Towards sustainable chocolate : Greening the cocoa supply chain

Camargo, Marisa; Nhantumbo, Isilda

2016-03

http://hdl.handle.net/10138/240365

Camargo, M & Nhantumbo, I 2016, Towards sustainable chocolate : Greening the cocoa supply chain. International institute for environment and development, London.

Towards sustainable chocolate

Greening the cocoa supply chain

Marisa Camargo and Isilda Nhantumbo

iied

UNIVERSITY OF HELSINKI

About the authors

Marisa Camilher Camargo is a researcher at the Tropical Resources Institute (VITRI) at the University of Helsinki, and a senior consultant at Indufor Oy. Email: marisa.camargo@gmail.com

Isilda Nhantumbo is a senior researcher in the Natural Resources Group at the International Institute for Environment and Development (IIED). Email: Isilda.Nhantumbo@iied.org

Produced by IIED's Natural Resources Group

The aim of the Natural Resources Group is to build partnerships, capacity and wise decision-making for fair and sustainable use of natural resources. Our priority in pursuing this purpose is on local control and management of natural resources and other ecosystems.

This report has been produced as part of the Inclusive REDD+ project which was coordinated by Isilda Nhantumbo and aimed to understand the role of the private sector in effecting sustainable land use for climate change mitigation.

Partner organisation

The Viikki Tropical Resources Institute (VITRI) forms part of the Department of Forest Sciences at Helsinki University. VITRI provides academic training and carries out research on forests and related natural resources in tropical and developing countries.

Acknowledgements

The authors would like to thank all the interviewees mentioned in Appendix 1 of this report who shared their views – in Ghana and Brazil, as well as in manufacturing and final consumption countries in Europe and the USA. We are particularly grateful to the World Cocoa Foundation (WCF): namely Paul Macek, Gael Lescornec and the rest of the team for facilitating the visit to Ghana and for subsequent discussions on findings and for their interest in following up with some actions. We also thank Voleny Fernandes and the team from the Organisation of Land Conservation (OCT) for the support and facilitation of the visit to Brazil, and André Guimarães, Miguel Calmon and Rachel Biderman for their overall guidance on global trends and ideas on how contextualize this report. Finally, we thank IIED colleagues for their overall support throughout the development of content and production of this report : Xiaoting Hou Jones provided valuable comments to an earlier version of this report, Geraldine Warren coordinated the production, Judith Fisher designed the layout and Nicole Kenton worked on the editing.

Published by IIED, March 2016

Citation: Camargo, M and Nhantumbo, I (2016) Towards sustainable chocolate: greening the cocoa supply chain. IIED, London.

http://pubs.iied.org/16613IIED
ISBN: 978-1-78431-319-7

Printed on recycled paper with vegetable-based inks.

International Institute for Environment and Development
80-86 Gray's Inn Road, London WC1X 8NH, UK
Tel: +44 (0)20 3463 7399
Fax: +44 (0)20 3514 9055
email: info@iied.org
www.iied.org

@iied
www.facebook.com/theIIED

Download more publications at www.iied.org/pubs

Cover photo: Investigating land tenure issues amongst cocoa farmers in the Brong Ahafo and Western Region of Ghana. Farmers interviewed were a mixture of indigenous landholders, sharecroppers and migrant tenant farmers who are members of the Kuapa Kokoo cooperative, which part owns Divine Chocolate. Photo credit: Emily Polack

Towards sustainable chocolate

Greening the cocoa supply chain

Marisa Camargo and Isilda Nhantumbo

Contents

List of figures, tables, maps and boxes

Acronyms

AfDB	African Development Bank
CEN	European Committee for Standardisation
CEPLAC	*Comissão Executiva do Planejamento da Lavoura Cacaueira* (Brazilian federal agency for cocoa research and extension)
CMC	Cocoa Marketing Company, Ghana
COCOBOD	Ghana Cocoa Board
COPOL	Alliance of Cocoa Producing Countries
CRIG	Cocoa Research Institute of Ghana
CSR	Corporate Social Responsibility
ERP	Emission Reduction Programme
ESG	Environmental, social and governance
EU	European Union
EUROSIF	European Sustainable Investment Forum
FCCA	Forest, Climate & Community Alliance
FCPF	Forest Carbon Partnership Facility
FDMP	Forestry Development Master Plan
FIP	Forest Investment Programme
FLEGT	Forest Law Enforcement, Governance and Trade
FOB	Free on board
FSC	Forest Stewardship Council
FWP	Forest and Wildlife Policy
GHG	Greenhouse gas
GHS	Ghanaian Cedi
ha	hectare
HFZ	High Forest Zone
ICCO	International Cocoa Organisation
ICRAF	World Agroforestry Centre

IDH	Sustainable Trade Initiative
IFC	International Finance Corporation
IIED	International Institute for Environment and Development
ISO	International Organisation for Standardisation
ISSER	Institute of Statistical, Social and Economic Research, Ghana
KPI	Key Performance Indicator
LBC	License buying company
LCA	Life cycle assessment
LUC	Land use change
MRV	Measurement, Reporting and Verification
MT	Metric ton
NTFP	Non-timber forest products
PPRC	Producer Price Review Committee
R$	Brazilian Real
RA	Rainforest Alliance
REDD+	Reducing Emission from Deforestation and Forest Degradation
RM&E	Research, Monitoring and Evaluation
R-PP	Readiness Preparedness Proposal
SAN	Sustainable Agriculture Network
SFM	Sustainable forest management
SPU	Seed Production Unit
SRI	Sustainable and Responsible Investment
SUA	Sokoine University of Agriculture
TFA	Tropical Forest Alliance
UNFF	United Nations Forum on Forests
WB	World Bank
WCF	World Cocoa Foundation
WFLDB	World Food Life Cycle Assessment Database

Executive summary

There is a growing global demand for chocolate, with new markets in Asia and a burgeoning middle class with a taste for luxury goods. This is leading to an increased interest and demand in green and ethical products. Ensuring the global sustainable production of cocoa and chocolate is becoming an ever-increasing challenge. Changing consumption patterns impact on natural resources and the climate, and bring higher environmental and social costs to cocoa production, processing and manufacturing.

The cocoa supply chain is a complex process with various stages and actors. All stages of producing chocolate and cocoa, including processing, transportation, storage, packaging, and distribution, contribute to increased global emissions, such as through the use of energy. The production and processing of other ingredients used in the production of chocolate, such as milk powder and sugar, also need to be taken into consideration when considering sustainability. The long path it takes to process and produce cocoa and chocolate has several negative externalities.

This research report outlines the journey of the cocoa bean on its way to becoming chocolate, showing how sustainability requires the greening of the whole supply chain – from farmer to consumer. Insights from cocoa production in Ghana, where cocoa farming is one of the dominant land use activities, with smallholder farmers spread over vast regions, and Brazil, the largest producer of cocoa in the Americas, illustrate some of the challenges – as well as the opportunities – of sustainability.

The production of agricultural commodities, such as cocoa, is one of the main drivers of deforestation and land use change. In addition, the use of fertilisers and pesticides are a major cause of environmental burdens in cocoa production. It is further predicted that climate change will result in a decrease in cocoa growing areas over the coming years. Initiatives such as Reducing Emissions from Deforestation and Degradation (REDD+) and zero-deforestation aim to reduce pressure on forests and other natural resources and address climate change impacts, while focusing on environmental and social costs and seeking the active engagement of local communities and indigenous people who depend on the forests. The cocoa sector itself provides the main livelihood to a large number of farm households, with an estimated 80 per cent of cocoa being grown on small family farms. Some estimates state that farmers get less than 5 per cent of the benefit derived from a chocolate bar.

To secure the future supply of cocoa and meet the increasing global demand for chocolate, building ecosystem resilience and strengthening and diversifying local livelihoods are crucial. Agroecology and sustainable forest management are approaches that aim to increase yields whilst conserving biodiversity and protecting livelihoods. Integrated approaches are required since cocoa farms are embedded in a landscape with a range of actors and different land uses and drivers.

This study was carried out with the premise that zero-deforestation is only part of the equation in addressing climate change challenges. A significant impact in meeting the Paris agreement will come from a concerted effort from all actors along the supply chain to address environmental externalities through insetting and offsetting interventions. Each process has a supply chain associated to it. The chocolate chain consists of farmer, certification body, local buyer, transporter/exporter, manufacturer, retailer and consumer. Since all these actors receive benefits from cocoa and chocolate production, they should also share the costs of internalising sustainability. A supply chain analysis is a way of quantifying the costs and benefits associated with each stage of the process.

Developing mechanisms and policy processes that effectively engage all stakeholders on how to address the issues of sustainability and reduce emissions are therefore key. Governments from both producing and consuming countries need to create a conducive environment for reducing the footprint of chocolate on landscapes and on the climate. Government policies, as well as private sector initiatives, such as certification schemes, need to focus on the whole landscape, not just individual farms, in order to generate more positive benefits. Greening the supply chain is costly and challenging; there needs to be an incentive for chocolate makers to invest in more sustainability. Companies involved in different stages of the supply chain need to develop standards and adopt sustainability criteria that are transparent and adhered to by all actors.

Fostering south-south cooperation can provide new opportunities for knowledge transfer and ownership and for the channelling of local knowledge into policy processes. NGOs have a role to play in raising awareness of the issues and promoting educational campaigns. Advertising and marketing need to be balanced, providing unbiased information to consumers, investors and the general public.

To ensure the global sustainability of chocolate, the study recommends that a supply chain approach is adopted as a path that will not only ensure that all steps of the chain are 'greened', but also build synergies and lead to better results. It is a clearer way to communicate to chocolate consumers and investors in the north that efforts towards addressing deforestation on the other side of the globe or landscape are actually in their control.

The findings, which include recommendations from interviews with a range of stakeholders, aim to inform global policy discussions on how to develop mechanisms that engage the private sector in particular on how to address negative externalities, such as emissions, while improving livelihoods. These findings can also help investors in the cocoa and chocolate industry to promote sustainability by giving businesses a greener image, a sustainable raw material supply, and improved investment relations – with a realisation of the opportunities that sustainable and climate-smart cocoa can bring.

Ultimately, as the report demonstrates, increasing the overall sustainability of the cocoa-chocolate supply chain will present a win-win for forests, local livelihoods, companies, investors and consumers. Cocoa farmers in Ghana, Brazil and elsewhere should be supported to adopt sustainable land use practices and not left to bear the whole cost of zero deforestation commodities.

Cocoa farmers in Ghana on average receive 3 per cent of a chocolate bar price and many are dependent on a single commodity for their livelihoods (Photo: Marisa Camargo)

Introduction

We live in a world with limited natural resources and a rapidly growing population with increasing purchasing power. To attend to the growing demand for food, fibre, energy and luxury goods, it is envisaged that the production of agricultural goods will continue to rise. Proposers of a green or sustainable economy suggest that this expansion and associated economic growth should be designed to meet the needs of present and future generations, and thus promote an optimal balance between economic, social, and environmental issues (Borel-Saladin and Turok 2013; Fay 2012; Brundtland 1987). However, despite the signals that sustainability should be pursued, the way that production is currently designed means that agriculture is estimated to be the proximate driver of 80 per cent of deforestation worldwide (Hosonuma *et al.* 2012; Kissinger *et al.* 2012) in pursuit of forest risk commodities, such as beef and leather, cocoa, palm oil, rubber, soya, pulp and paper (Rautner *et al.* 2013; Newton *et al.* 2013).

Acknowledging the high rates of deforestation worldwide, Reducing Emission from Deforestation and Forest Degradation (REDD+), including sustainable forest management, forest conservation and enhancement of carbon stocks, was developed as one of the central mechanisms designed at an international level to address emissions while ensuring that social and environmental values are not jeopardised. However, for REDD+ to become successful, it is imperative that it systematically addresses the direct drivers of deforestation and forest degradation at the large scale, ie including commercial agricultural commodities. This requires bringing both the small and large-scale actors on board to change the status quo; to move from chemical intensive, inefficient and unsustainable agriculture towards an increase in productivity and production that is green. Aware of the importance of engaging the private sector as an additional source of finance and to implement actions to reduce emissions, IIED has been conducting a study since 2012 to identify 'who' the private sector is and 'why' it is engaged in REDD+. An analysis of 115 projects being implemented in Africa, Asia, and Latin America provided an understanding of how REDD+ is being implemented and in particular shed some light on issues of rights, benefit sharing and the extent of involvement of various actors that contribute to causing deforestation and forest degradation in implementing solutions to it. One of the findings was that REDD+ projects seem to be concentrated in areas where small-scale agriculture and biomass energy production are the main threats to the forest. There is still a large gap for for-profit private sector-led projects to tackle drivers associated with large-scale businesses in agriculture commodity chains, such as cocoa, palm oil, and soy, and to ensure that the benefits are equitably distributed along the chain

(Nhantumbo and Camargo 2015). Nhantumbo and Camargo also found that for-profit companies financing REDD+ projects are loosely engaged in the initiatives, generally stating that they want to help address climate change.

With the exception of a handful of cases, these companies are making no connections between their supply chains and the REDD+ project they are supporting. Examples include electric service companies in the US paying for forest protection in Brazil. This disconnect between the polluting activities of companies, ie their negative externalities, and the conservation projects they are supporting, have been highlighted to suggest that this is deflecting attention from the real problem (Vogel 2006; Auld *et al.* 2008; Johnston 2012; Bumpus and Liverman 2008). It is a combination of insetting actions along the supply chain of the core business with offsetting through financing of mitigation actions by others that will deliver a cumulative positive impact in reducing deforestation from cocoa and from all stages of chocolate processing to final consumption.

Partially as a result of the slow progress of REDD+ implementation as many countries grapple with financing and the capacity to deliver on the ground, and the current apparent disengagement of the private sector, practitioners and academics are looking at ways to promoting sustainability in commodity supply chains. Large corporations have also followed, and are beginning to voice their commitment to undertake zero-deforestation in their supply chains. Nonetheless, it is not yet clear what these commitments would mean in practice. The challenge is to ensure these initiatives are not reduced to conserving forest plots adjacent to agricultural areas, but that they enhance the sustainability of the landscapes where the raw material is produced, as well as the rest of the supply chain – from farmer to consumer.

This report compiles information about cocoa production and its challenges and provides an analysis to inspire the industry, intermediaries farmers, investors and governments from countries that produce, manufacture and consume cocoa and its products, as well as NGOs, to take meaningful strides towards sustainability. It begins by drawing attention to global population dynamics and how the production of agricultural commodities contributes to deforestation worldwide (Chapter 1). It also discusses where commodities such as cocoa are being processed, manufactured and consumed, so as to understand the forces of global trade and demand. It then explores the benefits of analysing the issue through a supply chain lens, promoting sustainability from farmer to final consumer. Chapters 2 and 3 take a deeper look at cocoa – its appeal versus its dark sides – exploring the challenges associated with concomitantly increasing productivity, conserving forests, and improving livelihoods in the landscape. Leaving the physical landscape, the report follows the journey of cocoa to becoming chocolate. Chapter 4 identifies the different stakeholders involved in the chocolate supply chain and the externalities that are generated before consumers purchase the final product. Chapter 5 examines and discusses the main initiatives currently in place to help address cocoa and

chocolate sustainability challenges. To illustrate with historical background and a social and economic context, two case studies are presented: Ghana and Brazil. The report concludes with a discussion on ideas on how to move forward (Chapters 5, 6 and 7).

Methodology

The study is mainly based on a literature review and 85 semi-structured interviews with various actors in cocoa producing and manufacturing countries with the aim of building an understanding of the policies and institutions involved, and, more importantly, obtain first-hand knowledge of the challenges and opportunities of translating the pledges of a zero-deforestation supply chain into practice. The cocoa supply chain stakeholders and experts represent NGOs, government institutions, industry and farmers' associations, corporations, standard development organisations, certification bodies and academia in Brazil, Ghana, Netherlands, Denmark, Belgium, and the United States. In addition, information comes from field observations and discussions with farmers in Ghana and Brazil. Appendix 1 provides a list of interviewees.

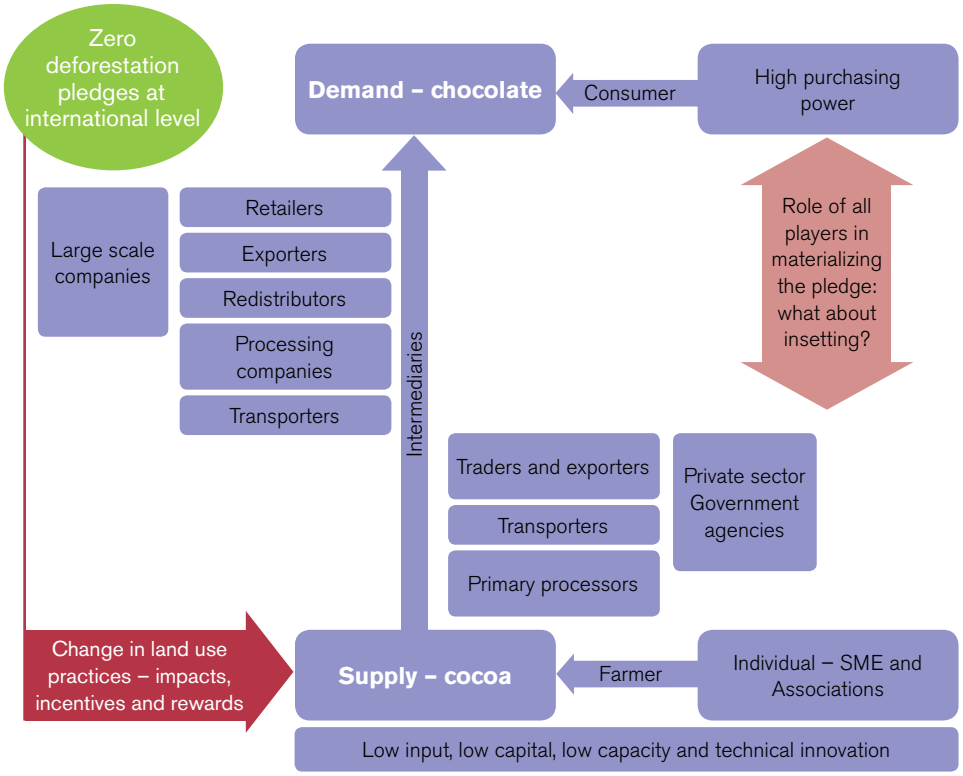
Interventions at the farm level are needed to keep the cocoa/forest frontier intact or to slow down the change. Can this happen? What constraints need to be overcome? What are the impacts for the farmers, and what technical and financial support and incentives might they need? What role should the various actors along the supply chain play? What about the governments of both producing and consuming countries – can they enact legislation and use fiscal and non-fiscal incentives to change the status quo?

Figure 1 highlights the web of institutions that are involved in the cocoa-chocolate business. As well as those operating at landscape level, the key stream is the industry making commitments towards mitigation of climate change, which has been galvanised by the Paris Agreement. The farmer is a key actor whose support systems for actions and welfare will determine whether the cost of delivering on the pledges will be equitably distributed. It will take concerted effort and contributions by all along the supply chain, including investors, to materialise the commitments. Of equal importance are the various policy and regulatory frameworks, landscape-level integrated planning and company-led compliance monitoring tools. These instruments are briefly discussed throughout the report.

In the process of undertaking this research, the authors participated in conferences organised by the key global players in the cocoa-chocolate supply chain. We invited them to fora organised by IIED, such as the Paris event[1], to discuss how to make the supply chain greener. This report therefore draws on literature and information from engagement with a range of actors along the chain.

1 Engaging men and women in REDD+ business, https://storify.com/IIED/redd-at-cop21

Figure 1 Drivers of land use change and key actors in delivering the zero-deforestation pledges



1

The drivers of deforestation and forest degradation

The distinction between direct and indirect drivers of deforestation and forest degradation helps to understand their most prominent causes. The first are human-induced activities that have a direct impact on forests, such as agriculture expansion and infrastructure development. The latter is a more complex set of interactions of political, cultural, social and technological processes (Geist and Lambin 2001; 2002).

Consumption patterns (population dynamics and choices)

The globe is expecting a significant increase in population by the end of the century (Figures 2 and 3). Estimates are that growth will be concentrated in Africa, while Asia will experience a significant change in society, with a considerable growth of the middle class. The latter is important as it influences the change in consumption patterns.

