the implementation of CSC pilots in the region.

Business cases for Climate Smart Cocoa

Climate Smart Cocoa Agroforestry managed by small-scale growers

In this section, we build the business case for Climate Smart Cocoa agroforestry systems managed by small holders, based on the results of the study *¨Economic analysis to determine the profitability of the cocoa agroforestry systems in El Salvador¨* , which was carried out in 2019 by WCF in alliance with Cocoa Alliance project led by Catholic Relief Service. Data and information generated from 59 Cocoa agroforestry plots on costs and returns hosted in an online information system were used for building the business case.

Based on the intensity of management, the 59 Cocoa agroforestry plots managed by small holders could be divided into three categories: 1) Intensive; 2) Semi-intensive and 3) Non-intensive.

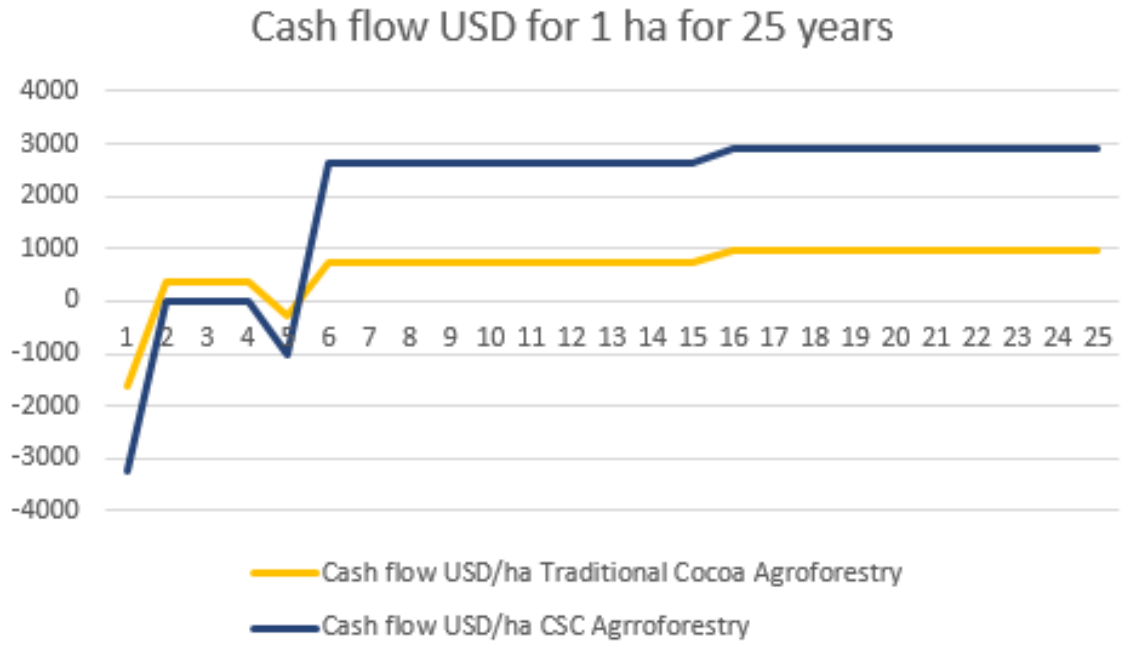
The group of small holders in the *Intensive management category (14 cases)* employed use of grafted polyclones of self-compatible or inter-compatible clones, use of complimentary irrigation, fertilizer use based on soil analysis, intensive pruning management, floor management, use of insecticides or fungicides for pest management, use of soil conservation practices, and diversification of the agroforestry systems with fruits, timber and service trees in optimal density. Hence they are considered smallholders implementing *Climate Smart Cocoa agroforestry* practices reflected by their productivity, quality, adaptation and mitigation profiles.

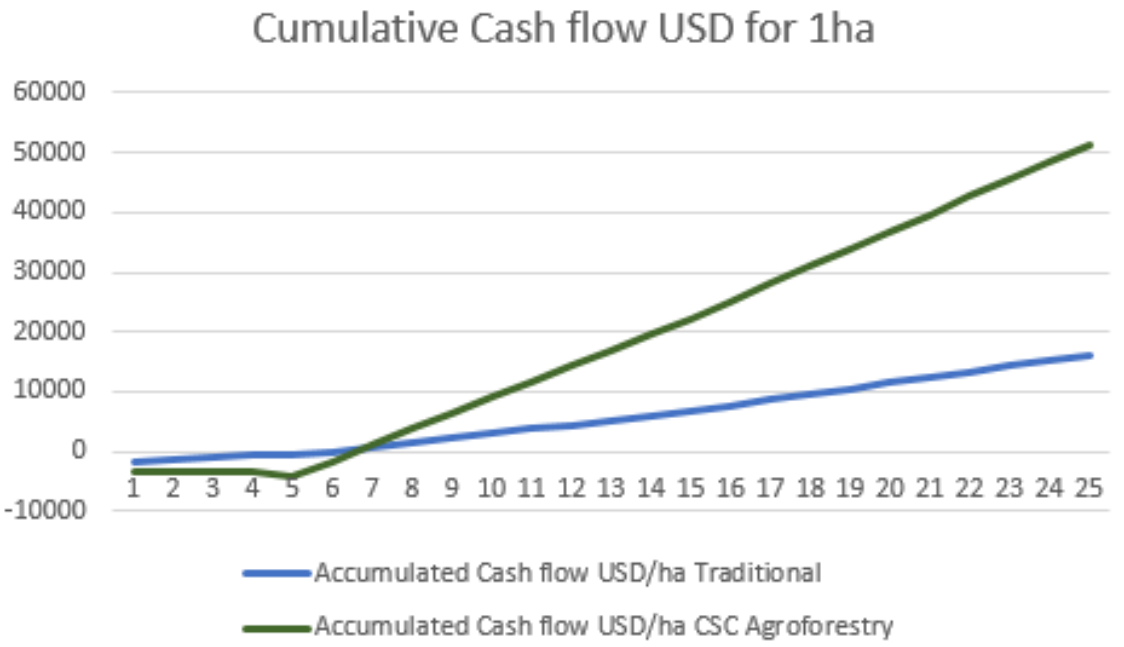
Based on the data from the 14 cases, median value of the cost to establish 1 ha of CSC agroforestry in El Salvador stood at USD 2900 and the median value of the cost of management oscillated between USD 1300-1800 during 25 years. The consolidated income from the CSC agroforestry plot generated from the sale of plantains, fruits, cocoa and timber ranged from USD 2500-2900, depending on the crop cycles. Based on these parameters, the Internal Rate of Return for the investment in CSC agroforestry managed by small holders can be estimated to be 28% with Net Present Value of USD 10,830 (Annex 1)

The group of small holders in the *Non-Intensive management* category (11 cases) employed cocoa plants generated from open pollinated seeds, did not use of complimentary irrigation, used fertilizer irregularly, practiced poor pruning and floor management, did not employ insecticides or fungicides for pest management, did not use soil conservation practices and did not focus on diversification of the agroforestry systems in optimal density. Hence they are considered smallholders implementing *Traditional Cocoa agroforestry* practices reflected by their productivity, quality, adaptation and mitigation profiles.

Based on the data from the 11 cases, median value of the cost to establish 1 ha of Traditional Cocoa agroforestry in El Salvador stood at USD 1500 and the median value of the cost of management oscillated between USD 400-900 during 25 years. The consolidated income from the traditional agroforestry plot generated from the sale of plantains, fruits, cocoa and timber ranged from USD 800-2000, depending on the crop cycles. Based on these parameters, the Internal Rate of Return for the investment in CSC agroforestry managed by small holders can be estimated to be 28% with Net Present Value of USD 3,500 (Annex 2)

From the comparison of the performance of the two groups, it is evident that the CSC agroforestry systems managed by small holders has a better business case. Although both Traditional and CSC agroforestry systems have a similar Internal Rate of Return for 25 years investment, the cash flow is much superior in the CSC agroforestry due to higher volume of cocoa driven by improved productivity, resulting from the implementation of climate smart cocoa practices. The analysis reveals that small holders implementing CSC agroforestry systems need higher investment amount, however, the improved cash flow of the system results in higher Net Present Value and a short recovery period of 6 years.





Climate Smart Cocoa Agroforestry managed by large scale plantations

To build business case of Climate Smart Cocoa agroforestry managed by large scale plantations, WCF visited a number of large scale cocoa plantations in Central America and Caribbean, and carried out interviews with the managers of the plantations to learn about CSC practices implemented by the companies and to build the business cases.