Figure 2: Expected population growth

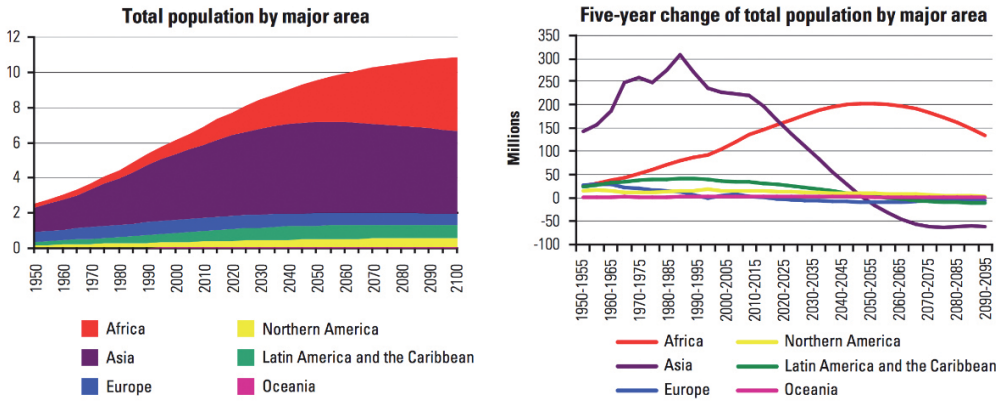
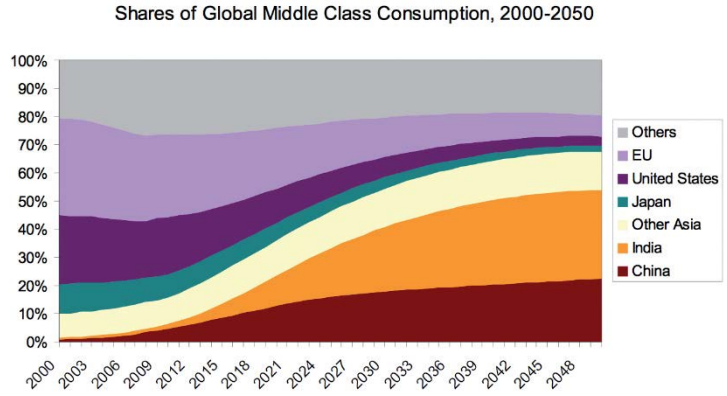


Figure 3: The growing middle class is changing consumption patterns

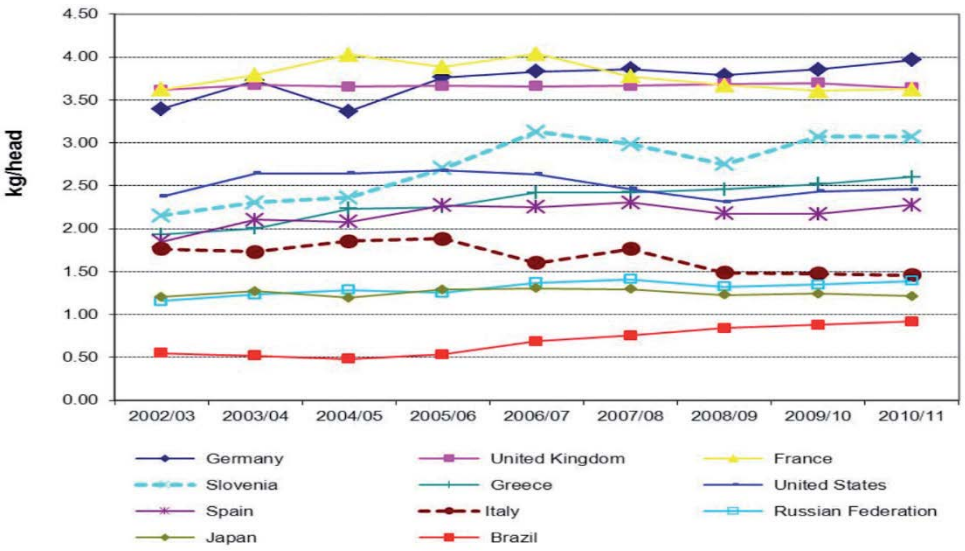


Studies suggest that this growth in the middle class will increase purchasing power, leading countries like India and China to change their consuming patterns and begin demanding more high-end products, including chocolate (Nierhoff 2014). Estimates are that the Asia-Pacific region's chocolate market will increase by around 23 per cent by 2018 – China already saw a 100 per cent increase in chocolate sales between 2006 and 2010 (Nierhoff 2014). This adds significant pressure to the supply of the raw material. As a result, the sector is concerned with securing supply – and ensuring a sustainable supply is key. Africa's middle class is also growing, but it is still very limited and remains vulnerable to shocks.

Additionally, it is estimated that the urban population will increase from the current 50 per cent to 70 per cent by 2050 (UN 2013). This move from rural to urban will also change the dynamics and patterns of consumption. Estimates are that this demand will continue to increase and is likely to surpass supply (Bloomberg 2014). Consumption of chocolate confectionery products already increased by 10 per cent between 2002 and

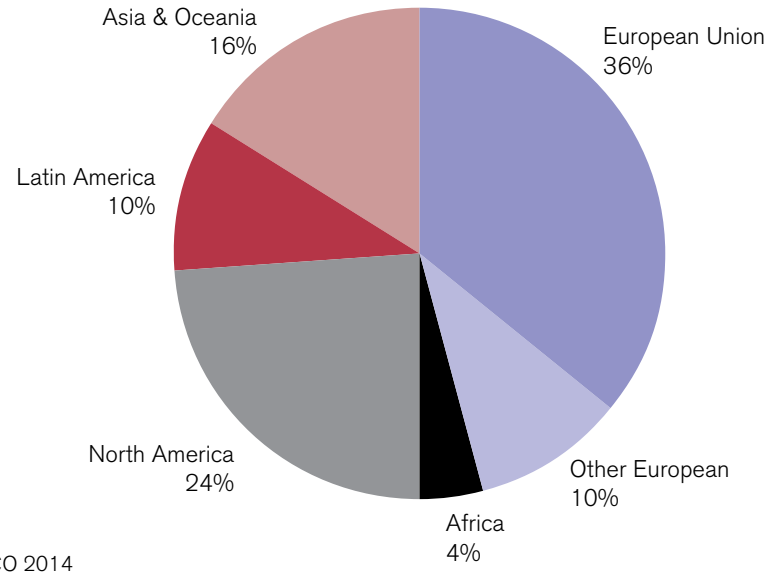
2010 in selected countries, including the major European countries, the United States, Brazil, Japan and Australia, corresponding to an annual growth rate of 1.2 per cent (ICCO 2012).

Figure 4: Global consumption of chocolate



Source: ICCO 2012

Figure 5: Apparent consumption of cocoa in 2011/12



Source: ICCO 2014

Catering not only for the growing population, but also for the growing demand for different products from the expanding middle class and urban populations, means an increase in the production of commodities (FAO 2009). The literature on global sustainability expects this growth to promote a trade-off between social, economic and environmental aspects, to avoid agriculture expansion being promoted at the expense of forest resources, which are the cornerstones to ensure ecosystem resilience. Nonetheless, current figures indicate that production of agriculture commodities has been leading to significant deforestation worldwide.

Future outlook: the growing Asian market

Chocolate is currently mostly consumed in western societies. Given the projected growth in the Asian middle class, estimates are that this market will demand a significant amount of chocolate over the next years, adding further pressure to the supply of the raw material. As a result, the sector is concerned with securing and ensuring a sustainable supply. In particular, countries such as Thailand, Malaysia, the Philippines, and Indonesia have been growing and increasing the share of the middle class, thereby changing consumption dynamics (LEK Consulting 2013).

Increases in household income are contributing to unlocking greater spending on new items such as chocolate. But how likely are Asian markets to demand greener products? Will there be demand for sustainable chocolate? Research on Asian consumer patterns has been identifying various trends. These include a growing emphasis on personal and environmental health, which also reflects a growing concern with broader issues such as climate change and food safety. Episodes like the contamination of baby milk in China in 2008 (Branigan 2008), as well as periodic outbreaks of salmonella, have been contributing to growing consumer awareness and, according to research, an increasing willingness to pay for safer and eco-friendly products, and gradually demand more certifiably healthy food choices (Accenture 2011).[2]

Research is pointing out, to the surprise of many, that Chinese consumers are among the most concerned about environmental issues. A survey of 18 countries ranked average consumers and, over the past few years, consumers in the large developing economies of India and China have scored highest in a consistent manner, followed by South Korea, Brazil, and Argentina (Greendex 2014).[3] Climate change has also been recognised as

2 According to Accenture 2011, Chinese and United Arab Emirates (UAE) consumers in particular are willing to pay more; in the case of UAE consumers pay nearly 10 per cent more for 'green' products. In contrast, consumers in western markets such as France and Canada pay only 1–5 per cent more for such products.
3 The objectives of the initiative are to provide regular quantitative measures of consumer behaviour and to promote sustainable consumption. Greendex 2014 ranks average consumers in 18 countries—up from 14 in 2008, for which changes are tracked according to the environmental impact of their discretionary and non-discretionary consumption patterns within these four major categories.

a serious issue, with 51 per cent of consumers in the 18 countries believing that global warming will negatively affect their own lives.

This new concern and inclination towards green consumer behaviour seems to be related to the growth of China's middle class, which estimates show makes up 23 per cent of the country's urban population. This population is between the ages of 25 and 44, better educated, tends to spend more on non-essentials, is willing to pay more for higher-quality goods and more inclined to try new, trendy products. This makes the middle class the largest consumer base for green products (Kan 2010).

But the green concern is not only about consumerism. To support that, there has been a development of public policies in recent years in which Asian's major economies are beginning to respond to global issues like climate change in addition to local concerns, such as regional pollution. These demonstrate that countries are becoming aware of the interdependence between long-term economic well-being and managing environment and human capital more wisely (Khoo 2012).

One example of this integrated approach is in China, with the promotion of cleaner production strategies, which are mainly based on the Cleaner Production (CP) Promotion Law of the People's Republic of China. Developed after the Pollution Prevention Law of the US, CP was considered by the UN to be a holistic approach of a 'source-oriented preventive mind-set', and was fully promoted; the term CP was first enacted into law by China in 2002 (Tseng *et al.* 2013).

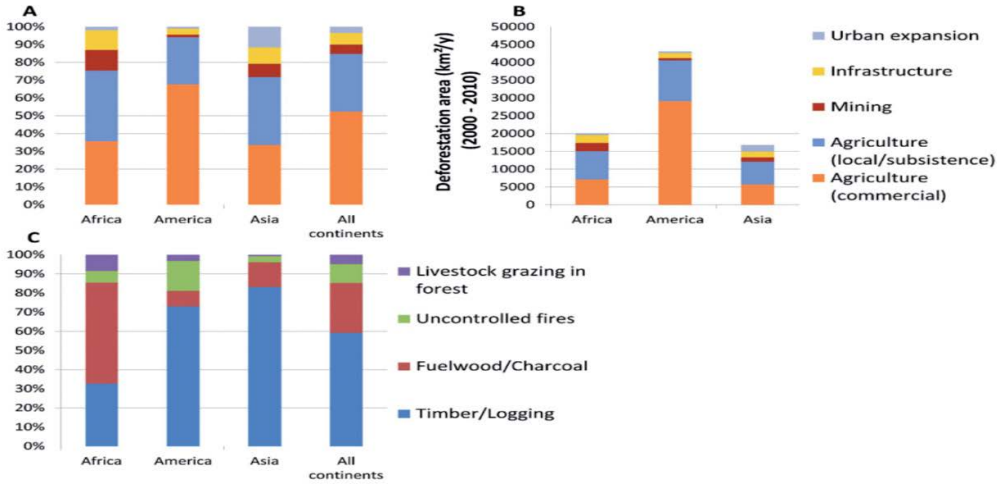
Another trend globally, but also in Asia, is a mobile consumer who wants to use technology to make shopping fast, fun and collaborative (Accenture 2011). This digital consumer will require information at a click of a button, and is likely to relay referrals, changing significantly how brand communication should be shaped.[4] Companies will need to do their homework and invest in true sustainability and tracing to be able to provide timely information at the expense of losing customers. This digital era will require significant innovation. Biswas and Roy (2015), for instance, recommend that manufacturers should try to offer products with sufficient product information on their environmental consequences, compliances, and after life disposal.

4 Digital technology will have just as great an impact on brand communication. Consumers are more reliant than ever on referrals: 70 per cent look to user reviews to inform their purchase decisions (Survey by Penn Schoen Berland, published in *BusinessWeek*, October 2009).

Agriculture commodities and deforestation/ forest degradation

As Figure 6 shows, practitioners and academics have been emphasising that commercial agriculture is the largest driver of deforestation, accounting for 40 per cent of the total, followed by subsistence agriculture, which adds up to 33 per cent (Hosonuma *et al.* 2012). Therefore, agriculture alone is responsible for 73 per cent of all deforestation.

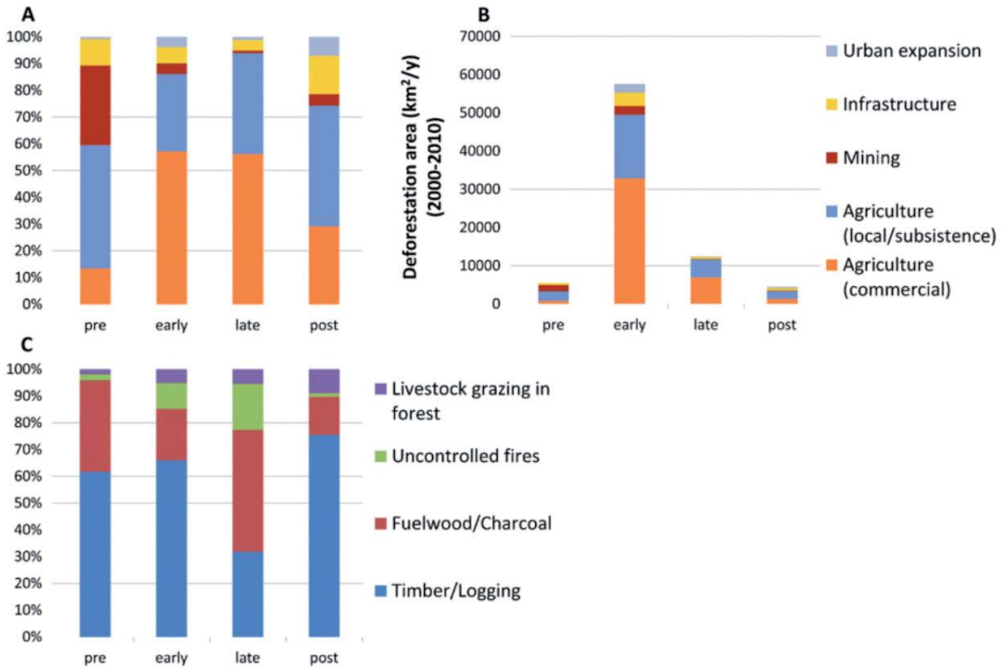
Figure 6: Causes of deforestation in different regions



Source: Hosonuma *et al.* 2012. Continental-level estimations of the relative area proportion (A) and absolute net forest area change (km2/yr); FAO (2010) for the period 2000–10 (B) of deforestation drivers; and of the relative disturbed forest area fraction of degradation drivers (C), based on data from 46 tropical and sub-tropical countries.

Additionally, data shows that commercial actors have been playing an increasing role in the expansion of agriculture into the forest frontier (Geist and Lambin 2002; Hosonuma *et al.* 2012). As portrayed in Figure 7, the contribution of commercial agriculture increases once we look at the development of deforestation drivers through time.

Figure 7: Deforestation drivers through time



Source: Hosonuma *et al.* 2012. Forest transition phase estimations of the relative area proportion (A), and absolute net forest area change (km2 yr-1); FAO (2010) for the period 2000–10 (B) of deforestation drivers, and of the relative disturbed forest area fraction of degradation drivers (C), based on data from 46 tropical and sub-tropical countries.

Africa is still largely driven by small-scale subsistence activities. The main causes of deforestation on the continent are the expansion of subsistence or smallholder agriculture, including for commercial purposes (cotton, sesame, tobacco and other crops), and the extraction of primary products, such as fuelwood and charcoal for domestic use and timber. However, estimates are that this reality might change given the increasing global demand for biofuels and other cash crops, such as tea and coffee (Fisher 2010). African cocoa producers are already exporting 70 per cent of their production (ICCO 2012) and the growing demand might further push the forest frontier.

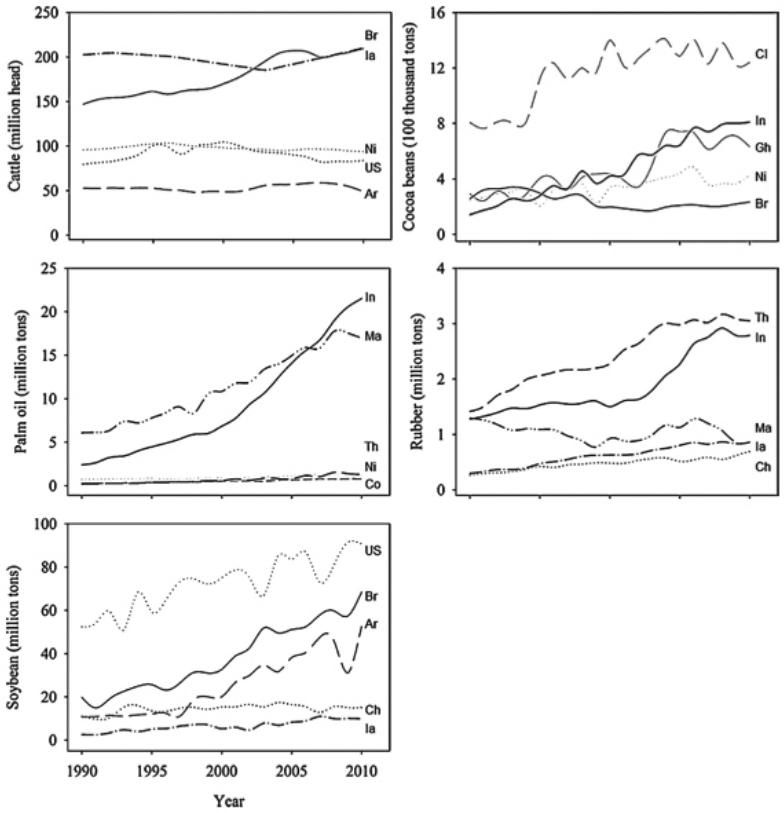
Commodities that have driven and still drive deforestation worldwide include: soy, palm oil, cattle (beef and leather), cocoa, and rubber (Rautner *et al.* 2013; Newton *et al.* 2013). As shown in Table 1 and Figure 8 below, these commodities are being produced in different countries at a very fast pace. Beef and soybean production are dominant in South America; oil palm and rubber are mainly grown in Southeast Asia; and cocoa is mostly produced in Africa. Oil palm expansion is also proving to be rapid in Africa.

Table 1: The extent (in 2010) and change (since 1990) of area, yield, and production of key commodities in the top five producing countries globally

Commodity	Country	Area		Yield		Production	
		Million ha	% change	Hg/ha	% change	Million tons	% change
Cattle*	India					210.20	3.8
	Brazil					209.54	42.4
	USA					93.88	(2.0)
	China					83.80	5.4
	Argentina					48.95	(7.4)
Cocoa	Côte d'Ivoire	2.15	37.2	0.06	12.1	1.24	53.8
	Indonesia	1.03	546.0	0.08	(11.9)	0.81	469.1
	Ghana	1.63	134.4	0.04	(8.1)	0.63	115.5
	Nigeria	1.34	88.0	0.03	(6.8)	0.43	75.3
	Brazil	0.65	(1.6)	0.04	(7.4)	0.23	(8.9)
Palm oil	Indonesia	*4.10*	*278.6*			21.53	792.6
	Malaysia	*3.60*	*108.6*			16.99	178.8
	Thailand					1.29	469.7
	Nigeria					1.09	48.8
	Colombia					0.80	217.5
Rubber	Thailand	1.93	37.8	0.16	56.2	3.05	115.2
	Indonesia	3.06	64.3	0.09	33.1	2.79	118.6
	Malaysia	1.29	(20.1)	0.07	(16.8)	0.86	(33.5)
	India	0.45	55.7	0.19	83.9	0.85	186.2
	China	0.69	75.6	0.10	48.8	0.69	161.4
Soybean	USA	31.01	35.6	0.29	27.5	90.61	72.9
	Brazil	23.29	102.8	0.29	69.8	68.52	244.4
	Argentina	18.13	265.4	0.29	34.7	52.68	392.3
	China	8.52	12.6	0.18	21.7	15.08	37.0
	India	9.21	259.2	0.11	5.0	9.81	277.1

Data: FAO Stat (www.faostat.fao.org), except data in italics: Koh and Wilcove (2008) (period: 1990–2005).
Blanks indicate data not available from these sources. Negative numbers in parantheses.
* Cattle production measured in head, not tons.
Source: Table extracted from Newton *et al.* 2013; Koh & Wilcove 2008 (period: 1990–2005)

Figure 8: Temporal trends in the production of five agricultural commodities including cocoa, 1990–2010



Source: Newton *et al.* 2013 utilising FAO Stat (www.faostat.fao.org). Line styles are consistent between graphs: North and South America (dark gray lines; *Argentina*: long dash (Ar); *Brazil*: solid (Br); *Colombia*: short-dash (Co); *USA*: dotted (US)), Africa (light gray lines; *Ivory Coast*: long-dash (Cl); *Ghana*: solid (Gh); *Nigeria*: dotted (Ni)), and Asia (black lines; *China*: dotted (Ch); *India*: dash-dot (Ia); *Indonesia*: solid (In); *Malaysia*: dash-dot-dot (Ma); *Thailand*: long-dash (Th)).

Low cocoa yields: could agroforestry be the solution for improving Africa's production and for the climate?

Approximately 70 per cent of the world's cocoa currently comes from West and Central Africa. The vast majority is grown on approximately two million small, independent family farms that are less than 2 ha in size. The Americas account for about 15 per cent of production, while Asia/Oceania accounts for 12 per cent. The major producing countries are:

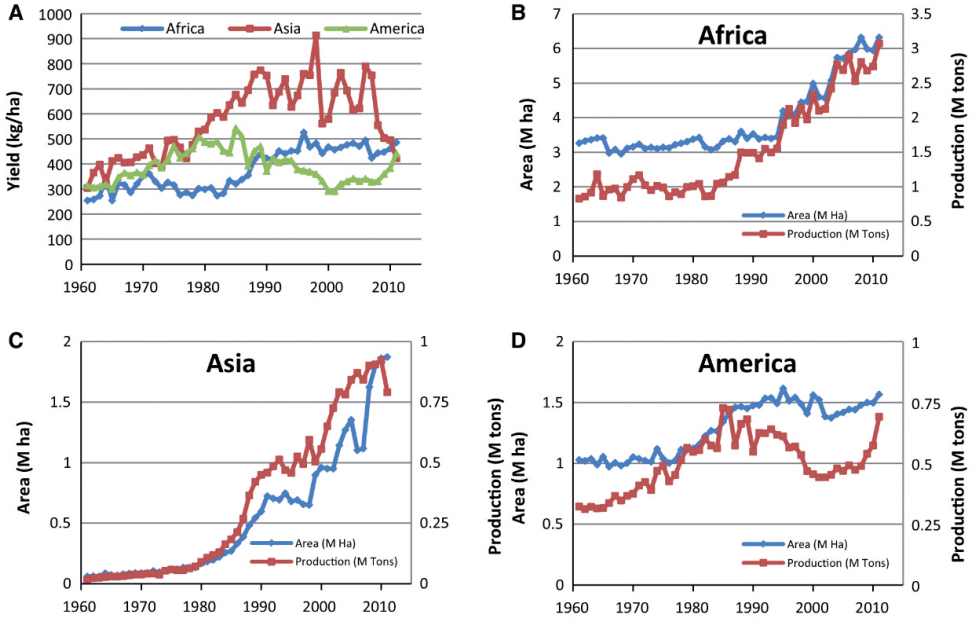
- Africa: Ivory Coast (~40 per cent global), Ghana, Nigeria, Cameroon.
- Asia and Oceania: Indonesia, Malaysia, Papua New Guinea.
- Americas: Brazil, Ecuador, Colombia.

Assessments suggest that smallholders produce between 90 and 95 per cent of cocoa, on a low input, low output basis (Afoakwa 2014). The FAO (2014) has estimated that over 80 per cent of cocoa comes from 7 to 8 million small family-managed cocoa farms around the globe. These actors have little capital and low investment capacity for technical innovation, resulting in low yields and high vulnerability to cocoa price volatility, pests and diseases outbreaks, as well as the effects of climate change (Läderach *et al.* 2013). There are also several social challenges that cocoa farmers face, including high poverty levels, lack of capacity, a struggle with high rates of illiteracy, and health risks such as malaria and HIV/AIDS. In addition, various media articles bring the attention to child labour in cocoa production (CNN 2014).

A typical farm (which normally covers 0.25–5 ha) yields 300–600 kg/ha/year in Africa and the Americas, and about 500–700 kg/ha/year in Asia (FAO 2014). These are considered very low. Yet, these farmers contribute to an annual production of 4.28 million tonnes, and have seen an increasing demand for cocoa at 3 per cent per year for the past 100 years (Afoakwa 2010).

Production also varies within regions, as portrayed in Figure 9 below, depending on the cocoa system adopted (Deheuvels *et al.* 2012). The figure shows the evolution over time of (A) cocoa yield (kg/ha) in Africa, Asia and America; and areas (in millions of ha) and production (in millions of tons) in Africa (B), Asia (C) and America (D).

Figure 9: Cocoa production over time in different regions



Source: Vaast and Somarriba 2014, based on FAO 2014 data.

Low cocoa yields can be attributed to: pests and diseases, low levels of fertilisation and the genetic potential of material planted. Soil fertility decline, especially in the absence of organic matter and fertiliser addition over the 20–30 years following forest clearing, has been highlighted as one of the major causes of a declining cocoa yield (Gockowski *et al.* 2013; Tscharntke *et al.* 2011).

The African continent is still expected to be the largest producer of cocoa for the next decades, even though both Asia and Brazil are putting considerable efforts into increasing production. The Ivory Coast is expected to grow by 2.0 per cent a year, and account for about 37 per cent of global cocoa production, due mainly to changes in foreign direct investment and market liberalisation (Afoakwa 2014).

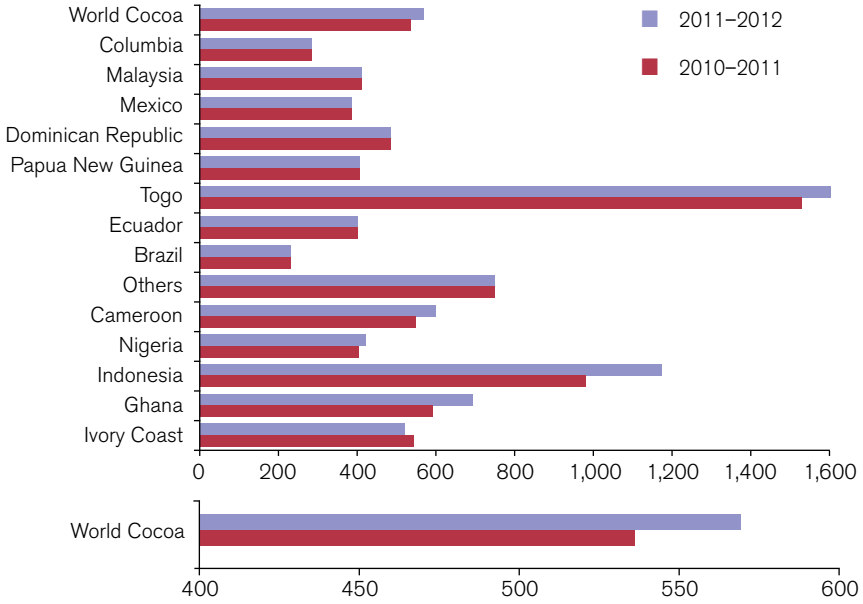
Table 2: Global cocoa production (thousand tonnes)

	2011/12		Estimates 2012/13		Forecasts 2013/14	
Africa	**2929**	**71.5%**	**2833**	**71.9%**	**3174**	**73.0%**
Cameroon	207		225		200	
Cote d'Ivoire	1486		1449		1730	
Ghana	879		835		920	
Nigeria	245		235		240	
Others	113		89		84	
America	**655**	**16.0%**	**622**	**15.8%**	**666**	**15.3%**
Brazil	220		185		210	
Ecuador	198		192		200	
Others	237		245		256	
Asia & Oceania	**511**	**12.5%**	**487**	**12.3%**	**505**	**11.6%**
Indonesia	440		410		425	
Papua New Guinea	39		41		42	
Others	32		36		38	
World total	**4095**	**100.0%**	**3942**	**100.0%**	**4345**	**100.0%**

Source: ICCO Quarterly Bulletin of Cocoa Statistics, Vol. XL, No. 3, Cocoa year 2013/14
Published: 29-08-2014
Note: Totals may differ from sum of constituents due to rounding.

Nonetheless, as portrayed in Figure 10, yields in Ghana and the Ivory Coast are nearly half of that of Indonesia, partially due to a lesser use of agricultural inputs and technical assistance in Africa. Rather than increasing high input production in the context of greening the cocoa at producers' level, African countries have a real potential to explore long-term sustainable supply by, for example, adopting agroforestry practices. Appendix 2 to this report highlights that there are technical issues and perceptions that need to be addressed – one of which is yields of cocoa under shade and the need to know the tree species that enhance cocoa yields. In the western part of Ghana, for instance, 90 per cent of farmers were reported to be eliminating trees to reduce shade, given that there was a general perception that new cocoa hybrids were intolerant of shade. There are commercial examples in dry regions of Brazil and Ecuador where there is a focus on planting full sun cocoa, with irrigation, heavy inorganic fertilisation, and use of high yielding clones to avoid pests and pathogens. On the other hand, in the Ivory Coast, the majority of cocoa farmers (338 out of 355) interviewed were pleased with the practice of integrating trees into their cocoa fields. They agree with the need to build resilience

Figure 10: World cocoa yields in major producing countries in 2010/2011 and 2011/2012



Source: Afoakwa 2014. Adapted from ICCO 2010, 2012

by stating that drier climatic conditions were the major drivers for wanting shade in their fields, especially to protect cocoa trees from water stress in the dry months of January and February. Farmers also mentioned that trees help to increase the probability of rain and contribute to soil fertility (Smith Dumont *et al.* 2014). Many stakeholders interviewed for this study highlighted that both research and technical assistance are fundamental to addressing issues at the production level and reducing forest loss (Box 1).

Farmers are the more vulnerable actors along the supply chain hence needing support based on solid research evidence. They need to know that the options they take can contribute to improving their livelihoods and enhancing the landscape, as well as promoting change at scale, increasing ecosystem resilience, and addressing several issues concomitantly (climate change adaptation, food security, conservation, productivity, biodiversity).

Box 1 Research and agriculture extension are fundamental to reducing forest loss

Technical assistance (TA):

- There is need to provide technical and financial assistance to renew plantations since trees are aging and productivity decreasing.
- Correct application of fertilisers is essential.
- Public extension services need to reach the majority of farmers and the private sector can complement this. In Ghana for example. COCOBOD extension services build alliances with industry, but there are still many farmers to reach. Other innovative communication media need to be developed, including the use of radio programmes and ICT to help share technical information.
- Technological innovation is key (eg improved hybrids), so partnership with research institutions is very important, and also important to channel the knowledge and tools to small famers.

Farmers' cooperatives are key institutions to ensure that the knowledge is channelled to several farmers with lower transaction costs and 'good' cocoa is produced. Cooperatives also increase the bargaining power of farmers. Support towards organisational strengthening should be provide, including development of managerial and leadership skills which are fundamental for long-term change.

Research questions:

- Bring evidence of benefits of shade and non-shade cocoa (intensification and land sparing) in the different agro-ecological zones where cocoa grows.
- Demonstrate how sustainability is also making cocoa farming a more financially attractive and resilient business.
- Demonstrate how to increase sustainability of the larger landscape and of the supply chain.
- It is important to work at landscape level addressing the three pillars of sustainable development (environmental, social and economic), and to identify tree species that can compose a productive agroforestry system that not only delivers shade to cocoa, but also produces timber and non-timber-forest-products that are marketable.
- Show evidence of the effectiveness of land use options in cocoa farming in promoting sustainability.
- Further research is needed on productive agroforestry systems and on trees compatible with cocoa that are marketable (most crops currently used are shade intolerant), as well as their carbon intake and other payments for environmental services (PES) that can be generated.
- Improving genetic material can help enhance the quality of beans and chocolate production, control pests, increase productivity in an area, and reduce the loss of forest land.

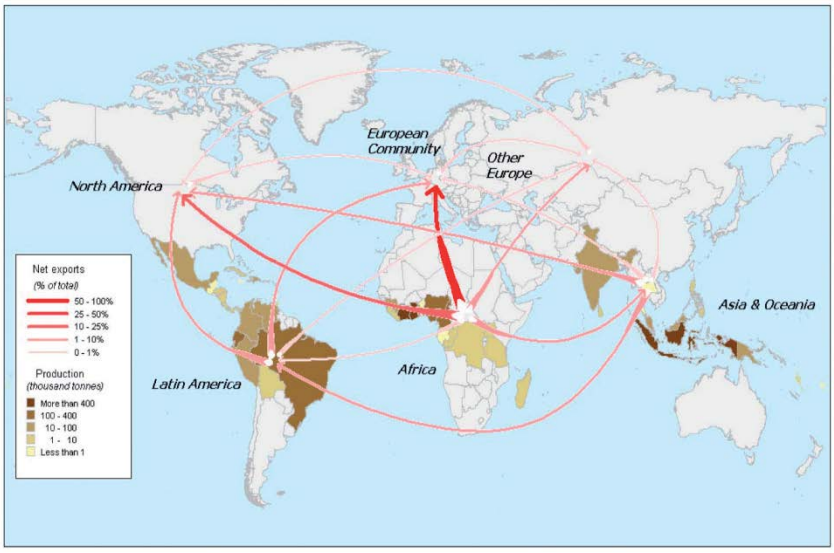
Processing and trade

A considerable amount of agricultural commodities are produced in developing countries, but they are often not necessarily consumed in the domestic market. Manufacturing, processing and consumption mainly take place elsewhere. In some cases, the manufactured product returns to the country where the raw material was produced – at a much higher price. Therefore, while it is important to address land use change (LUC) in developing countries, it is also imperative to look at the demand side; ie where these products are destined, and also the potential negative externalities of the processes following production of the raw materials.

Even though the Ivory Coast and Ghana are the largest producers of the raw commodity and export most of their production (about 70 per cent), they only process around 30 per cent of their production, missing out on the value that could be extracted from the chain (Ecobank 2013; ICCO 2011). This also has wider economic implications for the producing countries, as export of commodities means exporting jobs and tax revenues to countries that add more value to these. Industrialisation of the bigger producer countries would also enable better control of regulations on insetting and offsetting emissions.

Figure 11 shows how cocoa moves across the globe. The European Union imports about 54 per cent of African cocoa production for processing and manufacturing. The Netherlands alone is the highest importer of cocoa (for processing and manufacturing), but also a very large exporter, as a large amount of cocoa produced is consumed in other countries (see Box 2). The main chocolate consuming regions are: the European Union (36 per cent), North America (24 per cent) and Asia & Oceania (16 per cent) (ICCO 2014a). Table 3 below shows the clear market dominance of the European Union in terms of imports and export values (as of 2011).

Figure 11: The journey of cocoa: production and net exports



Source: ICCO 2012

Table 3: Main cocoa importers and exporters (2011)

Top cocoa importers (2011)			Top cocoa exporters (2011)		
Country	**Imports (US$m)**	**% of total**	**Country**	**Exports (US$m)**	**% of total**
EU	23,968	54.5%	EU	21,804	49.3%
USA	4,807	10.9%	Ivory Coast	4,159	9.4%
Russia	1,445	3.3%	Ghana	3,468	7.8%
Canada	1,390	3.2%	USA	1,592	3.6%
Malaysia	1,298	3.0%	Malaysia	1,378	3.1%
Japan	1,009	2.3%	Indonesia	1,345	3.0%
Others	10,088	22.9%	Nigeria	1,050	2.4%
			Others	9,412	21.3%
Total	44,006	100%	Total	44,208	100%

Source: Intracen/ITC, Ecobank Research (Ecobank 2013)

Box 2: The Netherlands and cocoa processing

The majority of processors of cocoa beans are located in Europe (39 per cent), followed by Asia & Oceania (23 per cent), the Americas (22 per cent), and then Africa (16 per cent).

Many cocoa beans on the EU market enter the market through the port of Amsterdam. They are re-exported to other EU countries or ground and further processed in the Netherlands.

The Netherlands hosts the world's largest cocoa–chocolate conglomerate where processors, traders and chocolate manufacturers come together. Although the Netherlands is not a big player in chocolate manufacturing, one of the largest chocolate factories in the world, Mars, is located in the Netherlands and processes approximately 60 thousand tonnes of beans annually.

The Netherlands, as the principal player on the cocoa market in Europe and also worldwide, houses some of the leading players in the business, among which are Gerkens (owned by Cargill), ADM, and Dutch Cocoa (owned by ECOM) (Ministry of Foreign Affairs, Netherlands 2011).

Many traders are also located in the Netherlands, supplying local processors as well as trading cocoa products across the EU.

Recent figures, however, show that cocoa grinding grew by 5.2 per cent in the three largest cocoa processing countries in Asia (Indonesia, Malaysia and Singapore) in the second quarter of 2014, confirming reports that demand for chocolate has been growing in emerging markets, according to the Cocoa Association of Asia (CAA). Additionally, the Ivory Coast has also increased its processing activity by almost 14 per cent, reflecting its additional capacity. Grinding in Ghana and Brazil is also expected to increase more modestly (ICCO 2014).

Chocolate: several commodities in it drive deforestation too!

The definition of chocolate varies from country to country. The EU defines it in Directive 2000/36 as 'the product from cocoa products and sugars which contains not less than 35 per cent total dry cocoa solids, including not less than 18 per cent cocoa butter and not less than 14 per cent of dry non-fat cocoa solids'. Milk chocolate should have no less than 25 per cent total dry cocoa solids. The USA Food and Drug Administration (FDA)

considers milk chocolate[5] to have a minimum 10 per cent by weight of chocolate liquor, 15 per cent sweet chocolate,[6] and 35 per cent semi-sweet or bitter chocolate.[7]

The other basic ingredients mixed with cocoa butter and liquor are sugar, lecithin,[8] vanilla, milk powder, and products such as nuts to give flavour. Table 4 shows the amount of ingredients that are mixed to form milk chocolate. Sugar and milk powder are two very important items.

Table 4: Chocolate ingredients

Milk chocolate		% of total weight	% of total weight	% fat at end of stage	% fat on total weight	% fat to total % fat
First mixture	Milk powder	22.0	45.7	37.9	17.3	51.6
	Cocoa liquor	12.0				
	Cocoa butter	5.0				
	Sugar	6.7				
Second mixture	Milk powder	1.2	37.6	0.8	0.3	0.9
	Sugar	36.5				
Conch filling	Cocoa butter	11.3	11.3	30.6	16.0	47.5
	Lecithin	0.0				
End conching	Cocoa butter	4.6	5.3	33.6		
	Lecithin	0.7				
	Vanilla	0.0				
Total		100	100	33.6	33.6	100

Source: Table extracted from the US patent *Process of producing chocolate and the product produced thereby*, Rumbaut, LJPA (2009). United States Patent No. EP2180793A2. Google Patent

5 www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?fr=163.130
"Milk chocolate contains not less than 10 per cent by weight of chocolate liquor complying with the requirements of 163.111 as calculated by subtracting from the weight of the chocolate liquor using the weight of cacao fat therein and the weights of alkali, neutralising and seasoning ingredients, multiplying the remainder by 2.2, dividing the result by the weight of the finished milk chocolate, and multiplying the quotient by 100. The finished milk chocolate contains not less than 3.39 per cent by weight of milk fat and not less than 12 per cent by weight of total milk solids based other dairy ingredients, not including any added sweetener or other dairy-derived ingredient that is added beyond the amount that is normally present in the specified dairy ingredient.
6 Sweet chocolate is the solid or semi-solid food prepared by mixing and grinding chocolate liquor with one or more optional nutritive carbohydrate sweeteners, and may contain one or more other optional ingredients.
7 Semisweet chocolate or bittersweet chocolate is sweet chocolate that contains not less than 35 per cent by weight of chocolate liquor
8 An emulsifier, often made from soy, makes the ingredients blend together.

Thus, to make chocolate, several sectors and actors interact; a complex set of processes and players come together to produce the final product. While this will be discussed later on in the report when the supply chain is analysed (Chapter 3), it is clear that zero-deforestation in the context of cocoa-chocolate has to be a cross cutting endeavour with sustainable production being pursued in other commodities, such as milk.

Negative externalities are beyond the land where commodities are grown!

The long path it takes to process and produce cocoa and chocolate leads to several externalities. The issue of deforestation is one among many challenges that chocolate faces to become a sustainable product. Researchers have used life cycle assessments (LCAs) to estimate the externalities generated in each of the cocoa and chocolate production phases. Studies adopt different methodologies such as: (i) different system boundaries definition; (ii) data handling and assumption; (iii) different database for background data (Marton 2012), so it is a challenge to compare results. However, the main findings follow.

Humbert and Peano (2014) analysed a chocolate LCA, taking into account the impacts of other ingredients, such as milk and sugar. It concluded that milk powder contributes to most of the carbon footprint, followed by cocoa, and that sugar is not an important source of emissions. A cocoa LCA study[9] revealed that production and the use of fertilisers and pesticides were a major cause of the environmental burdens in the cocoa production stage, highlighting that ozone layer depletion is caused by the emission of halogens and CFCs during the production of pesticides (Ntiamoah and Afrane 2008).

Ntiamoah and Afrane (2009)[10] looked into the LCA of chocolate and suggested that the chocolate manufacturing stage generates the least environmental impacts. However, cultivation and processing of the main raw materials lead to significant impacts; namely, freshwater aquatic eco-toxicity, human toxicity and global warming. Büsser and Jungbluth (2009) also concluded that the majority of the environmental impacts from the chocolate supply chain come from the amount of milk powder used and the agricultural production of cocoa beans. The authors recommend that retail packaging and distribution be further improved to reduce environmental impacts.

9 The study was conducted in accordance with the ISO procedural framework for performing LCAs. It looked into the processing of 1kg cocoa beans in Ghana, and analysed three main stages as follows: cocoa production (comprising pesticides and fertiliser production, cocoa cultivation, on-farm processing and temporary storage of cocoa beans); transportation (involving transport of beans to processing factory); industrial processing of cocoa beans (comprising cleaning, roasting, breaking and winnowing beans, and grinding them into cocoa liquor, cocoa butter, cake and cocoa powder). It did not take into account land use impacts, such as biodiversity loss and soil fertility.