Companies	Country	Year of establishment of CSC agroforestry systems	Area of CSC agroforestry systems ha	Expected volume of cocoa/year MT	Other products from CSC agroforestry
Cacao Oro	Nicaragua	2014	2000	4000	Plantains, Timber
Ritter Sport	Nicaragua	2014	1500	3000	Plantains, Timber
12Tree	Dominican Republic	2018	1000	2000	Cocoanut
Green Energy	El Salvador	2017	100	300	Timber, Plantains

Companies	Country	Climate Smart Cocoa practices
Cacao Oro	Nicaragua	Poly-clonal arrangements with fine flavor productive and disease tolerant clones in optimal density, Fractionated fertilizer application based on demand, Organic matter amendments, Intensive pruning and shade management, Timber trees in plantation and borders, use of innovative micro-grafts, Routine data taking for decision-making, State-of-art fermenting and drying system
Ritter Sport	Nicaragua	Poly-clonal arrangements with fine flavor productive and disease tolerant clones in optimal density, Organic matter amendments and liming, Fractionated fertilizer application based on demand, Intensive pruning and shade management, Timber trees in plantation and borders, use of innovative micro-grafts, Routine data taking for decision-making, State-of-art fermenting and drying system
12Tree	Dominican Republic	Poly-clonal arrangements with fine flavor productive and disease tolerant clones in optimal density, Complimentary irrigation, Fractionated fertilizer application based on demand via ferti-irrigation, Organic matter amendments, Intensive pruning and shade management, Cocoanut trees with cocoa, Routine data taking for decision-making, State-of-art fermenting and drying system
Green Energy	El Salvador	Poly-clonal arrangements with fine flavor productive and disease tolerant clones in optimal density, Complimentary irrigation, Fractionated fertilizer application based on demand via ferti-irrigation, Organic matter amendments, Intensive pruning and shade management, Plantains and timber trees with cocoa, Routine data taking for decision-making, State-of-art fermenting and drying system

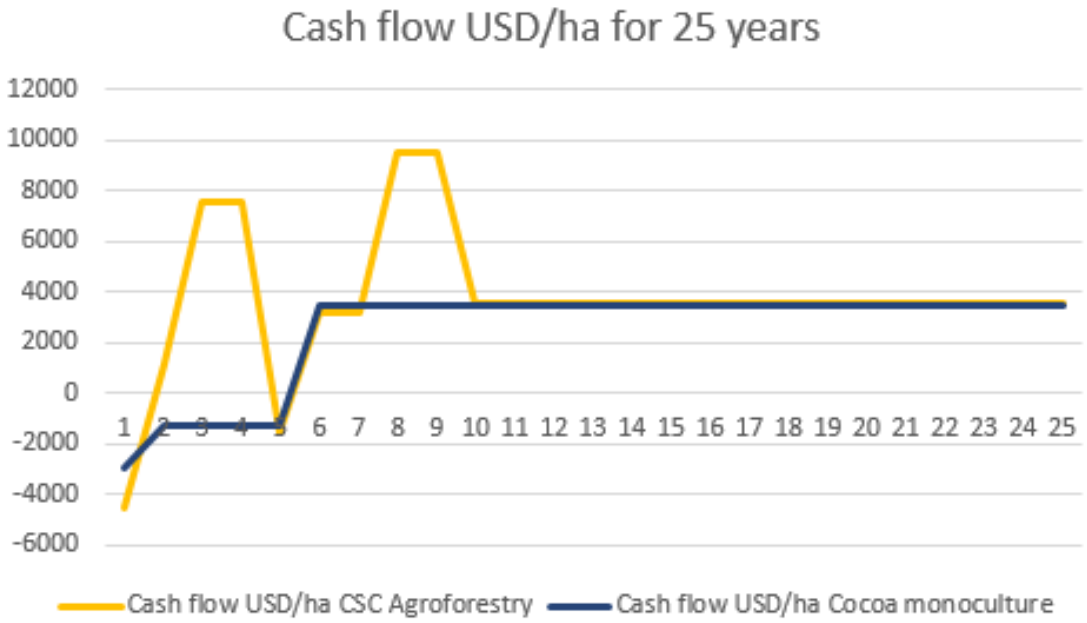
Based on the tally of the CSC practices implemented by each of the companies, all these cases can be confidently categorized as Climate Smart Cocoa Agroforestry systems as reflected by their productivity, quality, and adaptation and mitigation profile. All the companies have developed detailed financial analysis of their investment based on rate of return of the investments and risks associated with the investments. During the interviews, they all confirmed that Cocoa production with the CSC practices has solid business case with adequate Cost-benefit relation and rate of return (ROI). As many of the companies are accountable to their investors, the business plans normally go through multiple rounds of financial and social audits, so that the due diligence is robust and the investment is secure.

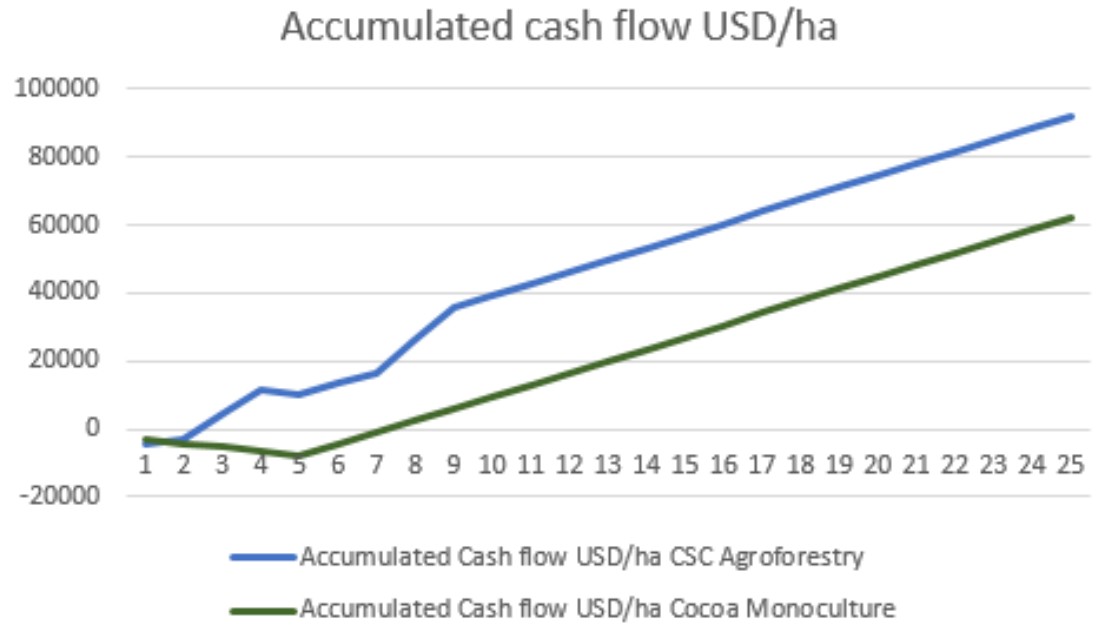
The business cases that the companies have developed are strictly for private use and are not available for sharing. However, one of the companies, Green Energy of El Salvador, with modest size investment in Climate Smart Cocoa plantations agreed to use the online system to estimate the profitability of their operation and permitted WCF to use the data for collective learning.

Based on the data from Green Energy, cost to establish 1 ha of CSC agroforestry managed within a larger plantation in El Salvador stands at USD 4500 and the cost of management of 1 ha oscillates between USD 1400-2300 during 25 years. The consolidated income from 1 ha of CSC agroforestry plot generated from the sale of plantains, cocoa and timber ranges from USD 3600-12000, depending on the crop cycles. Based on these parameters, the Internal Rate of Return for the investment in CSC agroforestry managed by a large plantation can be estimated to be 82% with Net Present Value of USD 30,366 (Annex 3).

Instead of CSC agroforestry, if Green Energy was to establish a traditional cocoa monoculture, cost to establish 1 ha of Cocoa monoculture in El Salvador would have been USD 2977 and the cost of management of 1 ha would have oscillated between USD 1100-2200 during 25 years. Income from 1 ha of CSC agroforestry plot generated from the sale of cocoa would be USD 5977. Based on these parameters, the Internal Rate of Return for the investment in traditional Cocoa monoculture managed by a large plantation can be estimated to be 24% with Net Present Value of USD 12,209 (Annex 4).

From the comparison of the two sets of data, it is evident that even simplified CSC agroforestry systems (Cocoa-Plantain-Melina) managed by large plantation with irrigation, state-of-art fermentation and drying facilities results in a solid business case. It has a much higher Internal Rate of Return and an improved cash flow compared to traditional cocoa monoculture system. This is driven not by higher cocoa productivity, but by the additional incomes from plantain and Melina timber. The CSC agroforestry system needs initial higher investment, however, the improved cash flow results in higher Net Present Value and an extremely short recovery period of 3 years.


Cash flow USD/ha for 25 years
12000
10000
8000
6000
4000
2000
0
-2000
-4000
-6000
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Cash flow USD/ha CSC Agroforestry
Cash flow USD/ha Cocoa monoculture


Accumulated cash flow USD/ha
100000
80000
60000
40000
20000
0
-20000
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Accumulated Cash flow USD/ha CSC Agroforestry
Accumulated Cash flow USD/ha Cocoa Monoculture

Climate Smart Cocoa Agroforestry scaled via clusters of Growers´ Organizations and Chocolate makers

To learn about the business case of Climate Smart Cocoa agroforestry scaled by clusters of Growers´ Organizations and Chocolate makers, involved in processing and trading high quality fermented certified cocoa beans, WCF studied two initiatives in Central America, and carried out interviews with the key actors of the supply chains to learn about investment in CSC practices and the business cases for scaling CSC agroforestry.

Companies	Country	Year of establishment of high quality cocoa supply chain	Number of Growers´ Organizations connected to the supply chain	Expected volume of certified fermented high quality cocoa/year MT	Salient cocoa development project
Ritter Sport	Nicaragua	2010	23	1200	Ritter Sport-IDB 2019-2022
Chocolats Halba	Honduras	2009	18	500	Chocolats Halba-PROCACAHO 2019-2023

Companies	Growers´ Organization	Climate Smart Cocoa practices promoted via the cluster of Growers´ Organizations and the Company
Ritter Sport	Cooperativa Cacaotera La Campesina	Planting fine flavor productive and disease tolerant cocoa in optimal density, fertilizer application based on soil analysis, organic matter amendments, intensive pruning and shade management, planting fruit and timber trees in plantation and borders, certification of the cocoa farms and improved fermenting and drying system and training of growers and incentives for implementing CSC practices
Chocolats Halba	APROSACAO	Poly-clonal arrangements with fine flavor productive and disease tolerant clones in optimal density, fertilizer application based on soil analysis, organic matter amendments, intensive pruning and shade management, fruit and timber trees in plantation and borders, complimentary irrigation, certification of the cocoa farms and improved fermenting and drying system and training of growers and incentives for implementing CSC practices

Based on the tally of the CSC practices implemented by Grower-cooperative-buyer cluster, both the initiatives can be confidently categorized as fostering or scaling Climate Smart Cocoa Agroforestry systems and should influence productivity, quality, and adaptation and mitigation profile of the systems in the future. However, very few Cooperatives had developed business cases, based on detailed financial analysis of their investment, rate of return and the risks. WCF carried out a pilot exercise with the Cooperative La Campesina in Nicaragua to estimate the cost-benefit of investments to scale CSC agroforestry systems with 500 members of the Cooperative. We build the business case for Grower-cooperative-buyer cluster, based on the data from this exercise.

To develop the analysis, we develop the story-lines of for two scenarios: 1) Traditional Cocoa Agroforestry systems and 2) Climate Smart Cocoa Agroforestry systems taking into account the following variables and parameters.

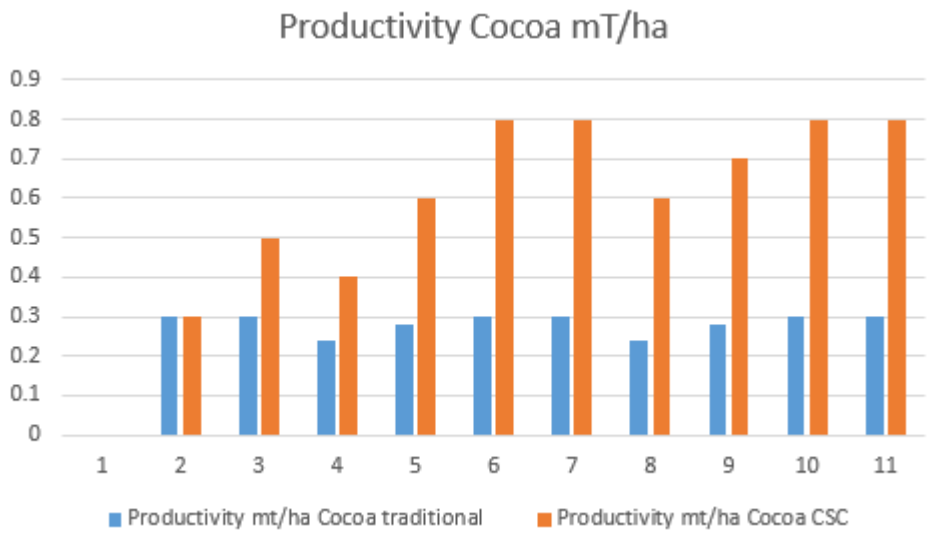
Parameters	Year	State and value for Scenario Traditional Cocoa Agroforestry systems	State and value for Scenario Climate Cocoa Agroforestry systems
Investment for facilities to ferment and dry cocoa	0	USD 100,000	USD 100,000
Depreciation of processing plant	1-10	7.5% per year	7.5% per year
Certification cost	0-10	USD 9/ha	USD 9/ha
Training and incentive for CSC practices	1-10		500 members x 2 ha x USD 150
Volume of production	1-10	500 members x 2 ha x productivity (0.24-0.3 MT/ha)	500 members x 2-3 ha x productivity (0.3-0.8 MT/ha)
Transport cost for procurement Cocoa	1-10	USD 40/MT Cocoa	USD 40/MT Cocoa
Price paid for buying cocoa	1-10	USD 2000/MT Cocoa	USD 2000/MT Cocoa
Cost of processing Cocoa	1-10	USD 160/MT Cocoa	USD 160/MT Cocoa
Transport cost processed Cocoa	1-10	USD 40/MT Cocoa	USD 40/MT Cocoa
Price received for selling cocoa	1-10	USD 3000/MT Cocoa	USD 3000/MT Cocoa
Financial cost USD (short term 10%)	0-10	10% interest	10% interest

Utilizing the values of the parameters developed through the participatory exercise with the Cooperative members, we carried out the Cost-benefit and financial analysis for the two scenarios.

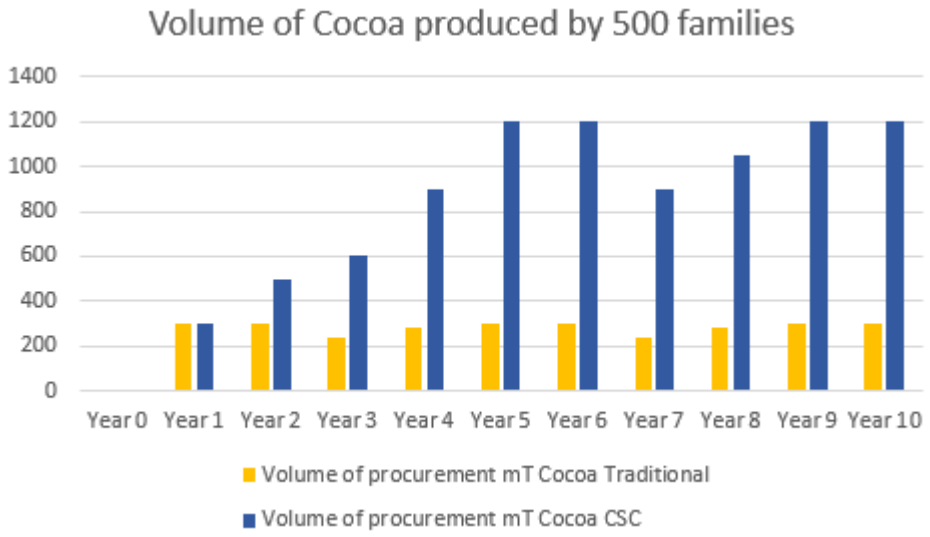
For the Traditional Cocoa Agroforestry scenario, the initial investment for establishing the cocoa processing plant was recovered by the third year, the accumulated cash flow at the end of the year 10 resulted to be USD 320,460, the Internal Rate of Return for the investment resulted to 36% and Net Present Value for the operations from year 1-10 resulted to be USD 138,645. In this scenario there was investment for certification (a condition for selling cocoa to Ritter Sport) but no additional investment for training and incentive for CSC practices. As a result the productivity stagnated around 0.2-0.3 MT/ha (Annex 5).

For the Climate Smart Cocoa Agroforestry scenario, the cash flow was positive by the fourth year, the accumulated cash flow at the end of the year 10 resulted to be USD 3,030,650, the Internal Rate of Return for the investment resulted to 53% and Net Present Value for the operations from year 1-10 resulted to be USD 1,350,564. In this scenario there was investment for certification (a condition for selling cocoa to Ritter Sport) and additional investment for training and incentive for CSC practices. As a result the productivity increased from 0.3 to 0.8 MT/ha within 6 years (Annex 6).

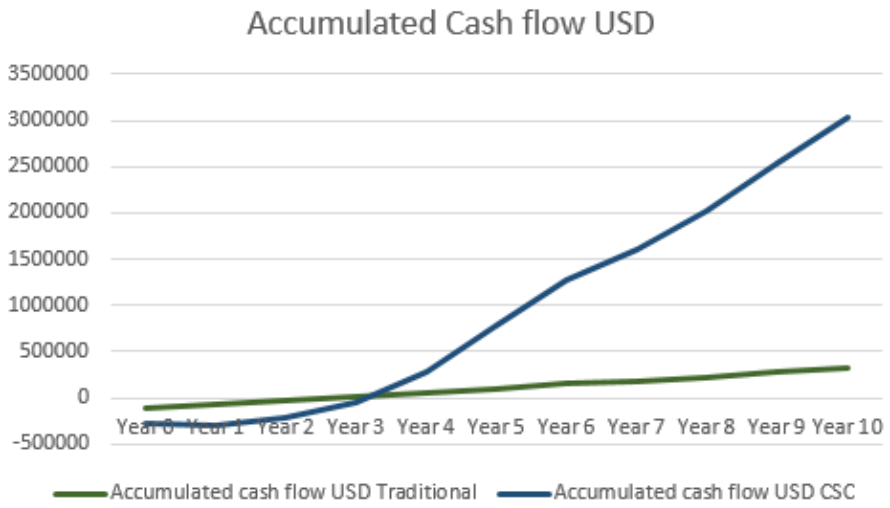
From the comparison of the two sets of data, it is evident that the scenario Climate Smart Cocoa agroforestry systems has a solid business case. It has a higher Internal Rate of Return and an improved cash flow compared to the scenario of Traditional cocoa agroforestry system. This is driven by increasing productivity achieved through constant and perseverant training and incentives for implementation of CSC practices, financed by the cluster of the growers´ organization-chocolate maker, via donor financed cocoa development projects in the frame of public-private partnerships.