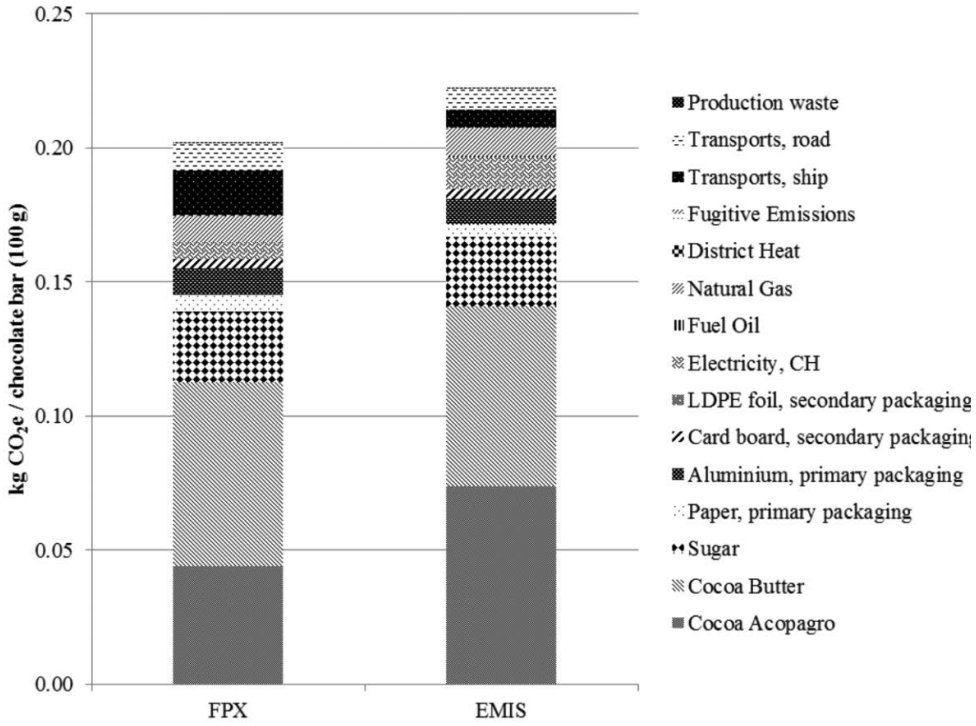
10 The study conducted a LCA of 1 kg of chocolate produced in Ghana, following the methodology outlined in ISO 14042 (2000).

Transportation also contributes to GHG emissions. The international shipping industry, for instance, accounted for about 2.7 per cent of total global CO^2 emissions in 2007 (compared to 1.9 per cent attributed to international aviation), and it is estimated to grow by a factor of 2 to 3 as a result of increasing demand. This sector is less regulated than international aviation; it is not part of the Kyoto Protocol, and there is no general agreement on how to address its GHG emissions (Corbett *et al.* 2009; Eyring *et al.* 2005).

Overall, it is safe to assume that all phases of chocolate production generate externalities. One of the most important issues when trying to address climate change is GHG emissions. As summarised in Figure 12 below, not only cocoa farming at landscape level, but also most other steps along the chocolate chain contribute to increased global emissions (Marton 2012).

So even though emissions from deforestation are a concern, this is not the only phase in which GHG is released into the atmosphere. Therefore, climate-related discussions should not be limited to zero-deforestation commodities, but instead, foster 'greening supply chains' and design strategies together that address externalities and internalise the costs of sustainability all along the supply chain.

Figure 12: GHG emissions from chocolate production using two different methodologies



Note: FPX – Footprint Expert (FPX) of the British Carbon Trust Footprinting Company Ltd; EMIS 5.6 from Carbo-tech AG. Source: Marton 2012

2

Insights from Ghana and Brazil

The context of these two cocoa producing countries is different. Ghana focuses on exporting cocoa, while Brazil focuses also on processing and plays a bigger role in consuming chocolate. Nonetheless, the farmers face the same challenges, in particular the need of extension services and evidence on options for producing greener cocoa that includes trees in the landscape.

Cocoa production and deforestation in Ghana

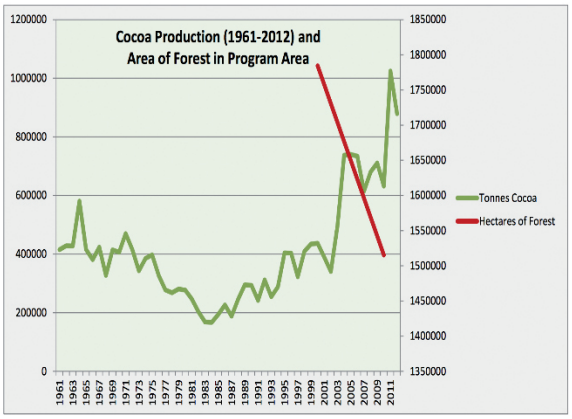
There is no definite figure on Ghana's deforestation rate, but estimates are around 2.0 per cent, leading to an annual loss of around 135,000 ha (FAO 2010; Forestry Commission 2012; Government of Ghana 2015); one of the highest deforestation rates globally. Outside of national parks and forest reserves, only 40,000 ha of rainforest remain out of the 8.2 million ha at the beginning of the 20th century (Rainforest Alliance 2013). About 21 per cent of the land in Ghana is covered by forests (4,940,000 ha). Of this, 8 per cent is classified as highly biodiverse and carbon dense primary forests and 260,000 ha are plantations (FAO 2010).

The main drivers of deforestation and degradation are: agricultural expansion (50 per cent); wood harvesting (35 per cent); urban sprawl and infrastructure development (10 per cent); and mining and mineral exploitation (5 per cent). Additionally, the discovery of oil reserves has added to the list of concerns, as this will likely increase pressure on

forests and natural resources through increasing economic activity, urbanisation, and increased demand for energy. Agricultural land expansion, especially cocoa, has been a major driver of land use change, and the growth rates have been over 4 per cent and 10 per cent (2000–2004, respectively).

There is also strong evidence of forest degradation over the last few years. As shown in Figure 15, a 10-year period (2000–2010) deforestation rate of 1.4 per cent per year was detected across the High Forest Zone (HFZ), with 820,000 ha of forest lost.

Figure 13: Cocoa production (1961–2012) and area of forest in programme area



Source: Armajaro, Government of Ghana, FAO 2014

Figure 14: Cocoa production, cocoa area and forest area

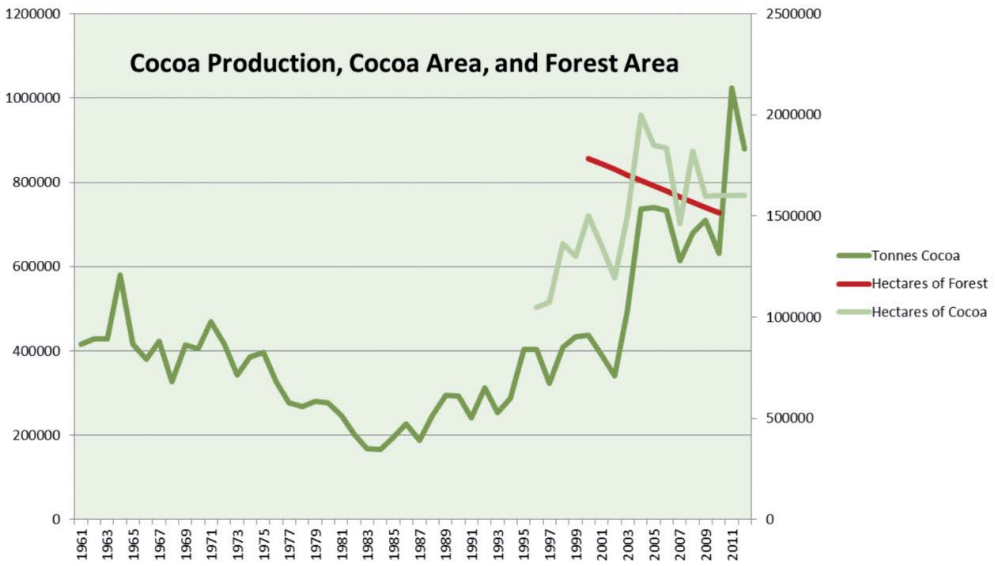
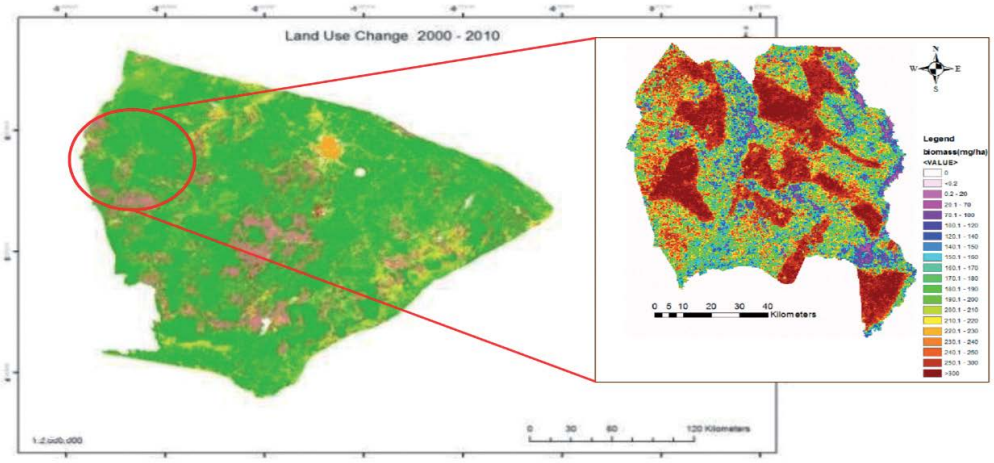


Figure 15: Land use change 2000–2010



The concern is not only on the impacts on forests, but how that will have an impact on the economy as a whole. The timber industry had an approximate value of US$383 million (in 2009), but declined to US$137 million in 2011, given the lack of systematic support and good practice. The same can happen with cocoa if the 'business as usual' scenario of low productivity, limited farmer support and extension service and further deforestation continues.

Over the years, there has been a rapid transition from traditional shaded cocoa cultivation (under primary or secondary forests) to increasingly open cocoa cultivation, which has been driven mainly by higher short-term profit and increasing competition for land, combined with other factors. Estimates are that shaded cocoa only accounts for less than 30 per cent in Ghana (21 per cent in the western region and 47 per cent in Brong Ahafo Region). It is estimated that this transition to open cultivation represents a loss of about 50 per cent of the carbon stocks.

In 1999, cocoa farms covered approximately 1 million ha, expanding to 1.45 million ha in 2002 and 1.66 million ha in 2009/10 (Hansen *et al.* 2009). As portrayed in Figure 15, expansion over the past decades has been mostly in the western region, which now accounts for over 56 per cent of production. The cocoa frontier has expanded, at the expense of forests mainly outside but also inside reserves. Within off-reserves in the HFZ, the area under cocoa production increased by 1 million ha (over 110 per cent) between 1996 and 2008. Loss of fallow areas in the HFZ covers 1.4 million ha. Deforestation as a result of food crop cultivation in the HFZ covers an area of 1.2 million ha (Ghana FIP investment plan).

This scenario is a result of a combination of various underlying causes:

- Extensive farming practices and low yields.
- Perception that cocoa does not need shade.
- Perverse incentives (cocoa input subsidies/lowering of input tariffs).
- Limited access to finance for sustainable agriculture activities.
- Increased interest rates if credit is provided at 40 per cent annually for rural banks in Ghana (Laven and Boomsma 2012).

Additionally, participation of people in conservation is not encouraged by the policy system in place (see Appendix 4). There are no incentives to stimulate such actions. As discussed below, the lack of suitable benefit-sharing mechanisms and tenure arrangements do not encourage smallholders to pursue long-term investments in tree crops, especially, for instance, in cases where farmers are tenants on the land.

The separation of land from the resources on the land, such as naturally growing trees, is complicating tenure and benefit sharing as well as reducing incentives for maintaining trees on off-reserve lands. As noted, landowners usually have no economic rights to the trees on their land. While traditional authorities can own the trees on their own lands, the management and commercial rights belong to the State in both reserve and off-reserve areas. Tree tenure (natural or planted) is key to sustainable cocoa production that incorporates trees into the landscape.

Opportunities

Given the importance of the cocoa commodity to the Ghanaian economy, the government and the industry are very keen to work towards promoting sustainability to increase production, productivity, and improve the livelihoods of farmers. There are a number of projects focusing on these issues.

There are several opportunities that Ghana is pursuing to address deforestation. The Natural Resources and Environmental Governance Programme (NREG) and the National Forest Plantation Development Programme aim to halt and reverse deforestation rates in the country and take steps to increase the national forest cover.

The Ghana Cocoa Board (COCOBOD) also has policies in place that not only aim to increase productivity, but also encompass environmental concerns such as the rehabilitation of aging cocoa farms. This is reflected in the recently launched National Cocoa Rehabilitation Programme (COCOBOD 2012). Components of this programme include: i) providing 20 million cocoa seedlings to farmers for free (using hybrid cocoa tree varieties that are more disease- and drought-resistant in order to increase yields); and ii) the Good Agronomic Practices initiative, which aims to support higher yields and sustainability in the cocoa sector.

The National Climate Change Policy Framework (NCCPF) has been developed through a consultative process, and the policy framework has three main objectives: adaptation and reduced vulnerability to the impacts of climate change; mitigating the impacts of climate change; and low carbon growth. The government finalised the National Climate Change Policy in 2013, which defined the vision, guiding principles and the strategic focus for addressing climate change in Ghana. REDD+ and other initiatives within the forestry sector have been identified as key aspects.

The Ministry of Lands and Natural Resources (MLNR) has the overall responsibility for forest sector planning and policy direction and for monitoring sector programmes towards the attainment of the national goals on forestry. The Forestry Commission (FC), which is officially under this Ministry, implements forest sector policies and programmes, and is the focal point for REDD+. Additionally, a National REDD and Technical Working Group (NRTWG) was created and allocated the overall responsibility for the management and coordination of REDD+ aspects.[11]

The Ghana Forest Investment Plan (FIP) identifies potential interventions, including:

- Promoting intensification[12] and increased productivity linked to community land use planning to curb further expansion into forests.
- Increased farmer access to financial and risk reduction mechanisms.
- Facilitating community-based land use planning to avoid deforestation and degradation.
- Increase access to information and technical information.
- Removal of financial incentives that encourage forest land conversion.

Interventions in farming systems, such as agroforestry and farm fallows, as well as support to regenerate old trees and improved management can provide important emission reductions through carbon sequestration. There is a significant available area and potential for agroforestry and restoration interventions in farm fallows, especially in the off-reserve areas.

Additionally, studies indicate that the western region is likely to yield the highest total benefits from carbon sequestration through landscape restoration in terms of both total carbon and net benefits per ton of carbon sequestered (Forestry Commission 2012).

11 Additional governmental bodies relevant to REDD+ include: the Natural Resources Advisory Council (ENRAC), the Natural Resources and Environmental Governance Technical Coordination Committee (NREG TCC+), the Carbon Credit Policy Committee, under the Ministry of Environment, Science, Technology and Innovation (MESTI), Ministry of Agriculture, and the Ministry of Mines and Mineral Resources.
12 Which needs to be compatible with promoting greener production practices.

Nonetheless, as discussed later in this report, Asante *et al.* (2014) found that carbon alone does not cover the opportunity costs of full sun production, Sandker *et al.* (2009) conclude that in the short term, REDD+ could be an attractive option for farmers if the policies focus on payments that halt the destruction of old-growth forests only. However, the authors raise the possibility that the REDD+ contracts may be abandoned as the forestland may be needed for cocoa production expansion. Therefore managing and monitoring this potential lack of permanence should be an essential component of any REDD+ incentives to reduce pressure on forests.

Additionally, REDD+ projects focusing on cocoa may not to be feasible as stand-alone projects. One of the first barriers relates to the definition of 'forest' adopted by the country: forests as being a minimum of 1 ha, having at least 15 per cent canopy cover and containing trees that are at least 5 m tall. If cocoa farms keep enough shade trees, they could be classified as forests, but, as mentioned, the trend towards diminishing shade to increase short-term yield prevents the sites from being REDD+ compliant. But this is an opportunity that farmers can explore if they identify the potential gain both in terms of resilience of their farming systems, and in terms of economic benefits.

Another important factor to acknowledge is that cocoa farms are very small, so a REDD+ project would require a large number of farmers to organise themselves and come together to meet the requirements. There is large potential in organising producers into associations to make such an intervention a viable undertaking, because the fact that the farms are scattered would allow the REDD+ project to be built around a larger landscape, including a myriad of other land uses and land users, and possibly facilitate tracing and account for leakage.

Therefore, one of the key first steps would be to organise producers and improve the information system to raise awareness of cocoa farming's potential around the country in the context of REDD+ and the greening agenda.

Cocoa can be an important ally on the mitigation and adaptation front. The landscape approach in which cocoa is only one component of agriculture systems and other land uses should be pursued to ensure cross-sector and multiple stakeholder engagement. This has been the approach of the country's Emission Reduction Programme (ERP) under the Forest Carbon Partnership Facility Carbon Fund.

Environmental aspects such as biodiversity, climate change and forest conservation are not yet high on the cocoa agenda, but stakeholders are starting to wake up to the potential adverse impacts of climate can have on cocoa production, but also the opportunities that climate-smart cocoa can bring. The international community focus on sustainable supply chains and climate-smart agriculture has slowly been flowing to country level and Ghana is starting to move towards grasping these opportunities. The FAO (2013) defines climate-smart agriculture as agriculture that sustainably increases productivity, resilience (adaptation), reduces or removes GHG emissions (mitigation) and

enhances the achievement of national food security and development goals. It is not only about carbon finance, especially because a preliminary review conducted by Katoomba (2009) revealed that carbon alone does not pay the bill of sustainable production systems. It is about improving the entire sector, which will render monetary and other benefits to several stakeholders.

There are great opportunities at landscape level to address the first stage of the cocoa chain. An excellent example of this is Ghana's ERP. This not only aims to diminish deforestation emissions in the country, but has also acknowledged that it cannot work in isolation just within the forest sector. By acknowledging that cocoa is still a driver of deforestation, and especially degradation, the programme is being built to align the cocoa and climate agendas in the landscape. It recognises that given the mosaic nature of cocoa production, with smallholder farmers spread over vast regions, Ghana will be more likely to address deforestation and degradation at landscape and programmatic level.

A landscape approach allows for a more holistic analysis of the challenges, instead of focusing on sectoral problems that alone are unable to address the cross-boundary drivers of deforestation. It also has greater potential to design cross-sectorial interventions that build synergies between different agendas (eg productivity, climate change, livelihoods), and bring together stakeholders from diverse backgrounds (eg the cocoa industry, the Bonn Restoration Challenge[13] stakeholders, development agencies, REDD+ actors).

Additionally, this approach can bring together isolated projects being promoted by the industry (eg CSR efforts with cocoa farmers) and development agencies (eg the UK's Overseas Development Administration (ODA) to develop capacity building in a community) into a collaborative framework where efforts build on each other, avoiding duplication and increasing potential outcomes. It can also identify the gaps and inform where new development programmes should focus efforts to contribute towards continuing to build the case for sustainability.

The benefit of having various actions under the same framework is that it will be easier to identify synergies and package activities that can be scaled up and replicated in other geographic regions. The ERP site houses a combination of various pilot ideas:

- Ensuring that the landscape promotes diverse synergies between different land uses – cocoa, mining, forestry, conservation, subsistence agriculture.

13 The Bonn Challenge is a global aspiration to restore 150 million ha of the world's deforested and degraded lands by 2020. It was launched by world leaders at a ministerial roundtable in Bonn, Germany, in September 2011. Underlying the Bonn Challenge is the forest landscape restoration approach, which aims to restore ecological integrity at the same time as improving human wellbeing through multi-functional landscapes. The Bonn Challenge is not a new global commitment but rather a practical means of realising many existing international commitments, including the CBD Aichi Target 15, the UNFCCC REDD+ goal, and the Rio+20 land degradation neutral goal. www.bonnchallenge.org/content/challenge

- Promoting diversification of income of farmers and not solely rely on cocoa.
- Testing new ideas to improve livelihoods (eg forest recreation).
- Developing an efficient geo-referenced inventory system that identifies cocoa farms and farmers, to assist in building sustainable land use strategies, and help Ghana achieve the aim of deforestation-free cocoa.
- Improving traceability of cocoa and identifying ways to increase efficiency and green the process (eg addressing emissions in all stages of the supply chain).
- Promoting more sustainable practices, which will assist in, for example, achieving certification.
- Testing and proposing improvements to current certification systems to develop standards on climate-smart cocoa.
- Developing simplified methodologies and monitoring protocols to account for emission reductions at landscape level.
- Developing new ideas to increase the income of cocoa farmers.
- Organising farmers and building their entrepreneurship to make cocoa a viable, sustainable and inclusive business rather than just a way of living – and as a consequence, lure more young people to stay in the business rather than move to the cities.
- Maximising the outreach of COCOBOD extension services, by, for instance, having the LBCs assist the process.
- Creating opportunities for more environmentally sustainable cocoa production based on market incentives and carbon/ecosystem payments. This could build on existing interventions:
  - The organic cocoa and fair trade market is still small but growing rapidly (20 per cent per year 2003 – 2008). South America is the leading producer region, but stakeholders argue that there is potential to further build branding organic and fair trade cocoa in Ghana. One successful example so far is the Kuapa Kokoo[14] where the premium is passed to the association.
  - There have been initiatives to introduce carbon payments for shaded cocoa, such as in the Ghana Cocoa Carbon Initiative by the Nature Conservation Research Centre (NCRC) and Forest Trends (Katoomba Group *et al.* 2011).
- Operationalising deforestation-free supply chain commitments through identification of opportunities for insetting at all stages, particularly those that Ghana has control over and influence through the Alliance of Cocoa Producing Countries (COPAL) (see Box 3) and the insetting by the international players.