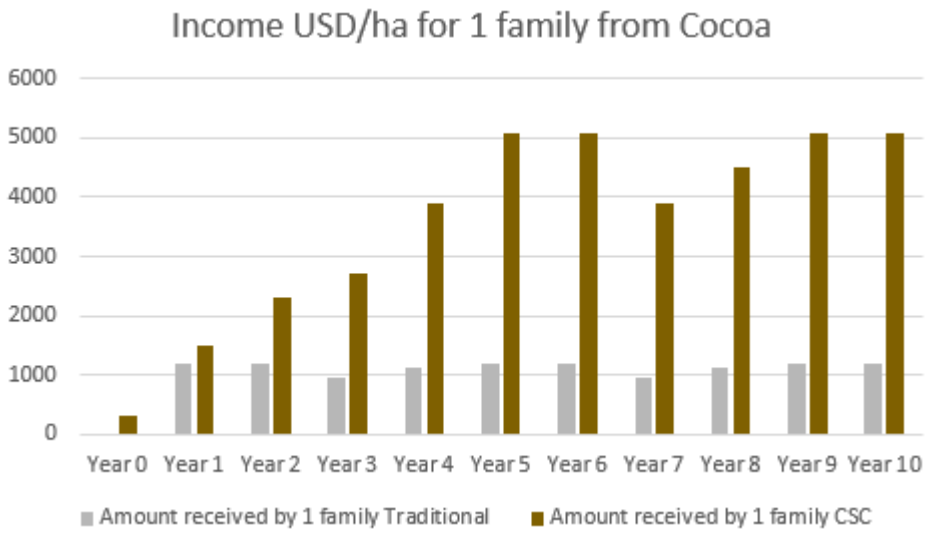
Climate Smart Cocoa investments carried out by the cluster of Chocolate Company and Growers´ Organization also results in increase in the volume of high quality fermented certified cocoa, fulfilling the goal or interest of the Chocolate Company to procure higher volumes of quality fine aroma cocoa.



Climate Smart Cocoa investments carried out by the cluster of Chocolate Company and Growers´ Organization also results in increase in accumulated cash flow over the years, thus strengthening the capacity of the Growers´ Organization to invest further in developing fine aroma cocoa value chain, entering the arena of cocoa processing and chocolate making. The improved cash flow also opens the door for the Growers´ Organizations to get involved in the value chains of the products of the diversified cocoa agroforestry systems like fruits, spices and timber.



The support of the business case also comes from the fact that income received by the families associated with the Growers´ Organization increases steadily during the years, due to higher volume of cocoa produced by them, resulting from increased productivity and establishment of new areas of Climate Smart Cocoa agroforestry, inspired by the success of the existing areas.



Climate Smart Cocoa investments carried out by the cluster of Chocolate Company and Growers´ Organization also results in increase in accumulated CO_2 capture over the years (643,110 t CO_2 in 500 ha over 25 years), thus opening the possibility that the Growers´ Organization may explore the possibility of developing a carbon market for Climate Smart Cocoa Agroforestry for the landscape. Successfully negotiated and implemented this helps to increase income of the members of the organizations, via sale of carbon in the international markets (additional income of USD 25,724 per family over 25 years).

Climate Smart Cocoa agroforestry							
	Number/ha	Growth m3 per tree in 16 years	Annual growth m3 per tree	Annual biomass growth t per tree	Annual C capture t per tree	Annual CO2 capture t per tree	Annual CO2 capture t/ha
Cocoa	800	0.70	0.04	0.03	0.01	0.04	28.35
Fruit tress	20	1.00	0.06	0.04	0.02	0.05	1.01
Timber trees	70	2.26	0.14	0.08	0.04	0.11	8.01
Service trees	30	0.30	0.02	0.01	0.01	0.02	0.46
Border trees	70	1.50	0.09	0.06	0.03	0.08	5.32
Live fence	300	0.30	0.02	0.01	0.01	0.02	4.56
Soil 1% OM increase in 16 years							3.75
Total accumulation tCo2 /ha per year							51.45
Number of project beneficiaries							500
Area of CSC Agroforestry ha							500
Total accumulation tCO2 by project beneficiaries per year							25724.44
Total accumulation tCO2 by project beneficiaries over 25 years							643110.94
Total income via sale of CO2 by project beneficiaries over 25 years							12862218.75
Total income via sale of CO2 by 1 family over 25 years							25724.44

Traditional Cocoa Agroforestry							
	Number/ha	Growth m3 in 16 years	Annual growth m3 per tree	Annual biomass growth t per tree	Annual C capture t per tree	Annual CO2 capture t per tree	Annual CO2 capture t/ha
Cocoa	600	0.80	0.05	0.03	0.01	0.04	24.30
Fruit trees	10	2.00	0.13	0.08	0.03	0.10	1.01
Timber trees	10	3.10	0.19	0.12	0.05	0.16	1.57
Service trees	10	0.40	0.03	0.02	0.01	0.02	0.20
Border trees	0	1.50	0.09	0.06	0.03	0.08	0.00
Live fence	0	0.40	0.03	0.02	0.01	0.02	0.00
Soil 0.5% OM increase in 16 years							1.88
Total accumulation tCo2/ha per year							28.96
Number of project beneficiaries							500
Area of Ccoca Agroforestry ha							500
Total accumulation tCO2 by project beneficiaries per year							14479.69
Total accumulation tCO2 by project beneficiaries over 25 years							361992.19
Total income via sale of CO2 by project beneficiaries over 25 years							7239843.75
Total income via sale of CO2 by 1 family over 25 years							14479.69

Climate Smart Cocoa Agroforestry scaled via clusters of Growers and Cocoa traders

To develop the business case of Climate Smart Cocoa agroforestry scaled via clusters of Growers and Cocoa traders involved in trading non-fermented cocoa beans, we developed an exploratory desk study about investment in CSC practices and the business cases for scaling CSC agroforestry in such a cluster.

Companies	Country	Year of establishment of non-fermented cocoa supply chain	Number of Growers connected to the supply chain	Expected volume of non-fermented cocoa/year MT
No name	Nicaragua	2019	500	1000

Companies	Growers	Climate Smart Cocoa practices to be promoted via the cluster of Growers and the Cocoa trader
No name	500 small and medium holders in northern Nicaragua	Planting productive and disease tolerant cocoa in optimal density, fertilizer application based on soil analysis, organic matter amendments, intensive pruning and shade management, planting plantains, fruit and timber trees in plantation and borders, certification of the cocoa farms and improved harvesting and training of growers and incentives for implementing CSC practices

To develop the analysis, we developed story-lines for two scenarios: 1) Traditional Cocoa Agroforestry systems and 2) Climate Smart Cocoa Agroforestry systems taking into account the following variables and parameters.

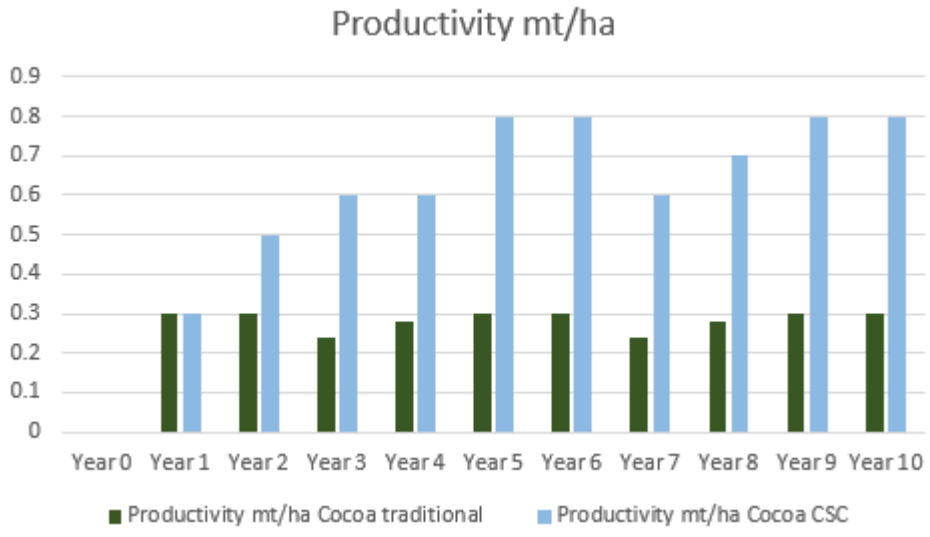
Parameters	Year	State and value for Scenario Traditional Cocoa Agroforestry systems	State and value for Scenario Climate Cocoa Agroforestry systems
Investment for cocoa drying and selection	0	USD 30,000	USD 30,000
Depreciation of processing plant	1-10	7.5% per year	7.5% per year
Certification cost	0-10		500 growers x 2 ha x USD 9/ha
Training and incentive for CSC practices	1-10		500 growers x 2 ha x USD 150
Volume of production	1-10	500 growers x 2 ha x productivity (0.24-0.3 MT/ha)	500 growers x 2-3 ha x productivity (0.3-0.8 MT/ha)
Transport cost for procurement Cocoa	1-10	USD 40/MT Cocoa	USD 40/MT Cocoa
Price paid for buying cocoa	1-10	USD 1600/MT Cocoa	USD 1600/MT Cocoa
Cost of processing Cocoa	1-10	USD 30/MT Cocoa	USD 30/MT Cocoa
Transport cost processed Cocoa	1-10	USD 40/MT Cocoa	USD 40/MT Cocoa
Price received for selling cocoa	1-10	USD 1950/MT Cocoa	USD 2400/MT Cocoa
Financial cost USD (short term 10%)	0-10	10% interest	10% interest

Utilizing the values of the parameters we carried out the Cost-benefit and financial analysis for the two scenarios.

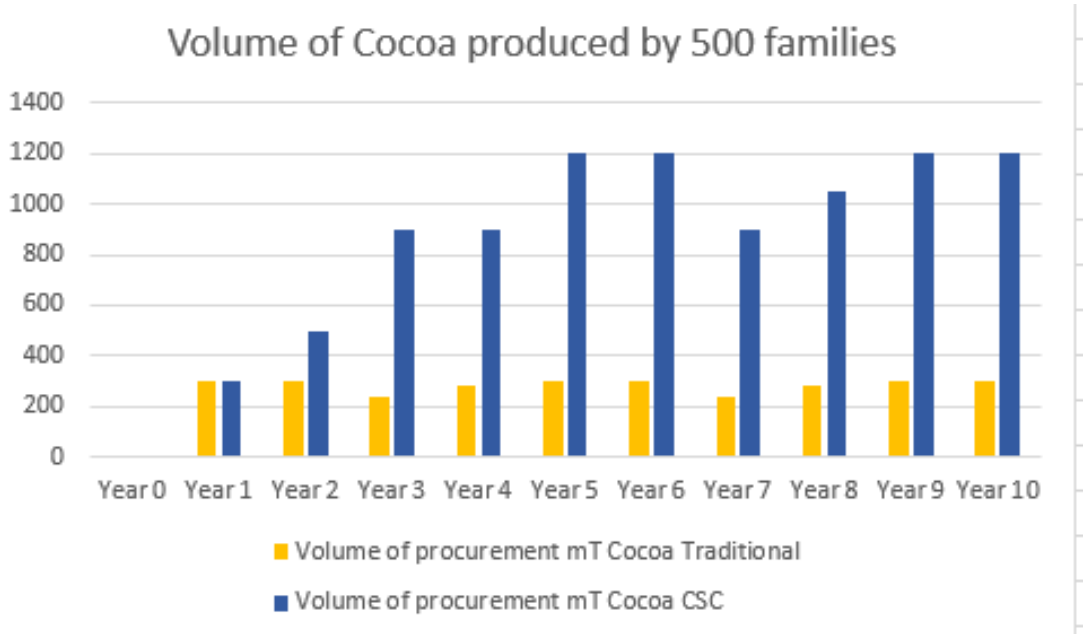
For the Traditional Cocoa Agroforestry scenario, the initial investment for establishing the cocoa processing plant was recovered by the third year, the accumulated cash flow at the end of the year 10 resulted to be USD 84,580, the Internal Rate of Return for the investment resulted to 38% and Net Present Value for the operations from year 1-10 resulted to be USD 37,424. In this scenario there was no investment for certification and no investment for training and incentive for CSC practices. As a result the productivity stagnated around 0.2-0.3 MT/ha (Annex 7).

For the Climate Smart Cocoa Agroforestry scenario, the cash flow was positive by the third year, the accumulated cash flow at the end of the year 10 resulted to be USD 3,251,650, the Internal Rate of Return for the investment resulted to 66% and Net Present Value for the operations from year 1-10 resulted to be USD 1,506,059. In this scenario there was investment for certification (for better market access) and additional investment for training and incentive for CSC practices. As a result the productivity increased from 0.3 to 0.8 MT/ha within 6 years and the sale price of cocoa increased from USD 1900 to USD 2400 per MT (Annex 8).

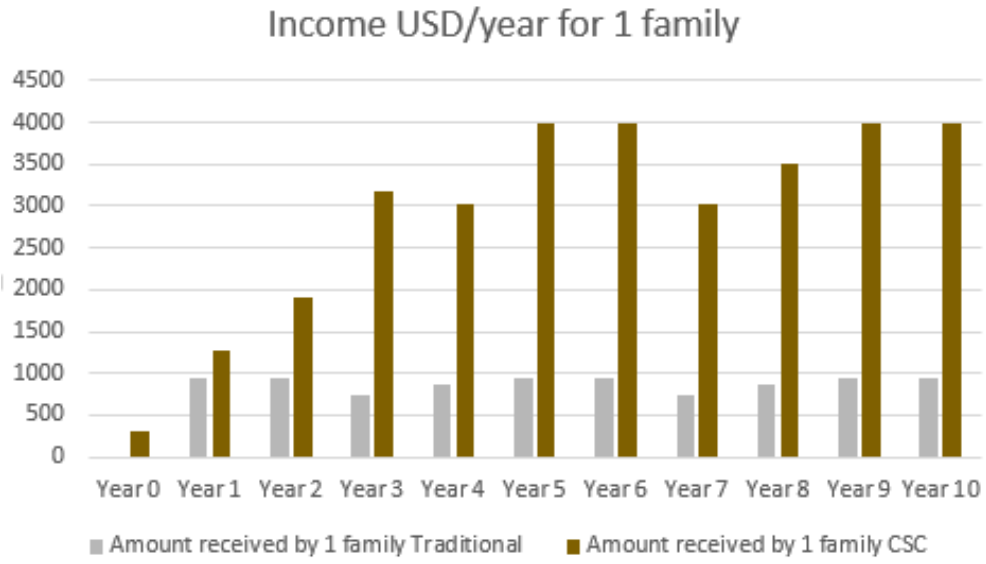
From the comparison of the two sets of data, it is evident that the investment for Climate Smart Cocoa by the cluster of Growers and Cocoa trader has a good business case. It has a higher Internal Rate of Return and an improved cash flow compared to the scenario of Traditional cocoa agroforestry system. This is driven by increasing productivity achieved through constant and perseverant training and incentives for implementation of CSC practices, financed by the cluster, either via donor financed cocoa development projects or via private finance in the frame of public-private partnerships.



Climate Smart Cocoa investments carried out by the cluster of Cocoa trader and Growers results in increase in the volume of non-fermented certified cocoa, fulfilling the goal or interest of the Cocoa trader to procure higher volumes of certified cocoa.



The support of the business case also comes from the fact that income received by the families associated with the cluster increases steadily during the years, due to higher volume of cocoa produced by them, via increased productivity and also being able to invest in establishing new areas of Climate Smart Cocoa agroforestry, inspired by the success of the existing areas.



Sources for funding for Climate Smart Cocoa investment in Latin America

CAF: Development Bank of Latin America

CAF is a development bank created in 1970, owned by 19 countries - 17 of Latin America and the Caribbean, Spain and Portugal- as well as 13 private banks in the region. It promotes a sustainable development model through credit operations, non-reimbursable resources, and support in the technical and financial structuring of projects in the public and private sectors of Latin America. With headquarters in Caracas, Venezuela , CAF has offices in Buenos Aires, La Paz, Brasilia, Bogota, Quito, Madrid, Mexico D.F, Panama City, Asuncion, Lima, Montevideo and Port of Spain.

Latin American Cocoa Initiative

Among the abundant natural resources that may be found in Latin America, fine flavor cocoa stands out for its rarity and originality. Considering that nine out of ten cocoa farms are held by small producers, CAF is looking at an opportunity to encourage sustainable development models that promote inclusive trade and best practices in agro-forestry, in addition to innovations to diversify the supply of cocoa in the food, cosmetic, and phyto-pharmaceutical industries.

Guided by CAF, the Latin American Cocoa Initiative (ILAC, for its acronym in Spanish) was created within this scenario. It includes the main Latin American producers of fine flavor cocoa to encourage productivity, promote sustainable green businesses, and boost a regional development strategy for this emblematic product in national and international markets.