14 www.confectionerynews.com/Commodities/Cocoa-farmers-should-have-shares-in-chocolate-companies-Divine

- Restoring aging cocoa farms and assisting the implementation of the Bonn Challenge, Ghana needs to put forward its ambition and practical ways to achieve it.
- Increasing the share of benefits accrued to communities.
- Recommending inter-sectorial policy changes, based on lessons learned from the project.
- Bringing stakeholders working in different themes around the same table to promote dialogue and building of synergies.

Box 3: The Alliance of Cocoa Producing Countries (COPAL)

The Alliance of Cocoa Producing Countries (COPAL) is an intergovernmental organisation now representing ten producing countries: Ghana, Nigeria, Brazil, the Ivory Coast, Cameroon, Dominican Republic, Gabon, Sao Tome and Principe, Malaysia and Togo. It provides a space for high level dialogue through conferences and regular meetings of member states. Among others, this body has an economic committee that looks into market supply strategies of production, policies and programmes of production management, determining and recommending actions and measures that could contribute to the establishment of the market equilibrium and assisting in the development of appropriate statistics. COPAL's mandate is to lead the discussion on common policy incentives and practical measures for the more sustainable production of cocoa to chocolate, and its consumption.

ERP presents an opportunity for a high-profile integrated approach foster collaboration from various stakeholders. To enable this scenario, it is important to have a multi-stakeholder process, involving several players such as the government, the existing local producer associations, local and international NGOs working on restoration and REDD+ in general, as well as engaging with development agencies and multilateral institutions. This is also an excellent opportunity to bring other stakeholders in the chocolate supply chain to the table and develop a common vision and actions to address the challenges and capitalise on opportunities to develop more sustainable commodities.

The supply chain is a complex process with various stages and actors. Increasing efficiency is costly and challenging, but we need to begin somewhere. There needs to be an incentive for chocolate makers to invest in more sustainability throughout the chain, but starting from the bottom. The ERP provides a short-term tangible mechanism for farmers. But legitimacy to the companies claims of pursuing sustainability will come from deliberate action taken by all actors to ensure that supply of dairy and sugar as well as processing, packaging, storage, transportation are all greener. For example fuel and energy savings are also critical to curb emissions from this sector in the context of integrating the business into a larger effort to address global sustainability. CSR should not only be about building a school for a community, but about building a school within a larger programme that also incorporates issues such as restoration, degradation, productivity and biodiversity conservation in the curriculum to install long term change.

The industry is competitive, but there are several opportunities for cooperation too. It is actually in everyone's interest to cooperate to diminish costs and promote more sustainability to the sector. The World Cocoa Foundation is in an excellent position to coordinate non-competitive actions and contribute to building a case that could be multiplied around the country.

The benefits for the industry are also multi-fold:

- Pilot case to test how to operationalise commitments to green supply chain.
- An opportunity to influence the process as part of a multi-stakeholder dialogue forum.
- Build closer linkages with government, NGOs and communities.
- Identify new business opportunities through a climate-friendly cocoa commodity.
- Demonstrate to investors and consumers that they are committed to develop sustainability strategies to ensure the continuation of business over the years.

But in order to allow this to happen, further coordination is necessary. The Forestry Commission is already working with the World Bank under the FIP project, but more alignment should be built, especially with IFC, to further facilitate private sector engagement. COCOBOD is also leading the ERP process, but there should be increased involvement by the different departments at this governmental agency such as the Cocoa Health and Extension Division and Seed Production Unit. It is a puzzle. The pieces are on the table. We need actors to work together, but most importantly we need a coordinating agency that takes the process forward. The government should be at the centre stage, but technical capacity and shortage of staff often come as the main barrier.

Cocoa production and deforestation in Brazil

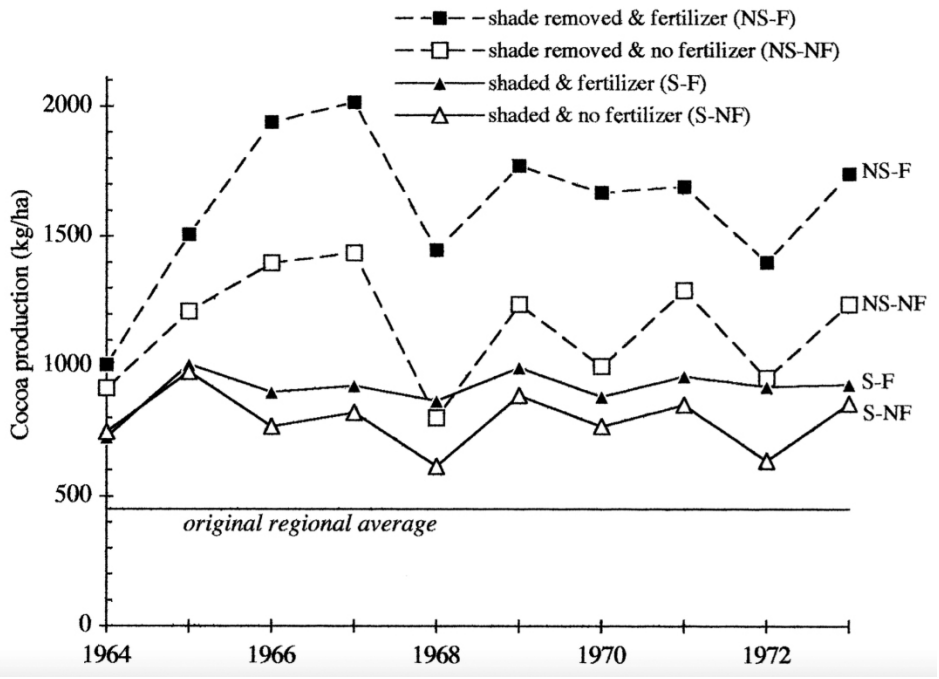
Although Brazil is the largest producer of cocoa in the Americas, it is less significant when compared to African countries. The country figures as the fifth largest producer worldwide, but this was not always the case. Cocoa was introduced in Brazil back in the 1700s, and increased some 259 per cent between the 1840s and 1890s with the advent of industrialisation in Europe and North America, which stimulated a market for this commodity (Tavares 2001; Wright 1992; Furtado 1963). Production began mostly with smallholders, who planted cocoa under the shade of canopy trees in an agroforestry system known as *cabruca* (Rolim and Chiarello 2004). This developed into large-scale farms to respond to the growing international market. Given the importance of the commodity, government plans were put in place to increase production (Johns 1999).

Over the years, with the volatility of the international markets and significant drops in price, the Brazilian government created several other institutions to support production

such as CEPLAC (*Comissão Executiva do Planejamento da Lavoura Cacaueira*) and the Cocoa Research Centre (CEPEC, *Centro de Pesquisa do Cacau*). The aim was to both intensify the use of agricultural inputs, as well as diversify varieties of cocoa trees (Garcez and Freitas 1975). This support contributed to the country becoming the second largest cocoa producer with close to 20 per cent of world production (Alger and Caldas 1994).

CEPLAC ventured into the full-sun route and encouraged the removal of shade to increase productivity. This became one of the primary goals of the organisation's programmes, along with subsidised support for the use of fertiliser and insecticides (Johns 1999).

Figure 16: CEPLAC productivity research results



Source: Johns 1999

CEPLAC found that yields almost doubled (from 900 to 1,700 kg ha-1) with the total removal of shade trees and the use of fertilisers on a series of cocoa farms monitored between 1964 and 1974. However, the intensification package was not widely adopted by farmers, who preferred a lower-risk management approach, with occasional use of fertilisers and agrochemicals and the maintenance of shade trees, recognised for their valuable role in limiting ecological risks such as drought and outbreaks of pests and diseases, and also as a risk mitigation to the volatility of global cocoa prices (Vaast and Somarriba 2014; Johns 1999; Alger and Caldas 1994). Table 5 below presents a summary of farmers' answers in relation to shade functions.

Table 5: Summary of Johns' (1999) interview with farmers on shade functions

Farm no.	Cocoa area (ha)	Farmer perception of the shade canopy's functions				Shade and modifications		
		Principal function(s) cited	Reducing shade causes greater			Shade coverage (%)[b]	Canopy thinned?	Risk taker?[c]
			Cocoa yield?	Fertilizer use?	Insecticide use?			
1	200	Protect from sun Maintain soil moisture Maintain soil fertility	Yes	Yes	Yes	50	No, avoided	No
2	200	Maintain humidity	Yes	No[d]	No	10	Yes, extreme	Yes
3	220	Protect from sun Maintain soil moisture	Yes	No	No	30	Yes	No
4	250	Protect from sun	Yes	No	No	60	No, avoided	No
5	129	Maintain soil moisture Maintain soil fertility Weed prevention	Yes	Yes	Yes	0	Yes, total	Yes
6	350	Maintain soil fertility Protect from sun	Yes	Yes	Yes	–	Limited	Yes
7	69	Stabilize microclimate Harbor pollination insects Maintain soil moisture	Yes	No	No	40	Limited	Yes
8	60	Diminish insect attacks	Yes	Yes	Yes	–	Very limited	Yes
9	37	Maintain soil moisture Weed prevention	Yes	No	Yes	–	Yes	No
10	90	Maintain humidity	Yes	Yes	–	–	–	Yes

a Farms 1–5 are the detailed assessment farms selected because of their wide spectrum of shade coverages. b Measured for farms 1–4. estimated by inspection on farm 7. c As measured with the Von Neuman-Morgenstern (1947) method, "yes" indicates farmer would take on gamble at 4:1 payoff at a probability of 50 per cent. d This answer qualified to be only for fertile soils as on this farm.
Source: Johns 1999

Once again, global prices bounced hitting not only the economy, but also workers in the large-property plantations. But the markets were not the only enemy this time. There are those who argued that what came next was not an act of nature, but an act of man; men dissatisfied with the socio-economic disparity between the large landowners and the unsupported workers (Caldas and Perz 2013).

At the end of the 1980s there was an outbreak of witches' broom disease in the cocoa agricultural system of southern Bahia. To contain the spread of the disease, entire cocoa plantations were burned to eradicate the fungus. Several hypotheses were raised concerning the outbreak, from agricultural sabotage from cocoa-producing competitor countries such as the Ivory Coast, to national sabotage by left wing militants from the Amazon to undermine the influence of the cocoa colonels in southern Bahia. Regardless of the reason, the episode demonstrates the vulnerability of cocoa production, and the socio-economic risks associated with concentrating on the production of a single commodity, as oppose to diversifying.

Cocoa growers, who constituted a block of landed elites harmed by the outbreak, responded to the attack by pursuing creative avenues of response as they fought to maintain their political and economic power. In other cases, farmers moved away from cocoa and diversified their production systems to focus on other commodities (Caldas and Perz 2013).

Approximately 200,000 rural workers lost their jobs in the cocoa plantations by the mid-1990s (Demeter 1996). The economic downturn in southern Bahia further deepened the social marginalisation of rural workers, who had no choice but to move to the cities. Before the cocoa crisis, social movements in southern Bahia were almost non-existent due to the political hegemony of the cocoa colonels. However, the various landless movements began to recruit rural workers in urban centres to participate in direct action tactics and make demands of land reform. As a result, the cocoa crisis in southern Bahia led to a proliferation of land reform settlements – it stimulated 64 new encampments involving 4,538 families, and by the beginning of the 1990s, settlements were linked to 37 different social movement organisations. Furthermore, since the appearance of witches' broom around 1990, 35 additional settlements were created in an area of 25,043 ha with almost 1,500 families (Caldas and Perz 2013).

The landscape also began to shift. There was a rural exodus. Farmers either abandoned the land, or began to diversify production systems focusing on other commodities, which, in some cases, led to cutting down the shade forests for open space for coffee and ranching (Alger and Caldas 1994 Caldas and Perz 2013).

Table 6: Population in southern Bahia region, 1980–2000

Population	1980	%	1991	%	1996	%	2000	%
Urbana	383,338	54.63	542,298	62.50	578,478	67.34	636,670	75.45
Rural	318,189	45.37	325,355	37.49	280,443	32.66	207,231	24.55
Total	701,527	100	867,653	100	858,921	100	843,901	100

Source: IBGF (Censos Demográficos 1980–2000)

Deforestation, degradation, restoration and sustainable forest management (SFM)

A large part of cocoa cultivation in Bahia was based on the traditional *cabrucagem* agroecosystem, in which cocoa is planted under large trees retained from the original forest. Whereas much of the 2,200 km^2 of new cocoa established since 1965 was in the place of original Atlantic rainforest, arguments are that farmers' choices not to spread follow CEPLAC's recommendation to move towards full-sun production might have considerably helped protect the remnants of the Atlantic forest (Johns 1999).

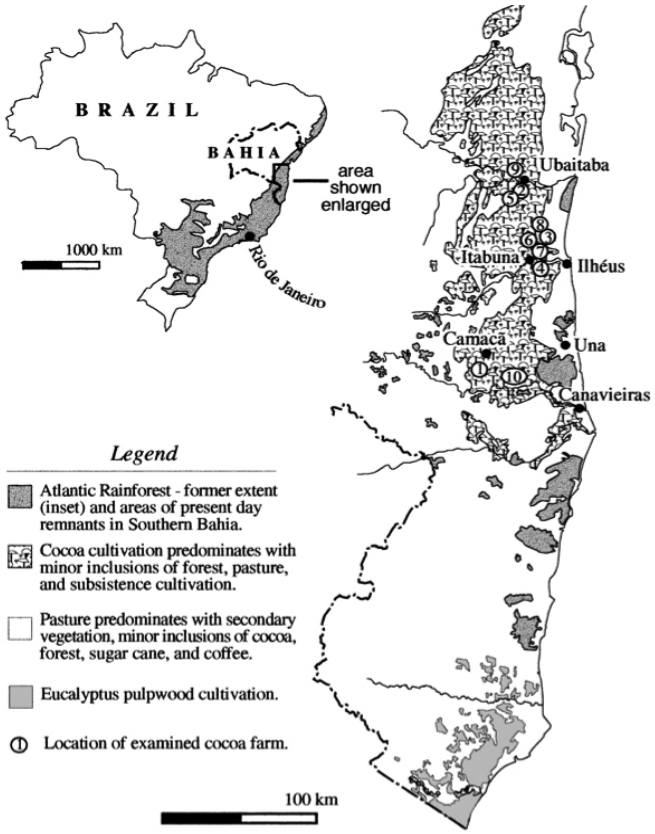
But all in all, cocoa discussions in the country are not closely associated with climate change. This is partially also because the Amazon biome is one of the main focuses of the country when it comes to the climate and forest debate; and because the Cerrado biome is the focus of the FIP.

After the cocoa plantations were abandoned due to witches' broom disease, a large area of the cabrucagem agroecosystem was substitute by pasture, subsistence cultivations, and sugar cane (Map 1). These activities cleared the forests to increase production. Thus, the drop of cocoa could also have led to the increase of emissions, making this commodity even more interesting in the fight against global climate change.

But, overall, the picture shows the diverse landscape that should be managed synergistically. Although there are no large-scale international programmes (eg FIP) or national government ones supporting efforts to bring back cocoa, there are some existing frameworks that could be built upon.

In 2010, the Ministry of Agriculture, Livestock and Supply approved the so-called Low Carbon Agriculture Plan – (*Agricultura de Baixo Carbono* – ABC – Decree 7390/2010), following the country's President commitment under the UN Conference of the Parties on Climate Change during COP-15 (Copenhagen 2009), to adopt measures to reduce GHG emissions to 36.1 per cent from 38.9 per cent by the year 2020. The plan aims to provide cheap credit to farmers wishing to grow sustainable commodities that contribute

Map 1: Former extent of Brazil's Atlantic rainforest and present day land use



Source: Johns 1999

to GHG reduction. The plan in the State of Bahia has about US$70 million[15] to finance activities including 265,000 ha for cocoa, and 100,000 ha only for the *cacao-cabruca* model (Matos 2013).

Despite the good news, challenges remain. Money is not enough if it is not accompanied by technical assistance. As mentioned, there are still several challenges associated with providing extension services to farmers, who are choosing to grow full-sun crops in the absence of guidance.

Additionally, ABC competes with other government incentive programmes like the Support to the Middle Rural Producer (Pronamp). Between 2013 and 2014, Pronamp provided R$13.2 billion, compared to R$4 billion of ABC, out of which only R$1.7 billion was requested by farmers. This represents a reduction of 17 per cent compared to R$2.3 billion released in the same cycle period 2012/2013.

15 R$205 million.

If financial resources are not the core of the problem, it is important to look into how to provide the technical assistance that the farmers are in need of. One way to look at it is to look further up the supply chain.

Challenges and opportunities

Cocoa production in Brazil is less significant when compared to African countries, and it has historically been concentrated in Bahia State, which sits at the Atlantic rainforest (see Map 2).

Map 2: Cocoa growing areas in Brazil over the centuries

Source: Caldas and Perz 2013

However, partly due to witches' broom disease and because of growing interest by other states, Bahia, even though still the leader, dropped from producing 95 per cent of cocoa nationally in the 1980s to 60 per cent in 2012. Nonetheless, given that a great number of people grew up surrounded by the cocoa culture, a deeper interest to grow this crop remained, and has begun to be revived over the past few years. But the interest faces a lack of support. Witches' broom disease did not only devastate the plantations, it also affected the interest of government and other stakeholders. CEPLAC, a major centre that supported research and provided extension services in the past is not as active as it used to, and its personnel are not being replaced but slowly retiring.

Stakeholders interviewed for this study even argued that Brazilian cocoa farmers are worse-off than African ones because there seems to be more development assistance projects focused on the latter. Because Brazil is considered an emerging economy, there is a perception that the country does not require international assistance. But the reality is that the disparity in income in the country leaves the farmers in an even worst situation if there are no institutions to support their development.

The main problems faced are lack of technical assistance and extension services, as well as labour availability. There are actors that would like to help the process such as Fazenda Juliana, but they argue that without a framework and without a platform to help them operate, it is not possible to reach farmers. Despite the challenges, the wonders of cacao are speaking for themselves. In recent years, partially to meet the increasing national and global demand for cocoa, new geographies and stakeholders have been waking up to the potential of this crop in Brazil.

In the State of Pará, traditionally not focused on cocoa but on ranching, Cargill is working with TNC and cooperatives to grow cocoa. Initially there was reluctance from the farmers given the lack of culture and knowledge about the commodity. But, after some early adopters were convinced and the benefits started to surface, demand for seeds and technical assistance increased.

According to a local cooperative called CAPRU, in a 5 ha area, one could raise 5–8 heads of cattle, rendering about US$2,500/year. If cocoa is grown instead, there is potential for having more than 5,000 cocoa trees, each producing a kilo of cocoa/year, and totalling US$10,000 of income per year. In addition to the cocoa, if shade production is pursued, other products such as fruits, nuts, rubber and wood can also be produced, contributing to diversification and increased income (Levin 2012). The maths was simple and clear enough to change mentalities.

Building on the potential of the state to grow cocoa (Lima Silva *et al.* 2013), in 2011 the government launched a programme on the development of cocoa supply chain, aiming at turning the Pará into the largest producer of this commodity by 2023. However, despite the fact that the state farm has delivered high yields (about 806 kg/ha according to CEPLAC 2011), main challenges are still related to a lack of technical assistance and supportive services (Vegro *et al.* 2014).

In Bahia, where production is also starting to pick up, and stakeholders are struggling to increase yield, though still haunted by witches' broom disease, environmental degradation is a concern. However, cocoa agroforestry systems have been recognised as a potential great ally towards promoting conservation (Johns 1999). In the mid-1995s the federal government also recognised this potential and committed US$368 million for a special loan programme, administered by CEPLAC, to combat witches' broom disease through to 1998 (Johns 1999).

Reflections

As noted, climate change and cocoa debates are not linked in Brazil, partially because focus has been on the Amazon. Restoration for example needs to be part of these reflections due to its important role in climate change mitigation and adaptation.

Bahia sits in one of the largest remains of the already deforested and degraded Atlantic rainforest,[16] which must be restored. Thus, cocoa should be more associated with large national restoration efforts such as the Atlantic Rainforest Restoration Pact (*Pacto pela restauração da Mata Atlântica*).[17] There is a clear opportunity for cocoa to help restore and enrich[18] degraded landscapes and current sites through productive agroforestry systems, however large-scale assistance programmes to build a platform and help set up a system are lacking.

Currently, farmers do not receive technical assistance. As a result, there are a number of plantations being established under full sun, contributing to ecosystem degradation. But, just as in Africa, extension services are key for small farmers. Although there are already some initiatives in place, they would benefit from improved coordination.

There is a big opportunity for cocoa to build synergies with other land uses in the landscape and lead the way towards restoring the ecosystem in the Atlantic forest and for doing it right in the new frontiers. The forest sector set up a multi-stakeholder dialogue in 2005, which led to regional initiatives. The continuous engagement brings different stakeholders together and opens the possibility for more synergies. A similar arrangement could be developed in the cocoa sector.