The initiative, which in its first stage includes Mexico, Panama, Dominican Republic, Colombia, Ecuador, Peru, Brazil, Costa Rica, and Bolivia, also expects to improve management, administration, and structures of the organizations of small producers. At the same time, these improvements must facilitate access to new lines of financing, identify products with value added that may be created in the industry, and promote environmental best practices in the cocoa sector.

CAF is a potential source of financing for sustainable cocoa initiatives in the region, especially for scaling Climate and Forest Smart Cocoa in countries like Dominican Republic with an annual production of 80,000 tons of quality certified and traceable cocoa. Similar investment cases can also be made for Colombia, Ecuador and Peru. However, so far no large scale commodity development project has been financed by CAF. So to bring about a first-time Sustainable Cocoa investment project will need that extra work with long-term commitment and co-financing from private and public sectors. It will also need sound business case support via technical and financial analysis.

https://www.caf.com/

THE IDB GROUP IN CENTRAL AMERICA AND THE DOMINICAN REPUBLIC

The IDB Group is the leading source of development finance for Latin America and the Caribbean. It helps to improve lives by providing financial solutions and development knowhow to public and private sector clients. The group comprises the IDB, which has worked with governments for 60 years; IDB Invest, which serves the private sector; and IDB Lab, which tests innovative ways to enable more inclusive growth.

IDB Invest

IDB Invest aims to be the partner of choice for the private sector in Latin America and the Caribbean. It finances projects to advance clean energy, modernize agriculture, strengthen transportation systems and expand access to financing. Like the Inter-American Development Bank (IDB), IDB Invest commitment is to economic growth and social inclusion; that is central to its identity, as part of the IDB Group. But its focus is on the private sector. As the private sector arm of the IDB Group, IDB Invest works across the region, where their clients are and can provide them with customized financing solutions and expert advice tailored to their specific industry and market.

IDB Lab

IDB Lab is the innovation laboratory of the IDB Group. IDB Lab mobilize financing, knowledge, and connections to catalyze innovation for inclusion in Latin America and the Caribbean. They believe that innovation is a powerful tool that can transform the region, providing today unprecedented opportunities to populations that are vulnerable due to economic, social, or environmental factors. IDB lab supports innovative projects and early stage ventures with a potential to generate impact on a large scale. It promotes innovation and entrepreneurship ecosystems, and we systematize and disseminate knowledge to connect ideas and scale their impact.

IDB group is a challenging and highly competitive environment for obtaining investment funding, where only smart ideas and committed entities are successful. We can visualize four stages with increasing complexities.

- Stage 1. IDB-LAB innovation and inclusion, which has a strong focus small producers and farmers organization; covers the themes of CSA, Inclusive cities and Knowledge economy. Has two windows for financing: Technical cooperation (Grant) and Investment (soft loan), with a limit of US$ 5 million including 50% co-financing.
- Stage 2. IDB-Invest dedicated to Private sector with market condition loans of 5 million USD or more with co-financing. Covers the themes: Value chain, Energy, Infra-structure, Agri-business, Financial institutions, Investment funds, Manufacture, Tourism, Water and Sanitation and telecommunication and Technology.
- Stage 3: IDB Public sovereignty loans for full proof investment for Reconversion landscape, Natural resources management and conservation, Climate financing, Health, Transport, Energy, Roads, Infrastructures.
- Stage 4: IDB facilitating access to third party funds like Global Environmental Funds (GEF) or Green Climate Funds (GCF)

https://www.iadb.org

Green Climate Funds

Many big, bold ideas are needed to move the needle on climate change. The Green Climate Fund's vision is to support a paradigm shift to low-emission and climate-resilient development. It is driven by innovation and targets its investments for transformational impact. In order to achieve maximum results, GCF seeks to catalyze funds, multiplying the effect of its initial financing by opening markets to new investments. The Fund creates new models for climate finance, channeling investment from both the public and private sectors. It aims to maximize the impact of public finance in a creative way, and to attract new sources of private finance to catalyze investment in mitigation and adaptation projects in the developing world.

Generation of Funding Proposals

Accredited Entities develop funding proposals, in close consultation with focal points, based on the differing climate finance needs of individual developing countries. Accredited Entities can also respond to Requests for Proposals issued by GCF to fill current gaps in climate financing. In issuing some Requests for Proposals, GCF may accept proposals from entities it has not yet accredited. However, non-accredited entities will have to team-up with Accredited Entities when formally submitting funding proposals to GCF. Entities that submit proposals through the Requests for Proposals can be prioritized when applying for accreditation.

Currently there are no Cocoa Agroforestry Investment project financed by GCF in Latin America or in West Africa. Before a Commodity Agroforestry Investment project can be submitted, the Nationally Appropriate Mitigation Actions (NAMA http://www.fao.org/in-action/micca/resources/learning/namas-learning/en/) has to be elaborated and approved. This is a complex process and needs a team of specialists to develop a NAMA on a crop landscape in a country. Only when a NAMA is approved, a GCF proposal can be elaborated based on the action plan included in NAMA. So if members of WCF would become Accredited Entity and work with National Focal point, it may be possible to develop GCF proposal for Cocoa and Forest Initiatives or Climate Smart Cocoa Scaling. Also it appears that the GCF investments are invariably linked to loans or micro-finance for scaling, hence multi-country proposal developed by consortium of banks and industry will be a better idea.

https://www.greenclimate.fund/gcf101

FONTAGRO

FONTAGRO is a unique cooperation mechanism among Latin American and Caribbean countries and Spain to promote innovation in family farming, competitiveness, and food security. Since its establishment, it has mobilized 105 million US$ in projects and celebrated 110 institutional agreements.

At its inception, in 1998, it received special donations from the Canadian International Development Research Centre (IDRC) and the Inter-American Development Bank (IDB), together with capital contributions from its member countries, which enabled its establishment, and funded its first projects. Throughout its history, the fund has played a leading role, not as a traditional fund for development research, but rather as a cooperation mechanism among countries.

Current project in Cocoa

Multi-agency Cacao Platform for Latin America and the Caribbean, "Cacao 2030-2050" : FONTAGRO is funding this initiative, via a mechanism known as a "seed fund." Creation of the platform is being proposed for the first phase and will be spearheaded by Ecuador's National Institute for Agricultural Research (INIAP) and the ESPOL Polytechnic School, together with research institutions from the region and public and private sector agencies. The Regional platform will accelerate cooperation between countries to carry out research and training to meet the challenge of residue of Cadmium in the Cocoa seeds.

FONTAGRO is not an investment fund or a traditional fund for development research, but rather as a cooperation mechanism among countries. So WCF members active in different countries of LAC may take on the opportunity to develop cooperative research, or cooperative training, or curricular development making use of FONTAGRO cooperation. The amount of funds are small, so the projects really have to be in the dimension of Seed Capital or Small scale validation for gathering evidence for attracting investments for scaling. The high demand on the counterpart financing (100-200%), may put the WCF industry members in an advantage to other competitors, if the work plan is within the action plans of the industry and other partners.

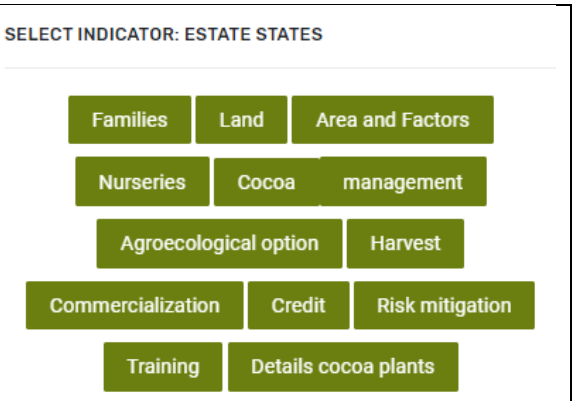
https://www.fontagro.org/en/

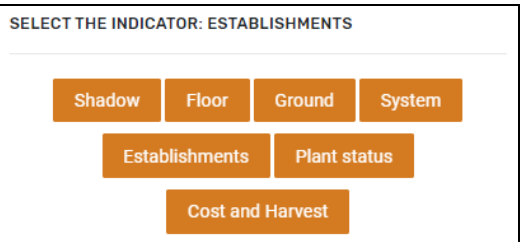
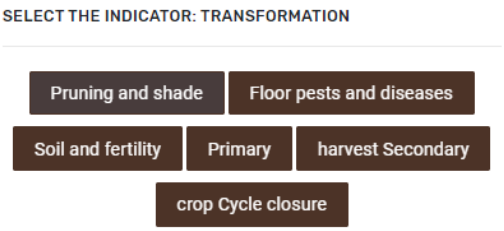
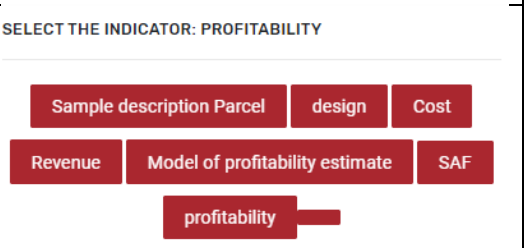
Monitoring impact of the investment ideas

Climate change will affect the cocoa sector in Central America and the Caribbean, with consequences for thousands of small producers, national economies and the cocoa and chocolate industry. Climate-Smart Cacao agroforestry systems can help meet the goals of increased productivity, adaptation to climate change and increased revenue from diversified agroforestry systems.

Climate Smart Cocoa agroforestry systems are complex. Monitoring and evaluation of such complex systems demand skills that are not always available in the Cocoa growing territories. Web-based tools, designed as expert systems, may help to facilitate monitoring and evaluation of Climate Smart Cocoa investments. In the frame of Climate Smart Cocoa Program, WCF and its allies have developed four such tools which are available for public use:

1) Tool to assess the current state of climate readiness of cocoa growing farms and families
2) Tool to monitor and evaluate performance of newly established CSC agroforestry systems (green fields)
3) Tool to monitor and evaluate performance of CSC agroforestry systems in transformation (brown fields)
4) Tool to carry out cost-benefit and financial analysis of CSC Agroforestry systems.

Tool to assess the current state of climate readiness of cocoa growing farms and families This tool is applied with a group of producers and producers, participating in some climate-smart Cocoa initiatives. The results of the tool reflect the state of farms and families of those involved in the initiative. Using a standardized protocol, local data of farms and families are collected and uploaded in the tool. Using filters, the data can be split into different groups or samples. Once the sample is selected, the tool estimates the values of the indicators from data stored on the server and demonstrates the results in the form of tables or figures.	

Tool to monitor and evaluate performance of newly established CSC agroforestry systems (green fields) This tool is used for collective learning about system design, soil, plant status, cost-harvest of established plots. For this, data collection cards designed for 0, 3, 6 and 9 months after planting are used, from the year of establishment to 4 years or more. Once the data in uploaded and the analysis universe is selected, the tool estimates the values of the indicators from data stored on the server and demonstrates the results in the form of tables or figures.	
Tool to monitor and evaluate performance of CSC agroforestry systems in transformation (brown fields) This tool is used for collective learning on the progress of pruning and shade, soil and fertility management, pests, diseases and floor management, harvest estimation and cost-returns of the Cocoa agroforestry plots in transition. For that, 7 data collection cards designed for each of the topics are used. Once the data is uploaded, and the universe is selected, the tool estimates the values of the indicators from data stored on the server and demonstrates the results in the form of tables or figures.	
Tool to carry out cost-benefit and financial analysis of CSC Agroforestry systems This tool is used for collective learning about the costs, income and profitability of SAF Cacao plots. Using the inventory, management itineraries and projected harvest data at 25 years, the costs, revenues and profitability of the Cacao agroforestry system and the system components are estimated. Once the data is uploaded and the analysis universe is selected, the tool estimates the values of the indicators from data stored on the server and demonstrates the results in the form of tables.	

Way forward

Our experience of working with the Climate Smart Cocoa Strategic Working groups in Dominican Republic, El Salvador, Guatemala, Honduras and Nicaragua during past four years (2017-2020) confirms that the private sector in leading the innovation of Climate Smart Cocoa to face the challenges faced by the cocoa supply chains from Climate change and Climate Variability. In their role of leader of Climate Smart Cocoa innovation they seek:

1) Granular climate-risk data
2) Guidance of practices to build resilience
3) Examples of business cases for CSC investments

Fortunately for most of the cocoa growing countries of Central America and Caribbean, granular, subnational-level climate-risk data is now available in an online information system. A wide range of users, cocoa growers, cocoa growers´ organizations, cocoa buyers and traders, investors, development agencies, local and national governments, multi-lateral development banks and other financial organizations can access the data and maps with no user cost and carry out foresight analysis about climate risks of the cocoa territories of Central America and Caribbean.

Fortunately for most of the cocoa growing regions of Central America and Caribbean, guidance for adaptation and mitigation practices are now available in an online information system, where one can consult the climatic conditions, aptitude and climate impact gradient of the territories and obtain a proposal of the practices. The system also permits a user to develop a climate adaptation plan with budget, based on the climate risk of the territory and the level of implementation of the proposed practices.

Our analysis reveal that private sector actors of Central America and Caribbean are diverse including small-scale growers, growers´ organizations, cocoa buyers-traders, cocoa buyer-chocolate makers, large scale plantations owners, and out-growers. Because of their different positions in the cocoa supply chains they demonstrate variability, and requires specific business case analysis. In this document we have attempted to develop business case of Climate Smart Cocoa for some of the above mentioned actors, based on the data and information gathered during the implementation of CSC pilots in the region.

At the start of this document, we stated that the investment decisions to promote Climate Smart Cocoa agroforestry systems can only be facilitated, if there are clear guidelines and indications for the investment opportunities. In this document we have presented salient ideas and information related to guidelines and indications that may facilitate such investment decisions. We hope that private sector actors of the region will use this document to build their own business plans to foster and scale Climate Smart Cocoa.

Beyond the publication of this document, we will need take deep dive into the guidelines and indications for CSC investments with the key private sector actors, individually and in consortiums, so that they can work the information into the frames of their own context and plans. This is crucial as we have learned that, to be able to scale Climate Smart Cocoa in the region, the private sector would prefer to make their existing cocoa sustainability efforts more climate-smart, rather than implementing new Climate Smart Cocoa programs.

Annexes

Annex 1. Cost-benefit and financial analysis of Climate Smart Cocoa Agroforestry systems managed by small holders of El Salvador (based on data of 14 cases).

Year	Investment USD/ha	Financial cost USD/ha	Income USD/ha	Cash flow USD/ha CSC Agrroforestry	Accumulated Cash flow USD/ha CSC Agroforestry
1	2934	293	0	-3228	-3228
2	1332	133	1470	5	-3223
3	1332	133	1470	5	-3218
4	1332	133	1470	5	-3213
5	916	92	0	-1008	-4220
6	1805	180	4631	2645	-1575
7	1805	180	4631	2645	1070
8	1805	180	4631	2645	3715
9	1805	180	4631	2645	6361
10	1805	180	4631	2645	9006
11	1805	180	4631	2645	11651
12	1805	180	4631	2645	14296
13	1805	180	4631	2645	16942
14	1805	180	4631	2645	19587
15	1805	180	4631	2645	22232
16	1830	183	4928	2915	25147
17	1830	183	4928	2915	28062
18	1830	183	4928	2915	30977
19	1830	183	4928	2915	33892
20	1830	183	4928	2915	36807
21	1830	183	4928	2915	39722
22	1830	183	4928	2915	42637
23	1830	183	4928	2915	45552
24	1830	183	4928	2915	48467
25	1830	183	4928	2915	51382
IRR 10%	28%				
NPV 10%	$10,831.57				

Annex 2. Cost-benefit and financial analysis of Traditional Cocoa Agroforestry systems managed by small holders of El Salvador (based on data of 11 cases).

Year	Investment USD/ha	Financial cost USD/ha	Income USD/ha	Cash flow USD/ha Traditional Cocoa Agroforestry	Accumulated Cash flow USD/ha Traditional
1	1465	147	0	-1612	-1612
2	419	42	840	379	-1233
3	419	42	840	379	-854
4	419	42	840	379	-475
5	251	25	0	-277	-752
6	727	73	1550	750	-2
7	727	73	1550	750	747
8	727	73	1550	750	1497
9	727	73	1550	750	2247
10	727	73	1550	750	2996
11	727	73	1550	750	3746
12	727	73	1550	750	4495
13	727	73	1550	750	5245
14	727	73	1550	750	5995
15	727	73	1550	750	6744
16	869	87	1900	944	7688
17	869	87	1900	944	8632
18	869	87	1900	944	9576
19	869	87	1900	944	10520
20	869	87	1900	944	11464
21	869	87	1900	944	12408
22	869	87	1900	944	13352
23	869	87	1900	944	14296
24	869	87	1900	944	15240
25	869	87	1900	944	16185
IRR 10%	28%				
NPV 10%	$3,468.07				

Annex 3. Cost-benefit and financial analysis of Climate Smart Cocoa Agroforestry systems managed by a large planation in El Salvador (based on data of Green Energy)

Year	Investment USD/ha	Financial cost USD/ha	Income USD/ha	Cash flow USD/ha CSC Agroforestry	Accumulated Cash flow USD/ha CSC Agroforestry
1	4136	414	0	-4549	-4549
2	2232	223	3640	1185	-3364
3	2225	222	9996	7549	4185
4	2225	222	9996	7549	11734
5	1434	143	0	-1577	10157
6	2617	262	6082	3203	13360
7	2617	262	6082	3203	16564
8	2610	261	12438	9567	26131
9	2610	261	12438	9567	35698
10	2323	232	6082	3527	39225
11	2323	232	6082	3527	42751
12	2323	232	6082	3527	46278
13	2323	232	6082	3527	49805
14	2323	232	6082	3527	53331
15	2323	232	6082	3527	56858
16	2323	232	6082	3527	60385
17	2323	232	6082	3527	63912
18	2323	232	6082	3527	67438
19	2323	232	6082	3527	70965
20	2323	232	6082	3527	74492
21	2323	232	6082	3527	78019
22	2323	232	6082	3527	81545
23	2323	232	6082	3527	85072
24	2323	232	6082	3527	88599
25	2323	232	6082	3527	92126
IRR 10%	82%				
NPV 10%	$30,366.68				