16 See more at Schroth *et al.* 2011.

17 To bring the Atlantic forest back from the brink of extinction, over eighty environmental organisations, private companies, governments, researchers, and landowners launched the Atlantic Forest Restoration Pact. The initiative aims to promote large-scale forest restoration by coordinating, integrating, and increasing the scale of all restoration initiatives and also help to protect the existing forest remnants in priority areas for biodiversity.

18 Supporting this idea, Rolim and Chiarello (2004) indicated that *cabruca* forests in Bahia are actually less diverse and less dense than secondary or primary forests of the region, and highlighted that, as a consequence, *cabrucas* present a structure where tree species of late successional phases are becoming increasingly rare while pioneers and early secondary species are becoming dominant. Therefore, the study recommends that current management practices of thinning and clearing of native trees are improved at the expense of putting into threat the long-term survival of these forests, as well as their role in maintaining biodiversity in the long run.

3

The supply chain approach

The actors

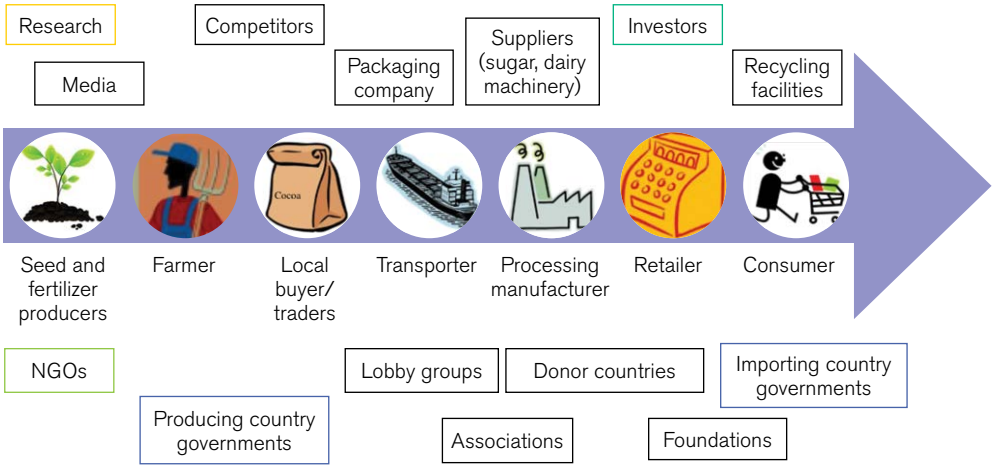
The supply chain begins with the inputs industry (seedlings, hybrids, fertilisers, technology) before reaching the farmers, who in turn sell their products to local buyers (traders). Part of the cocoa is then processed (roasted and ground into semi-finished products – butter, powder, liquor) and transported (mostly to Europe) by ship. The outputs are sold to chocolate manufacturers that finalise the product and pack it in aluminium foil[19] and paper before it is transported to the retailers. Consumers buy the product and after consumption part of the packaging is recycled and partly disposed of in landfill or in incineration plants. Figure 17 is a simplified attempt to summarise the main actors involved.

While **farmers** are the heart, they are also the weakest and most dispersed link of the chain. As noted, about 90 per cent of cocoa production comes from smallholders. **Traders** and **manufacturers**, on the other hand, are concentrated industries, with a few multinationals dominating the market.

But as Figure 17 depicts, there are several other players that are part of the supply chain or that add value to the process (and are part of the supply chain). On the **private sector** side, the companies include storage, packaging, transport, retail, and recycling facilities. The sugar, nuts and dairy industries are also key players because, as noted, these products are necessary for making chocolate.

19 Since chocolate is usually stored for long periods and exposure to air and light can deteriorate its taste and texture, aluminium foil is frequently used to shield against light and moisture, etc. (Büsser and Jungbluth 2009). Additionally, individual items need to be packed together for more efficient transportation.

Figure 17: Actors in the chocolate supply chain



NGOs work on a wide range of issues. They partner with companies, supporting farmers in improving production systems, and with national governments to develop social and environmental initiatives both at the landscape, and also at global level through, for example, policy reviews. This happens in other industries such as sugar, soy, tobacco, cashew – Care International, ADRA, etc. are such examples. These complement the national government extension services. They promote market campaigns to pressure government and companies to pursue sustainability and also act as third-party standards developers and certifiers.

The **media** helps communicate issues related to chocolate sustainability to the general public and **researchers** contribute to generating knowledge about options for increasing sustainability of almost all phases of the supply chain. Research also produces knowledge on social, environmental and economic aspects of cocoa and chocolate production, including: developing improved agroforestry systems which optimise the trade-offs between productivity, ecosystem resilience, and livelihoods; conducting genetic research to enhance cocoa hybrids, improve quality and finer flavour, and address pests and diseases; improving planting material; developing better systems to improve governance and share benefits across the supply chain; in short informing policy debate and reform.

Producing country governments and NGOs are important actors to provide extension services to farmers, to provide support to increase national processing, and coordinate international efforts to promote sustainability of the sector. **Consuming country governments** assist the sustainability agenda by providing development assistance to producing governments and communities and lead in raising consumer awareness and adoption of fiscal and non-fiscal incentives to sway consumption patterns towards more sustainably- produced chocolate.

In addition, there are **industry associations and foundations,** which organise the efforts of the sector to promote more synergies between its members.

Other important players are **investors**. They are instrumental, as without finance, companies and individuals have limited possibilities to operate. Given that the flow of investments to, for example, trade and manufacturing companies is not transparent, it becomes a challenge to provide specific information. Nonetheless, it is imperative to engage these actors in the sustainability discussion and demonstrate to them that they might unintentionally be financing deforestation.

All of these actors contribute to the existence and functioning of the chocolate supply chain. However, they also contribute to the generation of negative externalities. Hence they have a role to play in reverting the situation.

The cocoa supply chain

Proposers of green growth highlight that economic advancement should not be at the expense of environmental and social issues, as these are interconnected (ten Brink *et al.* 2012). Therefore, economic growth, associated with production, export, and manufacturing of basic commodities should be more sensitive to avoid adverse environmental and social impacts from the producer to consumer.

Given that commodities travel a long way from farmer to consumer, it is imperative to look at all the other steps of the supply chain beyond production such as processing, transport, manufacturing, and consumption and to design strategies to 'green' these stages. One cannot talk about sustainable commodities if greening efforts are only concentrated on the raw material production stage. Therefore, the notion of insetting and addressing externalities needs to be incorporated into the business strategies and practices of all actors.

it is therefore crucial to design strategies and interventions that follow the production of commodities from cradle to grave, from farmer to consumer and end disposal, to contribute to a meaningful global sustainability. Achieving the commitment for less than 2°C increase in temperature that the Paris Agreement has endorsed, require all actors to take individual and collective responsibility and action. Assessing the impacts and demonstrating verifiable results in terms of reducing deforestation and carbon footprint will place us on course for contributing towards that target.

There are several benefits associated with greening the entire supply chain, rather than focusing solely on the landscape level where producers, technologies, local transport and possibly primary processing takes place, creating emissions. To ensure that resources and initiatives developed at farm level have a continuous positive impact is to combine third-party certification and zero-deforestation production at farm level with initiatives that

foster sustainable manufacturing and transportation along the chain through insetting, together with information awareness-raising and education to change consumption patterns.[20] If stakeholders demanding these commodities are not aware of the importance of purchasing sustainable products, efforts spent towards developing sustainability in the landscape can be lost. This is the case in cocoa, as over half of certified production is not being able to sell at a premium. If this situation persists, if there is no demand and market for 'green' products, farmers and companies might be discouraged from continuing to promote sustainable production.

Additionally, one must note that there is interdependency between actors along the chain: without consumer demand, there is no need to manufacture; without investors companies cannot operate. But it is important to note that the base of it all is the farmer. Without the cocoa, there is no chocolate supply chain. If farmers decide to shift production to other commodities, or if adverse impacts, such as from climate change, take place, the entire supply chain will collapse.

Figure 18 attempts to portray this idea of connectivity and interdependency between the processes while Figure 19 highlights the key stages at landscape level. At the base level, the physical landscape is represented where several land uses co-exist (and sometimes compete). Each one of these has a supply chain associated to it. The chocolate chain consists of farmer, certification body, local buyer, transporter/exporter, manufacturer, retailer, consumer. Figure 19 illustrates with pictures the key stages of Cocoa from the farm to shipping in Ghana.

Cocoa production consists of the following stages: growing[21], harvesting, fermenting and drying, marketing, packaging, and transport to the primary processing facility (roasting/grinding) and port of export. Cocoa pods ripe at different rates, so harvest is done mainly by hand rather than using machinery. Harvesting of cocoa fruits involves the removal of pods from the trees and the extraction of the beans and pulp from the interior of the pod. The beans are then separated by hand and the placenta is removed. Beans at this stage do not have any resemblance to chocolate flavour, which will happen mostly at fermentation stage. The process of fermentation is necessary for the formation of constituents or flavour precursors that undergo further development during the roasting process (Figure 20).

After fermentation, the moisture content of the beans needs to be reduced from 60 per cent to 7 per cent, which is considered appropriate moisture content for secure storage of

20 There is increasing evidence that focusing efforts on the demand side can assist the fight against deforestation. Examples are the European Union Timber Regulation (Regulation (EU) No 995/2010 laying down the obligations of operators who place timber and timber products on the market. OJ L 295, 12.11.2010, p. 23–34) and USA Lacey Act (16 USC §§ 3371–3378) regulations targeting trade in illegal tropical timber, and the Brazilian Soy Moratorium (Persson *et al.* 2014).

21 For the different phases of cocoa growing and harvesting refer to www.icco.org/about-cocoa/growing-cocoa.html and Afoakwa 2014.

Figure 18: Land use and supply chains

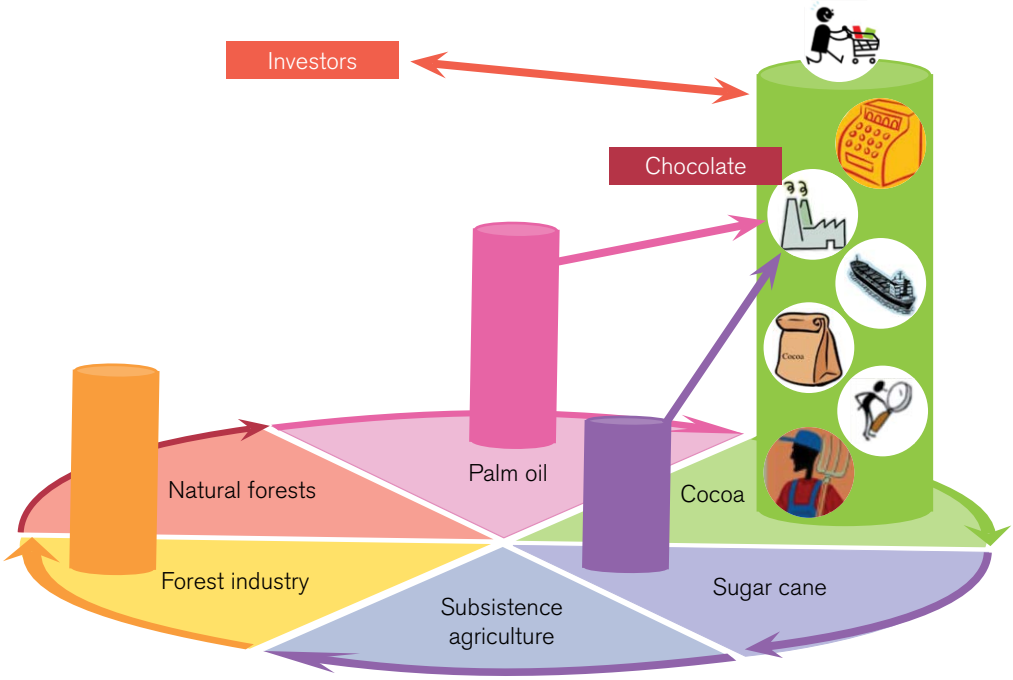


Figure 19: Cocoa supply chain

Source: Authors' own – depicted during data collection

cocoa prior to marketing and processing. Drying is an important step in cocoa processing as some of the reactions, which produce good flavoured cocoa, are still proceeding during this process. Ideally, this should last five to seven days. The beans are then packed in bags, and transported to be roasted, and ground into a paste. The heat generated by this process causes the cocoa butter in the nib to melt, creating cocoa liquor. This liquor can be further refined, and sold as unsweetened baking chocolate, or used in chocolate manufacturing.

To ensure global sustainability, it is recommended that a supply chain approach is adopted, as a path that will not only ensure that all steps of the chain are 'greened', but also build synergies and lead to better results. It is, for example, a clearer way to

communicate to chocolate consumers and investors in the north that efforts towards addressing deforestation on the other side of the globe or landscape are actually in their control.

The cocoa supply chain in Ghana

As mentioned, the cocoa sector in Ghana is partially liberalised, but COCOBOD still has a monopoly on cocoa marketing and export through its subsidiary, the Cocoa Marketing Company (CMC). The upstream collection of cocoa (from farmers to COCOBOD warehouses) was privatised, but all processes in the supply chain are still coordinated by this body. The cocoa industry has three segments: production, processing and marketing. Production and processing encompasses activities such as drying, collection and bagging, quality control, haulage and warehousing.

The sector is dominated by a handful of players, with a dozen license buying companies (LBCs) accounting for 98 per cent of bean purchases, and four grinders accounting for 55 per cent of grinding capacity.

The main stakeholders in the supply chain and their main characteristic and roles are:

A. Farmers

- 800,000 smallholders spread around the cocoa growing regions focusing on on-farm production and pre-harvest/industrial processing of cocoa.

B. License buying companies

- Private companies that are licensed to buy cocoa from farmers and deliver to ports,[22] where it is officially taken over by COCOBOD's export subsidiary, the Cocoa Marketing Company.
- There are 26 LBCs licensed to buy cocoa in the country, but a dozen of them control 98 per cent of purchases.

C. Haulers

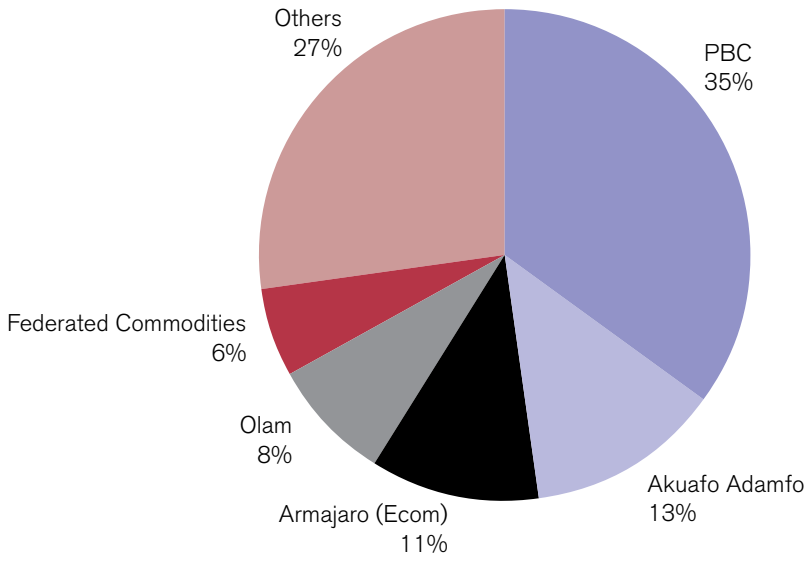
- Transporting the cocoa from farm to processing

D. Cocoa processing companies

- Responsible for processing of cocoa, Ghana's cocoa grinding sector is dominated by a handful of multinationals and the former state-owned grinder, Cocoa Processing Company (CPC).

22 After a sufficient amount of cocoa is collected at the buying centre, it is transported to depots ('the district level') where it is graded and sealed by COCOBOD. LBCs then transport the beans to Tema and Takoradi ports where they receive payment from CMC. Tema and Takoradi ports each account for around 45 per cent of Ghana's cocoa exports, with the balance of 10 per cent being exported from Kaase port.

Figure 20: Market share of LBCs in Ghana (2014)



- Despite the fact that Ghana is Africa's second largest cocoa primary processing hub, its capacity is growing very slowly and its utilisation rate is around less than 55 per cent of its installed capacity, due to many causes, such as high costs of irregular power supply, ageing equipment, and financial difficulties of local processors (Ecobank 2013). There is a clearly a big constraint when it comes to contemplating a more integrated supply chain to include further processing of cocoa into chocolate.

Table 7: Ghana's cocoa grinders (2014)

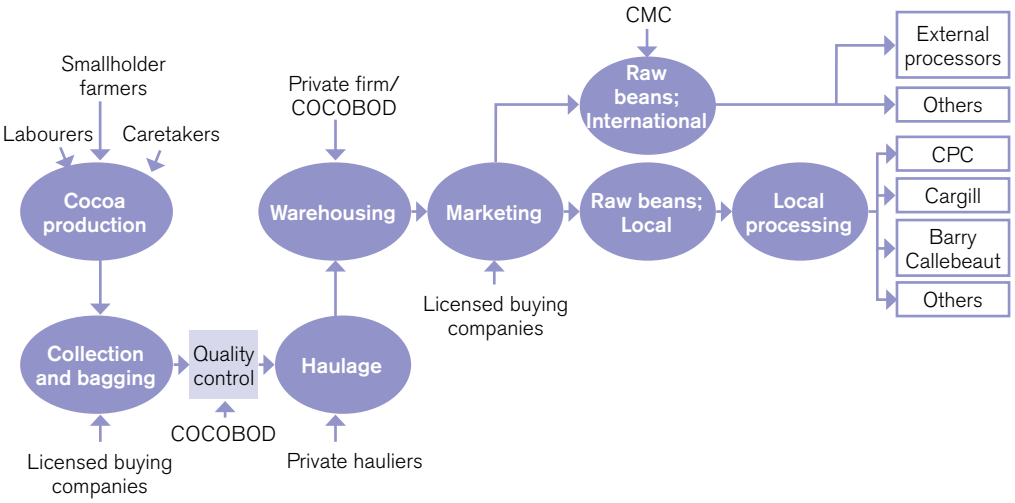
Company	Installed capacity (000s MT)	Market Share
Barry Callebaut	67.0	16%
Cargill	65.0	15%
CPC	64.5	15%
ADM	42.0	10%
Others	191.5	45%
Total	430.0	100%

E. International buyers/ global companies – creating demand for cocoa.

F. Research institutions of Ghana (CRIG, ISSER, RM&E) – conducting research and development on the cocoa tree and farming systems for innovations.

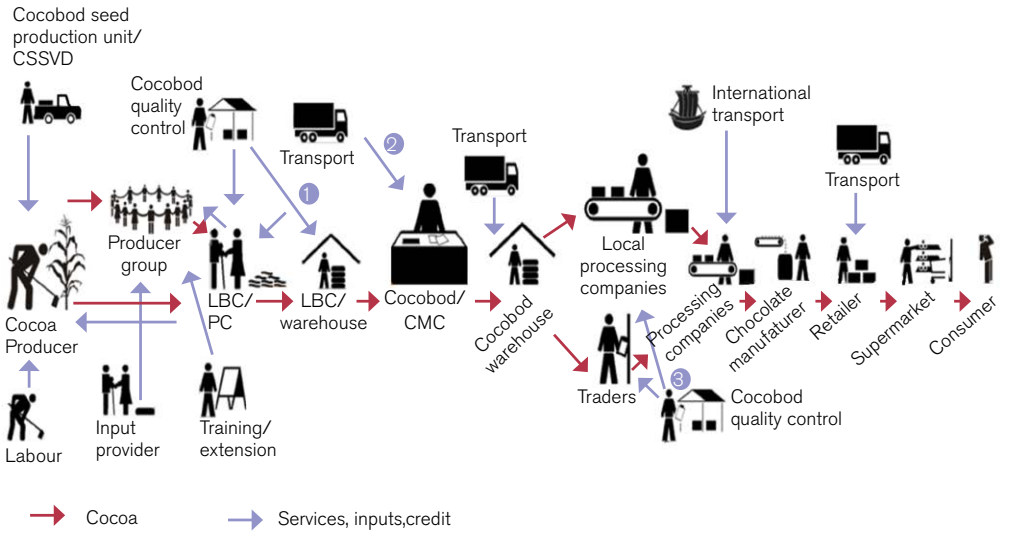
Figure 21 and 22 depict a high level and detailed supply chains of cocoa in Ghana shading light on the complexity and number of stakeholders that would need to be on board for greening the supply chain.

Figure 21: Cocoa supply chain in Ghana



Source: Sutton and Kpentey 2012

Figure 22: Pictorial representation of the cocoa chain in Ghana



Source: Laven and Boomsma 2012

So, in a nutshell, the supply chain in Ghana is comprised of:

- A large number of smallholder farmers cultivating cocoa with low yield, still with inadequate technical assistance and insignificant opportunities to access credit, limited number of farmers' organisations, and an aging population.
- 27 licensed buying companies.
- Some processors (ADM, Cargill, Barry Callebaut) and manufacturers (Nestlé).
- One exporter (Cocoa Marketing Company).