Annex 4. Cost-benefit and financial analysis of Traditional Cocoa in monoculture system managed by a large planation in El Salvador (based on data of Green Energy)

Year	Investment USD/ha	Financial cost USD/ha	Income USD/ha	Cash flow USD/ha Cocoa monoculture	Accumulated Cash flow USD/ha Cocoa Monoculture
1	2706	271	0	-2977	-2977
2	1126	113	0	-1238	-4215
3	1126	113	0	-1238	-5453
4	1126	113	0	-1238	-6691
5	1126	113	0	-1238	-7929
6	2274	227	5998	3497	-4433
7	2274	227	5998	3497	-936
8	2274	227	5998	3497	2560
9	2274	227	5998	3497	6057
10	2274	227	5998	3497	9554
11	2274	227	5998	3497	13050
12	2274	227	5998	3497	16547
13	2274	227	5998	3497	20044
14	2274	227	5998	3497	23540
15	2274	227	5998	3497	27037
16	2274	227	5998	3497	30534
17	2274	227	5998	3497	34030
18	2274	227	5998	3497	37527
19	2274	227	5998	3497	41024
20	2274	227	5998	3497	44520
21	2274	227	5998	3497	48017
22	2274	227	5998	3497	51513
23	2274	227	5998	3497	55010
24	2274	227	5998	3497	58507
25	2274	227	5998	3497	62003
IRR 10%	24%				
NPV 10%	$12,209.92				

Annex 5. Cost-benefit and financial analysis of operation of a cluster of Growers´ Organizations and Chocolate maker involved in a scenario of Traditional Cocoa Agroforestry system (based on data of La Campesina and Ritter Sport, Nicaragua)

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Investment USD	-100000										
Depreciation USD		-7500	-7500	-7500	-7500	-7500	-7500	-7500	-7500	-7500	-7500
Certification cost USD	-9000	-9000	-9000	-9000	-9000	-9000	-9000	-9000	-9000	-9000	-9000
Volume of production mT Cocoa Traditional		300	300	240	280	300	300	240	280	300	300
Transport cost for procurement Cocoa USD		-12000	-18000	-14400	-16800	-18000	-18000	-14400	-16800	-18000	-18000
Price paid USD purchasing cocoa		-600000	-600000	-480000	-560000	-600000	-600000	-480000	-560000	-600000	-600000
Cost of processing USD Cocoa		-48000	-48000	-38400	-44800	-48000	-48000	-38400	-44800	-48000	-48000
Transport cost processed Cocoa USD		-12000	-12000	-9600	-11200	-12000	-12000	-9600	-11200	-12000	-12000
Price received USD selling prcessed cocoa USD		810000	810000	648000	756000	810000	810000	648000	756000	810000	810000
Financial cost USD (short term 10%)	-10900	-68100	-68700	-55140	-64180	-68700	-68700	-55140	-64180	-68700	-68700
Cash flow USD	-119900	53400	46800	33960	42520	46800	46800	33960	42520	46800	46800
Accumulated cash flow USD	-119900	-66500	-19700	14260	56780	103580	150380	184340	226860	273660	320460
IRR 10%		36%									
NPV 10%		$138,645.42									
Amount received by 1 family Traditional		1200	1200	960	1120	1200	1200	960	1120	1200	1200

Annex 6. Cost-benefit and financial analysis of operation of a cluster of Growers´ Organizations and Chocolate maker involved in a scenario of Climate Smart Cocoa Agroforestry systems (based on data of La Campesina and Ritter Sport, Nicaragua)

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Investment Processing USD	-100000										
Depreciation USD		-7500	-7500	-7500	-7500	-7500	-7500	-7500	-7500	-7500	-7500
Certification cost USD	-9000	-9000	-9000	-9000	-9000	-9000	-9000	-9000	-9000	-9000	-9000
Training and Incentive for CSC USD	-150000	-150000	-150000	-150000	-150000	-150000	-150000	-150000	-150000	-150000	-150000
Volume of production mT Cocoa CSC		300	500	600	900	1200	1200	900	1050	1200	1200
Transport cost for procurement Cocoa USD		-12000	-30000	-36000	-54000	-72000	-72000	-54000	-63000	-72000	-72000
Price paid for buying cocoa USD		-600000	-1000000	-1200000	-1800000	-2400000	-2400000	-1800000	-2100000	-2400000	-2400000
Cost of processing USD		-48000	-55000	-66000	-99000	-132000	-132000	-99000	-115500	-132000	-132000
Transport cost processed Cocoa USD		-12000	-20000	-24000	-36000	-48000	-48000	-36000	-42000	-48000	-48000
Price received selling cocoa USD		900000	1500000	1800000	2700000	3600000	3600000	2700000	3150000	3600000	3600000
Financial cost USD (short term 10%)	-25900	-83100	-126400	-148500	-214800	-281100	-281100	-214800	-247950	-281100	-281100
Cash flow USD	-284900	-21600	102100	159000	329700	500400	500400	329700	415050	500400	500400
Accumulated cash flow USD	-284900	-306500	-204400	-45400	284300	784700	1285100	1614800	2029850	2530250	3030650
IRR 10%		53%									
NPV 10%		$1350,564.19									
Amount received by 1 family CSC	300	1500	2300	2700	3900	5100	5100	3900	4500	5100	5100

Annex 7. Cost-benefit and financial analysis of operation of a cluster of Growers and Cocoa trader involved in a scenario of Traditional Cocoa Agroforestry system (based on desk study, Nicaragua)

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Investment USD	-30000										
Depreciation USD		-2250	-2250	-2250	-2250	-2250	-2250	-2250	-2250	-2250	-2250
Certification/traceability cost USD	0	0	0	0	0	0	0	0	0	0	0
Volume of procurement mT Cocoa Traditional		300	300	240	280	300	300	240	280	300	300
Transport for procurment of Cocoa USD		-12000	-18000	-14400	-16800	-18000	-18000	-14400	-16800	-18000	-18000
Price paid for purchasing cocoa USD		-480000	-480000	-384000	-448000	-480000	-480000	-384000	-448000	-480000	-480000
Cost of processing USD Cocoa		-9000	-9000	-7200	-8400	-9000	-9000	-7200	-8400	-9000	-9000
Transport of processed cocoa USD		-12000	-12000	-9600	-11200	-12000	-12000	-9600	-11200	-12000	-12000
Price received USD selling cocoa		585000	585000	468000	546000	585000	585000	468000	546000	585000	585000
Financial cost USD (short term 10%)	-3000	-51300	-51900	-41520	-48440	-51900	-51900	-41520	-48440	-51900	-51900
Cash flow USD	-33000	18450	11850	9030	10910	11850	11850	9030	10910	11850	11850
Accumulated cash flow USD	-33000	-14550	-2700	6330	17240	29090	40940	49970	60880	72730	84580
IRR 10%		38%									
NPV 10%		$37,424									
Amount received by 1 family Traditional		960	960	768	896	960	960	768	896	960	960

Annex 8. Cost-benefit and financial analysis of operation of a cluster of Growers and Cocoa trader involved in a scenario of Climate Smart Cocoa Agroforestry system (based on desk study, Nicaragua)

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Investment Processing USD	-30000										
Depreciation USD		-2250	-2250	-2250	-2250	-2250	-2250	-2250	-2250	-2250	-2250
Certification/Traceability cost USD	-9000	-9000	-9000	-9000	-9000	-9000	-9000	-9000	-9000	-9000	-9000
Training and Incentive for CSC USD	-150000	-150000	-150000	-150000	-75000	-75000	-75000	-75000	-75000	-75000	-75000
Volume of procurement mT Cocoa CSC		300	500	900	900	1200	1200	900	1050	1200	1200
Transport for procurment of Cocoa USD		-12000	-30000	-54000	-54000	-72000	-72000	-54000	-63000	-72000	-72000
Price paid buying cocoa USD		-480000	-800000	-1440000	-1440000	-1920000	-1920000	-1440000	-1680000	-1920000	-1920000
Cost of processing USD		-9000	-15000	-27000	-27000	-36000	-36000	-27000	-31500	-36000	-36000
Transport of processed cocoa USD		-12000	-20000	-36000	-36000	-48000	-48000	-36000	-42000	-48000	-48000
Price received selling cocoa USD		720000	1200000	2160000	2160000	2880000	2880000	2160000	2520000	2880000	2880000
Financial cost USD (short term 10%)	-18900	-67200	-102400	-171600	-164100	-216000	-216000	-164100	-190050	-216000	-216000
Cash flow USD	-207900	-21450	71350	270150	352650	501750	501750	352650	427200	501750	501750
Accumulated cash flow USD	-207900	-229350	-158000	112150	464800	966550	1468300	1820950	2248150	2749900	3251650
IRR 10%		66%									
NPV 10%		$1506,060									
Amount received by 1 family CSC	300	1260	1900	3180	3030	3990	3990	3030	3510	3990	3990