The relationship between the LBCs' buying agents and farmers is very important to ensure supply. In that sense, there is some competition between the LBC, which wants to secure supply. A survey showed that around 40 per cent of farmers reported that they received gifts from the LBC (50 per cent of gifts were personal/household goods; 10 per cent were tools) to influence their decision making process (Hainmueller *et al.* 2011). Additionally, as most cocoa farmers are not bankable, increasingly, business partners provide credit (in-kind) to farmer groups. This binds farmers and increases their vulnerability. Therefore, there is need to reflect on the added incentives that could be provided in the context of changing or improving production systems to contribute to the viability of the cocoa farms and zero-deforestation agenda.

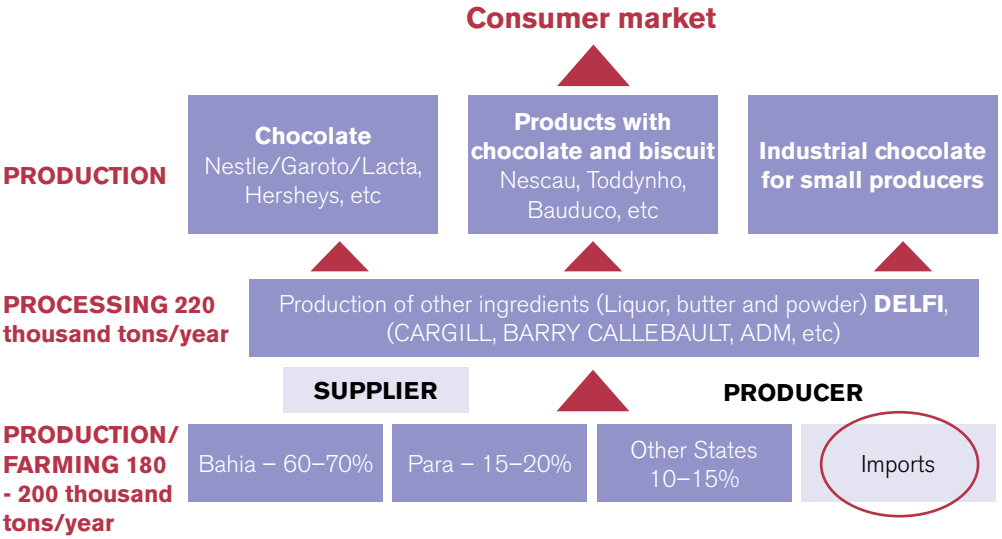
LBCs also strive to improve production and productivity and also encourage and support certification when their clients demand it. However, they do not recommend that farmers pursue certification without an already committed buyer. So, if the market and the chocolate companies demand it, LBCs like Armanjaro have the capacity to assist farmers in pursuing certification to deliver sustainable beans to processors. But demand needs to be put in place.

The cocoa supply chain in Brazil

Cocoa is produced by 50,000 farmers in seven Brazilian states and totals about US$315 million[23] a year. After several years of producers' insistence, the federal government announced in 2013 a minimum price for cocoa: US$1,80/kg.[24] This was included in the government's Minimum Price Guarantee Policy (PGPM). Figure 23 indicates a developed chain with imported cocoa to supplement local production and integrating very high level value addition and production of chocolate products to meet mainly the domestic demand.

23 R$900 million.
24 R$75.00/arroba or R$5.10/kg.

Figure 23: Cocoa supply chain in Brazil

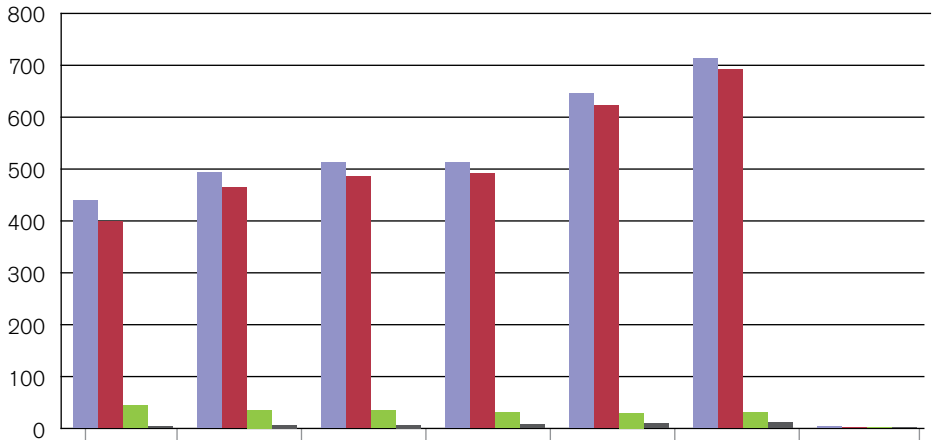


Brazil has become, over the years, one of the main cocoa processors in the world. Mostly concentrated in southern Bahia and in São Paulo, Brazil ranks as the sixth largest cocoa producer in the world and seventh cocoa processor, after Holland, Germany, Ivory Coast, the United States, Malaysia and Ghana (Müller 2012).

The processing industry has five main actors: Cargill, Delfi, Joanes, Barry Callebaut and Indeca. It has an installed capacity for processing 250,000 tons of cocoa a year, which is larger than the actual supply of raw material. Therefore, to prevent the equipment from remaining idle, the companies import cocoa to be processed in Brazil and export it again (Figure 24). This has been taking place since the 1997–98 crop, when Brazil turned from exporter to importer of cocoa beans, which explains why although it is producing less than what is consumed, Brazil continues to export (Müller 2012). There are about 57 chocolate industries providing over 1,000 employment opportunities.

Demand for chocolate is growing in Brazil and there are a good number of private companies operating in the country: Mars, Cargil, Mondelice, Kalibu, Mitsubishi, Hersheys. They are mostly developing their own projects with specific cooperatives and farmers, without much coordination. Mars has a research centre in Bahia looking into various aspects of growing cocoa, including identifying a new variety of cocoa that is resistant to diseases like witches' broom, increasing productivity and delivering improved flavours. Mondelice is working with local cooperatives, and NGOs like OCT, which is associated with the Odebrecht Foundation, and is promoting landscape projects, focusing on improving the cocoa supply chain, while also focusing on diversification and environmental

Figure 24: Production, consumption, export and import of cocoa (thousands of tons) 2006/2011



	2006	2007	2008	2009	2010	2011	Variation 2011/10
Production	444	497	517	517	648	710	9.5%
Consumption	404	465	487	493	628	691	10.0%
Export	46	40	39	34	33	33	–0.1%
Import	6	8	9	10	13	14	8.0%

Source: Adapted from ABIMAC 2013 (reference missing)

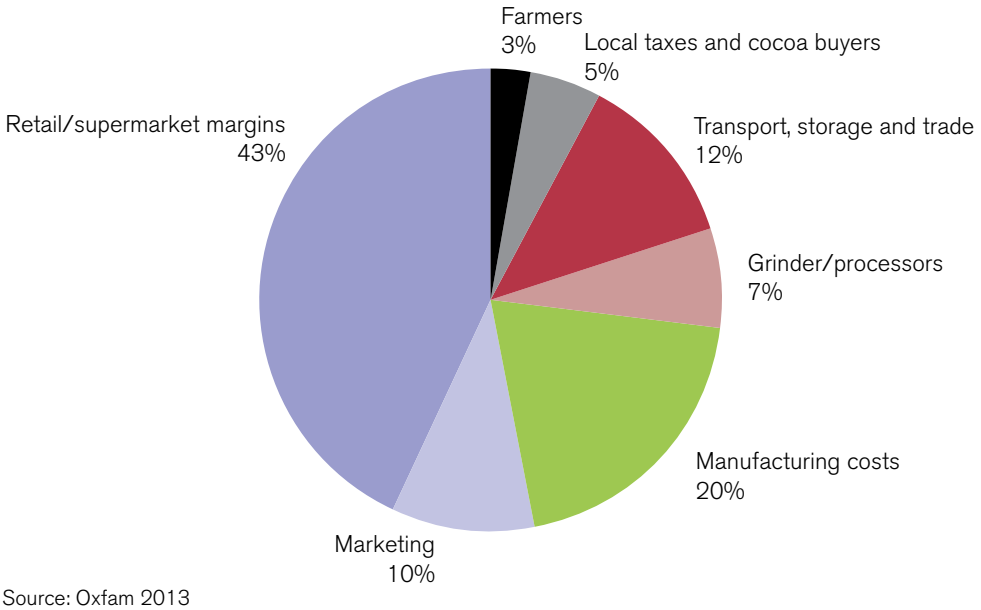
protection. And as mentioned, Cargill is beating on new frontiers in a bid to increase the supply of cocoa.

But how much these efforts can result in true transformational change and at scale is still a question mark. During our field visit, it became clear that stakeholders are not clear about what others are doing, which is in all likelihood leading to duplication of efforts and inefficient interventions. Even though the cocoa sector is still competitive, it is facing a common adversary: shortage of supply. Without improved coordination between the industry as a whole and other stakeholders, such as research centres, NGOs, and government, moving forward will be a slow process.

Winners and losers: Benefit sharing

There is not much publicly available data on benefit sharing along the chocolate supply chain. Regarding the share that farmers receive, different sources present different figures. Oxfam argues that farmers receive as little as 3 per cent (see Figure 25).

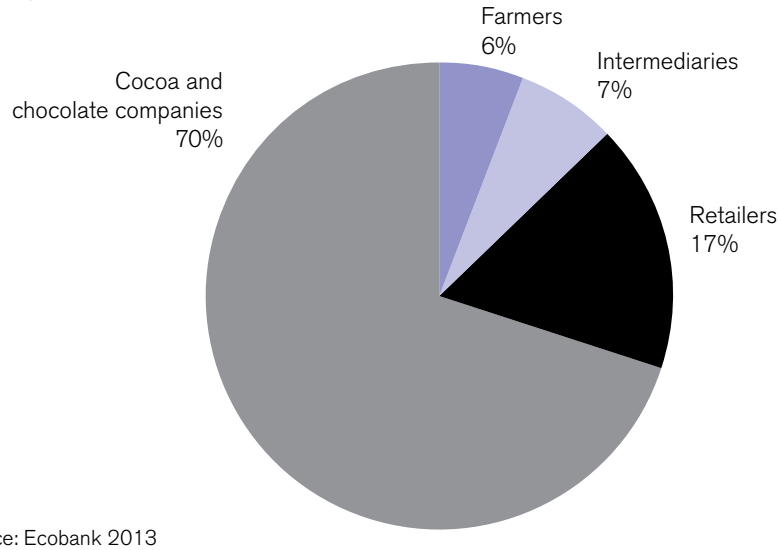
Figure 25: Farmers' share in value of chocolate bars in 2012



Source: Oxfam 2013

Industry experts suggest that around 6 per cent of the final chocolate bar price goes to the farmers, while about 70 per cent goes to cocoa and chocolate companies, as shown in Figure 26. This share has fallen from 16 per cent in 1980, which reflects considerable investments made by chocolate manufacturers in research and development and marketing (Ecobank 2013).

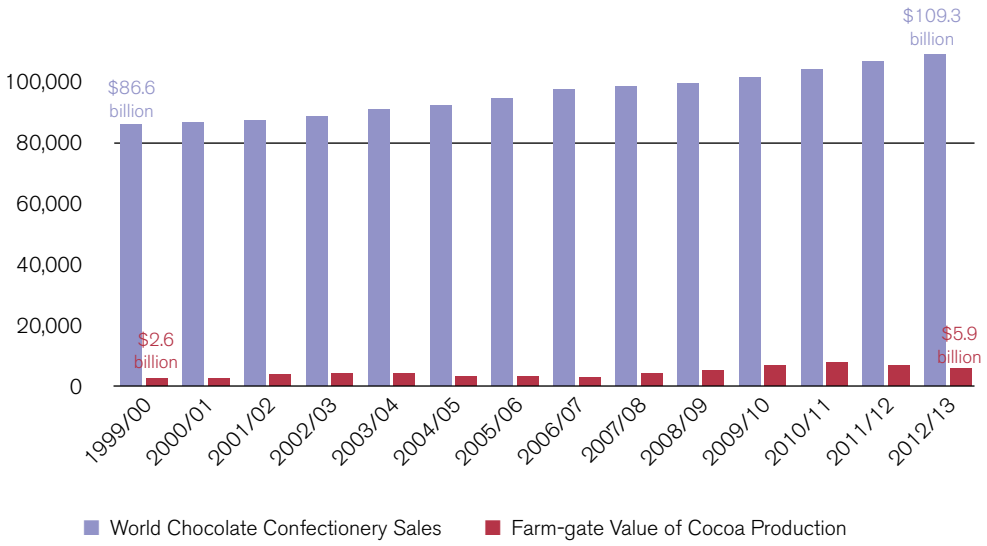
Figure 26: Share in the sales of an average chocolate bar (2012 estimate, based on a 100g chocolate bar at EUR0.79)



Source: Ecobank 2013

Chclt.net 2013 suggests that the largest share of cocoa price stays with retailers, not the manufacturers. When looking into benefit sharing, we must recognise the challenges of identifying the true share of cocoa to farmers, because, as noted, a chocolate bar can contain different amounts of cocoa depending, for example, on country legislation. Chocolate is different from coffee, as it is a more heterogeneous product, incorporating other raw material inputs such as milk and sugar. Figure 27 illustrates the startling difference in value of cocoa and chocolate. Notwithstanding the multiple products that goes into it, understanding the price structure of cocoa from the farm and in the chocolate might help identify potential incentives for insetting emissions and contributing to zero deforestation.

Figure 27: Global chocolate sales versus global farm gate value of cocoa production



Source: Euromonitor, ICCO

Not only do farmers receive very little of the total price, African producing countries also only retain a smaller margin of the value, given that most cocoa is exported as raw material. Even though Africa is responsible for about 70 per cent of global production, close to 75 per cent of cocoa leaves the country raw, going to Europe for processing and coming back as packaged chocolate. Export also involves high costs of employment, taxes and reinvestment in improving infrastructure, service provision and social aspects. Going further, experts suggest that 30 per cent of Africa's import bill in 2012 consisted of machinery, vehicles and electronics, highlighting the reliance the continent has on importing manufactured products from the rest of the world (Ecobank 2013). Another

issue highlighted by experts is the very small share of chocolate consumption in Africa.[25] This this is not the case in Brazil where most cocoa harvested is manufactured and consumed domestically.

Aware of these challenges, the 2014 World Cocoa Conference held in Amsterdam had a special focus on how cocoa farmers can improve their income. One of the key recommendations of the Global Cocoa Agenda is for countries to develop and implement a national Cocoa Development Plan derived from a fully transparent and participatory process with all key stakeholders involved in the cocoa sector, through public-private partnerships. Higher incomes generated from cocoa farming would attract a new younger generation of modern farmers as a preferred choice for employment.

Another possibility is to focus on improving social-environmental production issues and third-party certification, which in theory should pay a premium to the farmer. There should be a potential growing market for certification, given the commitments of large companies to only buy sustainable cocoa for the next few years. However, experts suggest that if certification becomes mainstreamed, it is unclear how the value of premium and certification in general will evolve over time (KPMG 2012).

Benefit sharing in Ghana

In Ghana, the price for cocoa paid to farmers is decided in a multi-stakeholder committee, the Producer Price Review Committee (PPRC). It is chaired by the Minister for Finance and Economic Planning (MOFEP), and membership includes representatives of farmers, the Ministry of Finance and Economic Planning and COCOBOD. With the introduction of competition in domestic buying, membership has been expanded to include other stakeholders, such as representatives of Haulers and the LBCs.

Since 2001, the PPRC has set aside a portion of the projected revenues for the delivery of services to arrive at a net Free on Board (FOB). Then the net FOB is allocated to various stakeholders, including producers.

The annual producer price increased from 56 per cent of the FOB in 1998/99, up to 70 per cent in 2004/05 (Ministry of Finance 1999) and 76 per cent in 2011/12. Also from 2013 to 2014, there was a 62.74 per cent increase in cocoa producer price. Table 8 provides information of net FOB in 2011/12 and 2012/13.

25 According to the Bank of America Merrill Lynch, consumer spending in three of Africa's largest cities – Accra, Lagos, and Nairobi – will more than triple from US$6bn in 2012 to US$22bn by 2022. That is an additional US$6bn of spending every year (Ecobank 2013). Most of this increase will come from Nigeria, reflecting the rise of its urban middle class.

Table 8: Net FOB, Ghana

	20011/12		2012/13	
	Rates (GHC/tonne)	% share of Net FOB	Rates (GHC/tonne)	% share of Net FOB
Farmers	3,280.00	76.04	3,392.00	78.42
Stabilization fund	25	0.58	–	–
Buyers' margin	342.55	7.94	342.55	7.92
Hauliers	140.40	3.25	140.40	3.25
CMC's internal marketing	45.11	1.05	45.11	1.04
Disinfestation/ grading/sealing	62.62	1.45	62.62	1.45
Crop financing	36.87	0.85	36.87	0.85
Scale Inspection/ Phytosanitary	0.33	0.01	0.33	0.01
Export duty/Cocoa roads	107.98	2.50	47.43	1.10
Farmers' housing scheme	1.02	0.02	1.02	0.02
Replanting/ rehabilitation (cocoa)	5.65	0.13	5.65	0.13
Replanting/ rehabilitation (coffee)	1.57	0.04	1.57	0.04
COCOBOD	264.65	6.14	250.00	5.78
TOTAL	4,313.75	100.00	4,325.55	100.00

The total value of Net FOB is 3,666,689,332.80 GHS, the price for one tonne of cocoa is 4,313.75 GHS. Source: Ghana Cocoa Board 2011.

As detailed in Table 9, producers receive a share of the sales, while the remaining amount is allocated to a diverse range of activities that are aimed at supporting the cocoa sector.

From the gross FOB price, 6.6 per cent is set aside to cover for "industry costs for the projects and the procurement of logistical materials for internal marketing operations during the 2011/12 cocoa year" (Ghana Cocoa Board 2011).

Table 9: Costs involved in internal marketing operations (2011/2012)

Costs involved	Amount in GHS
Disease and pest control cost	100,190,825.20
Jute sacks and related items cost	39,091,000.00
Scholarship fund	2,000,000.00
CSSVD cost	2,456,817.00
Hi-tech	106,970,000.00
Child labour certification	2,000,000.00
Farmers' pension scheme	7,602,025.00
Total	**260,310,667.00**[12]

COCOBOD provides the following services to its farmers: (i) extension via the Cocoa Swollen Shoot Virus Disease Control Unit (CSSVDCU) and the Seed Production Unit (SPU), (ii) Research via CRIG; (iii) subsidised fertilisers via Cocoa Hi-Tech; (iv) mass spraying via the National Cocoa Diseases and Pest Control (CODAPEC); (v) scholarships via COCOBOD; (vi) Seeds/ hybrid seedlings via CRIG and the SPU; (vii) rehabilitation and replanting via CSSVDCU; (viii) mistletoe removal via CSSVDCU; (ix) cocoa roads via funding from COCOBOD; (x) farmers' housing via funding from COCOBOD; (xi) farmers' pension scheme via COCOBOD funding .

The argument for allocating these services is mainly to address challenges such as aging farmers and aging and diseased trees, which impact productivity. Thus, COCOBOD sets aside over US$100 million from the gross FOB price to stimulate higher productivity levels among farmers (eg through the Hi-Tech programme, investments in Disease and Pest Control and Cocoa Swollen Shoot Virus Disease – CSSVD).

There is no price differentiation for cocoa of different quality in the country, so LBCs are not allowed to pay less than the fixed amount, nor are they encouraged to pay farmers more. Farmers report receiving prices very close to the official producer price, but price changes are not automatically communicated to farmers, who might receive amounts

relating to previous seasons' prices. This suggests information asymmetries and inequality between farmers and buyers.

Stakeholders in the country have different views on the amount that should be allocated to producers. Some argue that because the farmer is the one producing, 100 per cent should be allocated to them, while others believe that a share of the sales should remain with the government to sustain the industry.

Stakeholders interviewed argue that the system is still inefficient, and COCOBOD does not have the resources to reach all farmers, making benefit sharing between farmers unfair. COCOBOD argues however that even with limited resources they are still able to reach a large number of farmers through tools such as radio.

Additionally, researchers argue that while the price of cocoa paid to farmers have been increasing, these increments did not translate into increased purchasing power, as the farmers were not able to afford assets like televisions, mattresses and vehicles any better, five years after the programme was started.

Another important issue raised is how well the farmers are represented at the PPRC. Many stakeholders interviewed believe that representation is not optimal particularly in a situation where not all farmers are part of associations or even federations. Empowering farmers and farmers' organisations is critical to strengthening their position and voice in negotiations regarding various aspect of production and commercialisation of cocoa.

Farmers have been learning from the various technical services provided to them by both COCOBOD and companies. There is an acknowledgement in the country that the level of education is increasing and that the situation should improve over the years. However, a key factor missing is the ability of farmers to organise themselves and lead the process. Currently, different companies and programmes determine which elements they want to work and support in different communities. It is not the farmers themselves who identify their needs and set the path for change.

As mentioned, most farmers' support programmes focus on increasing productivity. The country needs more initiatives that focus on strengthening farmers' organisations and leadership. This could be an important propeller for greater influence in policy development, advocacy and lobbying. But also help to galvanize concerted action towards more sustainable production of cocoa.

Farmers do receive forms of support from their engagement in the supply of cocoa but most are towards increasing productivity and possibly benefiting more the various actors downstream. What is the real net benefit to farmers themselves?

Less than 40 per cent of farmers (ranging from 21 per cent in the Western Region to 52 per cent in the Eastern Region) recommend their children continue their cocoa growing activities, as most farmers consider that other sectors might offer better opportunities.

Most farmers report that their living conditions have worsened over the years, mainly due to decreasing cocoa prices, hence they have no disposable income. (Hainmueller et al. 2011).

Improving livelihoods

Increased demand for sustainability must come with the commitment to improve farmers' livelihoods and incomes. Sustainability ought to include increased benefits to the heart of the supply chain as well as other social and environmental aspects embedded in the zero-deforestation pledges. After all, increasing the share of certification hinges on net positive economic benefits to farmers.

The Second World Cocoa Conference (2014) highlighted that there are various overlaps among the cocoa certification systems, and that the economic pillar is still the weakest one. If there is no sense of monetary benefits for farmers to pursue certification, the argument for protection of biodiversity will not be sufficient. Biodiversity conservation is important for the ecosystem resilience as a whole, but farmers are not in a position to sacrifice their income to benefit society if they are not being compensated for it. Farmer's losses also mean losses in terms of employment conditions and state revenue. This would not be conducive to sustainable development.

The Key Performance Indicators (KPIs) need to be revisited and challenged for continuous improvement. To assess the impact of certification, the extent to which the criteria in the standards really contribute to sustainable cocoa farming needs to be measured. If there are doubts about the benefits of certification, the challenge is to draft criteria that measure the desired impact for the farmer, the community and the environment.

There are, for instance, claims in the literature that cocoa certification falls short of providing evidence that certification solves persistent problems in cocoa farming, such as gender inequality and the lack of democratic control in cooperatives. Although all certification schemes prohibit child labour explicitly, there is lack of data on the effectiveness of the schemes in eliminating child labour completely (KPMG 2012; Tulane University 2011). Climate change is another concern that is not currently being significantly addressed when discussing cocoa standards. An alliance of international and domestic players is essential for monitoring impacts on the ground, documenting and improving statistics. COPAL (see Box 3, p. 45) could certainly drive this process by engaging national statistics bureaus to strengthen information generation, analysis and dissemination.

4

Sustainable cocoa: ways forward

Greening the supply chain

An important factor for effective 'greening' is to consider the relationship between the various stages of processes in the supply chain and the natural environment and seek to mitigate externalities, and not only focus on managing the chain itself.

The framework for addressing the greening of supply chain management has come from environmental management and supply-chain management literature. There are various ways to define the process. It can range from green purchasing to integrated green supply chains flowing from supplier to manufacturer to customer. It can include several activities such as how one designs products, sourcing the (raw) material, manufacturing, transporting, and disposing of waste deriving from the end product. It can also include several strategies: such as using less (material or energy); substitution (toxic for non-toxic materials); cleaning-up of the outputs, and turning outputs into inputs through recovery options (Russel and Allwood 2007).

For many years, researchers and practitioners have focused on buffering business operations from external influences, among which we include the natural environment. This was mostly to increase efficiencies, reduce costs and increase quality. The natural environment has often been addressed as an external constraint, requiring operations to work within prescribed limits. The tendency has been for business to do as little as possible, even in addressing environmental impacts that are often legally required in many countries. This also gets small-scale producers of cocoa and other commodities off the hook precisely because they are small. However, the cumulative impact of their operations needs to be taken into account in the greening efforts. Governments and bigger players

in the cocoa to chocolate supply chain need to provide the right incentives and support systems at this level and minimise the burden for farmers. Therefore it is this dependency between the natural environment and the existence of business – such as reliance on raw material – that requires a more integrated framework to reconcile the business strategy aims and targets with sustainable natural resource management. Additionally, there has been mounting pressure for businesses to move their Corporate Social Responsibility (CSR) activities from deflecting attention to internalising externalities (Vogel 2006).

This dependency is also closely related to risk; risk of reliance and potential depletion of natural capital. Thus a more strategic way of looking at environmental management questions must be pursued by companies, as their investors, shareholders and general civil society (eg their consumers) will increasingly raise the issue – which can no longer be ignored given the impacts of and on climate change. Environmental management needs to be perceived as a business value driver, rather than a cost.

An example is Norway's government US$850 billion Global Pension Fund, one of the world's largest sovereign wealth funds, which decided to divest from 114 companies in the last three years, where it "considered there to be high levels of uncertainty about the sustainability of their business model" in relation to environmental, social and governance (ESG) issues.[26]

Another example was with Santander, which withdrew finance from the paper company Asia Pacific Resources International (April 2015) after receiving pressure from Greenpeace and petitions signed by its customers. April's operations were harming natural forests, so the bank decided that future loans to the company would be conditional upon the implementation of new sustainability measures that address its involvement in deforestation.[27]

The need to give a supply chain approach to the problem at hand has been highlighted by several researchers, practitioners and governments (Kissinger *et al.* 2012; Rautner *et al.* 2013; Nepstad *et al.* 2013). The G7 leaders, likewise, pledged to 'promote safe and sustainable supply chains' in 2015.[28] The industry has also acknowledged its share of responsibility in contributing to change. Private corporations have come together to make significant voluntary commitments towards halting deforestation.

Greening supply chain efforts can be approached as reactive, proactive and value-seeking (van Hoek 1999). In a sense, given that agricultural commodities are already well known for impacting forest resources, businesses should be on a reactive mode. But because

26 www.environmental-finance.com/content/news/worlds-biggest-sovereign-wealth-fund-discloses-divestments.html
27 www.environmental-finance.com/content/news/santander-withdraws-funding-april-after-greenpeace-deforestation-campaign.html
http://blueandgreentomorrow.com/2015/02/27/santander-commits-to-cutting-funding-for-deforestation-firm/
28 www.supplymanagement.com/news/2015/g7-leaders-pledge-to-promote-safe-and-sustainable-supply-chains

there is not yet clear association and organised regulation and pressure from civil society, there is still room for proactive and value-seeking efforts to take place. This includes the opportunity for businesses to transform greening as a 'burden' to a potential source of competitive advantage (van Hoek 1999).

Even though it is a complex issue to combine these two worlds – business strategy discipline with natural resources management – given the multitude of stakeholders interests, such as uncertain implications for competitiveness and international importance to name a few, business and society will only prevail if a more holistic approach to sustainability is adopted from cradle to grave.

Current interventions to address sustainability challenges or embrace sustainability

There are several initiatives being implemented to promote more sustainable cocoa. These include projects led by private actors under the banner of CSR or sustainability, as well as overseas development assistance initiatives, among others. This section describes some of these initiatives by different actors.

a. Demand-led

Stakeholder interviews highlighted the need to address demand side measures as part of a pathway towards reduced forest loss and emissions from production of commodities. Some interventions suggested were that consuming countries need to inform consumers to demand more sustainable products. This will give a market signal and green light to the industry to invest more in sustainability. For example, the low demand for sustainable certified cocoa makes it costly to run production solely focused on this type of commodity. Other measures include market campaigns, re-thinking subsidies to commodities that lead to deforestation, rethinking branding to communicate to consumers on quality and sustainability, not on price alone; and rewriting government procurement policies to help support the production of more sustainable commodities.

There is a need to promote more knowledge exchange on what works and on the enabling environment. Many indicated that the media has an important role to play in informing consumers by sharing relevant information with the public. This includes using social media and promoting strategic marketing of sustainable cocoa/chocolate.

Other governments are also aware of their responsibility towards improving the sustainability of cocoa. The EU, for instance, called on its member states as the world's

biggest chocolate consumer[29] and created the European Standardisation Committee (CEN), which is developing a European standard for traceable and sustainable cocoa.

As previously mentioned, the Netherlands hosts the world's largest cocoa–chocolate conglomerate, and is responsible for 25 per cent of all global cocoa processing and supports greening initiatives. The Dutch market has committed to 100 per cent certified sustainable cocoa by 2025. This has created a strong multiplier effect in the market. Private sector players, NGOs and development organisations signed an official letter of intent in 2010.[30]

Germany is one of the largest consumers of chocolate worldwide. The government, together with members of the private sector, civil society and development organisations, launched the Sustainable Cocoa Forum in June 2012, with the objective of increasing the amount of sustainable cocoa produced in countries like Ghana and the Ivory Coast, and improving the lives of smallholder farmers. The intent is that it will assist to link up initiatives and increase collaboration in the sector.[31]

As noted, there are a number of initiatives promoted towards encouraging more sustainable cocoa. However, there does not seem to be much synergy between them, which diminishes their overall impact. Additionally, climate change is not featured as a central concern in these interventions. Yet, impacts of climate change will be significant, threatening the whole industry.

Third-party certification could potentially create synergies among different initiatives as a common tool. And there do exist third-party certifications for cocoa, these will be discussed in the next chapter.

b. Company-led

Several companies are aware of the increasing demand for chocolate and the many challenges associated with promoting more sustainable cocoa to secure a long-term supply. Table 10 describes the commitments made by some of the large actors. Company-led sustainability monitoring tools including traceability are important not only for environmental protection reasons, but also to ensure quality of the beans.

29 www.europarl.europa.eu/news/en/pressroom/content/20120123IPR35955/html/Trade-MEPs-call-for-action-against-child-labour-in-cocoa-production
30 www.idhsustainabletrade.com/news/sustainable-cocoa-through-idhunder
31 www.bmelv.de/SharedDocs/Standardartikel/EN/International/Sustainable-Cocoa- Forum.html

Table 10: Example of cocoa corporate initiatives

Company	Programme	Location	Description
Mondelez	Cocoa Life	Ghana, Ivory Coast, India, Indonesia, Dom. Republic and Brazil	Its approach incorporates three main principles: holistic & farmer-centric; committed to partnerships; aligned with sourcing. It focuses on five key areas: farming, community, livelihoods, youth and environment – with a cross-cutting emphasis on gender underpinned by an operating framework that sets out the elements that expect to be in any Cocoa Life Programme.
Mars	Sustainable Cocoa Initiative	Global	Mars is committed to buying 100 per cent certified cocoa by 2020. As of 2012, about 20 per cent of Mars cocoa was certified. Actions planned: a) Certifying the entire cocoa supply and encouraging others in the industry to commit to certification, to reach as many farmers as possible. b) Conducting breakthrough research to improve cocoa breeding, farming methods and protection against pests and disease. c) Investing in critical cocoa sourcing regions to give farmers the knowledge and technology they need to triple their yields.
Cargil	The Cargil Cocoa Promise	Global	The Cargill Cocoa Promise is a global commitment to ensure that farmers have the right support, education and tools to sustain the quality and reliability of their products. It also commits to working with its customers to increase awareness of the issues and demand for sustainable cocoa.
Hershey	Cocoa Sustainability Strategy	Focus on Ivory Coast and Ghana, with programmes also in Indonesia and Latin America	Hershey's 21st Century Cocoa Sustainability Strategy seeks to modernise cocoa farming to increase farmer incomes, attract new farmers and improve cocoa growing communities. The strategy will also help accelerate Hershey's commitment to purchase 100 per cent certified cocoa by 2020 for all chocolate products around the world.
Ferrero	Cocoa Supply Chain		Ferrero reconfirms its goal to source 100 per cent sustainable cocoa before 2020 and, under its Code of Business Conduct, it highlights its strong determination to contribute to the elimination of child labour, starting with its worst forms, and of all forms of slavery, human trafficking, forced or compulsory, and prison labour. Ferrero's Code of Business Conduct is based on the principles of the ILO's applicable Conventions.
Barry Callebaut	Sustainable Cocoa		Its aim is to increase productivity and improve the quality of cocoa. In order to achieve this, efforts start at the very beginning of the supply chain in the countries of origin. The company strives to create the best conditions for cocoa farming by improving farming practices, as well as farmer education and farmer health. Its various programmes and activities contribute to increase cocoa farmers' yields in a sustainable way. It has established clear guidelines for its suppliers, which have to comply with a number of requirements, such as labour standards, quality and anti-corruption.

There are also more product-targeted initiatives – for example Unilever's 'low-carbon' ice cream, where the company's laboratory partnered with Cambridge University to ensure that all the cocoa for its Magnum ice creams is Rainforest Alliance (RA) certified by 2015 (Borg and Selmer 2012). Another is Source Trust[32] – which was set up by Armajaro to help farmers improve livelihoods through sustainable farming practices, leading to higher crop yields and increased quality.

Additionally, some companies, for example, Mars and Mondelez, are also engaging in initiatives such as the World Food Life Cycle Assessment Database (WFLDB). This database was launched by the Swiss Federal Research Station, Agroscope, and the consulting firm Quantis. It brings together experts from all the stakeholder groups along the food supply chain to develop a comprehensive and up-to-date inventory database for an accurate LCA of the food sector. It publishes datasets and information for the public on the modelling methods.[33] This is critical for informing investors and consumers about how the goods they consume are produced. It is suggested that the information be packaged in a more user-friendly manner to help inform consumer preferences on sustainable products. There are a number of NGOs partnering with these companies and assisting in the implementation of the initiatives. These include international organisations, such as the Nature Conservancy and Solidaridad,[34] as well as national ones.

c. Multi-stakeholder

One of the organised initiatives from the business sector came from the Consumer Goods Forum (CGF), a global, parity-based industry network with over 400 retailers, manufacturers, service providers and other stakeholders across 70 countries. In 2010, they announced two major initiatives on climate change including to help achieve zero net deforestation by 2020. The forum focuses on promoting the sustainable sourcing of commodities such as palm oil, soy, paper, and beef. It acknowledges that success will only be achieved by working in collaboration with governments as regulators and NGOs, not only as campaigners for sustainable production and consumption, but also as providers of services (such as agriculture extension) to the lower level of the chain (the farm).

Additionally, in September 2014, during the Climate Summit in New York, more than 20 global food companies, such as Dunkin Donuts, Krispy Kreme, Wilmar and Golden Agri-

32 www.sourcetrust.org/projects/index.html offers a financing system through which smallholder farmers receive payments from carbon credits, generated through the implementation of sustainable land management and agroforestry practices. It is an NGO, funded by the Ford Foundation, WCF, and the Sustainable Trade Initiative (IDH).

33 Governmental institutions as well as private companies fund the project, which allows the most urgent needs of the food and beverage sector to be addressed through a consensus process. The funding partners are: the French Environment and Energy Management Agency (ADEME), Bayer, the Swiss Federal Office for the Environment (FOEN), General Mills, Kraft Foods, Mars, Mondelēz International, Monsanto, Nestlé, Syngenta and Yara. More at: www.agroscope.admin.ch/aktuell/00198/05299/05494/index.html?lang=en&msg-id=49817

34 www.solidaridadnetwork.org/regions/west-africa and www.quantis-intl.com/microsites/wfldb/

Resources, committed to deforestation-free policies for sourcing palm oil. Companies such as Cargill and Mars[35] extended the pledge to also cover cocoa.

There are also business and investors joining coalitions to encourage governments to approve an international agreement, but also taking action towards a zero-deforestation supply chain. One example is: 'We mean business', a coalition of organisations working with businesses and investors that recognise the threats that climate change can pose, not only to society, but specifically to their business. They are taking action towards a low carbon economy to secure sustainable economic growth. One of the goals is zero-deforestation supply chains.

Despite these private sector pledges, it is not yet clear how these commitments will unroll in practice, with conservationist groups asking if it is even possible to achieve zero-deforestation (Sonenshine 2013). Researchers and practitioners have been discussing the different elements that zero-deforestation commitments should incorporate, including safeguards and emerging best practices on governance, land tenure, biodiversity, rural development, local communities and indigenous peoples' rights (WWF 2015; TFD 2014)

The main challenge is to ensure that zero-deforestation commitments are not reduced to conserving forest plots adjacent to agriculture areas, but that they enhance the sustainability of the landscapes where the raw material is produced, as well as the rest of the supply chain – from farmer to consumer.

The World Cocoa Foundation (WCF) is an organisation based in Washington DC with over 100 members (representing about 80 per cent of total cocoa produced), and it also includes retailers such as Marks & Spencer. It works to empower communities by training farmers, enhancing education, investing in families, and improving community health and welfare.

- Countries with operations: Africa (Ivory Coast, Ghana, Liberia, Nigeria, Cameroon); Americas (Mexico, Guatemala, Colombia, Ecuador, Peru); Asia (Vietnam, Malaysia, Indonesia, Philippines, Papua New Guinea).
- Programmes:
  - **African Cocoa Initiative:** a public-private partnership to double productivity for 100,000 cocoa farm households through the strengthening of local and national institutions, and in so doing raise farmer incomes by 150–200 per cent.[36]
  - **The WCF Cocoa Livelihoods Programme:** works to double the income of approximately 200,000 cocoa-growing smallholder households in West and

35 Mars deforestation policy available at: www.mars.com/global/about-mars/mars-pia/our-supply-chain/our-strategy-and-priorities.aspx
36 For more information, refer to http://worldcocoafoundation.org/wcf-african-cocoa-initiative/ [Accessed on 20th May 2014]

Central Africa. The overall goal of the programme is to increase farmers' income while strengthening local service capacity.[37]

– Building on WCF member-supported pilot education programmes, **ECHOES** strengthens cocoa-growing communities by expanding opportunities for the youth and young adults through livelihoods, literacy and basic education.

The International Cocoa Organisation (ICCO)[38] is a global organisation, composed of both cocoa producing and cocoa consuming member countries. ICCO was established in 1973 to put into effect the first International Cocoa Agreement which was negotiated in Geneva at a United Nations International Cocoa Conference. It works towards promoting a more sustainable cocoa economy. ICCO's work related to sustainable cocoa production and consumption includes: the co-ordination and rationalisation of policies for production and programmes for cocoa producing countries; the improvement of knowledge available on cocoa resources in producing countries; the compilation of an inventory on the health and nutritional attributes of cocoa and chocolate; and the generic promotion of cocoa and chocolate consumption in emerging markets. ICCO has initiated and supervised a number of projects in the cocoa sector with an emphasis on the development of cocoa production and trade, as well as on the improvement of the income position of smallholder cocoa farmers.

The Roundtable for a Sustainable Cocoa Economy (RSCE) is an initiative for dialogue and sustainability for all stakeholders in the cocoa economy: cocoa farmers and cooperatives, traders, exporters, processors, chocolate manufacturers, wholesalers, governmental and non-governmental organisations, financial institutions, as well as donor agencies.

IDH – the Sustainable Trade Initiative[39] covers different commodities. On cocoa they have launched several programmes, including the **Cocoa Fertiliser Initiative** (2012), the **Cocoa Improvement Programme** (2008–2011), and are currently promoting a sustainable cocoa landscape initiative in the Ivory Coast.[40] The IDH cocoa programme brings together over 40 per cent of the worldwide cocoa processing industry and 30 per cent of worldwide chocolate manufacturing businesses. It also involves local governments and other stakeholders. IDH also launched a sustainable landscape

37 **Contributing partners**: Bill & Melinda Gates Foundation; **Major branded manufacturers:** The Hershey Company, Mars, Incorporated and Mondelez International; **Cocoa processors:** ADM Cocoa, Barry Callebaut, Blommer Chocolate Company, and Cargill; **Supply chain managers & allied industries:** Armajaro Trading Ltd., Ecom Agrocacao, Guittard Chocolate Company, Meiji, Noble Resources, Olam International Ltd., Petra Foods Ltd., See's Candies, Inc., Starbucks Coffee Company and Transmar Commodity Group Ltd.; **Other key contributors:** The German Ministry for Economic Cooperation and Development (BMZ) and the Sustainable Trade Initiative (IDH).

38 www.icco.org/about-us/about-the-icco.html

39 www.idhsustainabletrade.com/sustainable-land-and-water-program

40 The Initiative for Sustainable Landscapes: www.idhsustainabletrade.com/sustainable-land-and-water-program

initiative. The initiative proposes to work beyond farm-level, supporting food production, ecosystem conservation, and rural livelihoods across entire landscapes in an integrated manner. It also aims to leverage and balance the interests of different stakeholders, such as companies, governments, and civil society organisations.

d. Third-party certification

Market mechanisms can contribute to driving sustainability. Certification is a helpful tool to assure consumers that Corporates are taking action and to guide farmers on how to improve their plantations and manage their farms. It brings discipline to farmers and helps them to comply with legal requirements. Consuming and producing countries should work more closely together to promote the sustainability of commodities from farmer to consumer. While many agree that certification is one of the few existing tools to deliver third-party 'good' cocoa, they equally highlight some issues to its wide application:

- The very high cost, burdensome process is not optimal as it is not necessarily paying a premium to farmers. Not all certified cocoa finds a buyer, despite the fact that the industry has made commitments to only purchase sustainable cocoa.
- Industry and government tend to work with 'low-hanging-fruits' – farmers that are better organised, rather than also work with the more vulnerable ones.
- Certification lobby groups sometimes coerce corporates to get certified.
- Ability of certification bodies to inspire innovation, not only be certifiers of compliance
- Cocoa certification and other initiatives to promote sustainability mostly focus on social issues (eg labour), as the environmental aspects are not yet so clear to consumers. But climate change awareness has started to change that.
- Small-scale manufacturing corporates wanting to work with sustainable commodities struggle to find supply, besides dealing with high cost and inadequacy of machinery required for processing.
- Sustainability packages need to make economic sense to farmers in order to effectively engage them. The business case for environment and climate change needs to be clearly presented.
- Certification needs to be re-thought. The on-going ISO/CEN standard for sustainable cocoa is a multi-stakeholders process trying to address key questions, but it is still not clear how verification will be done.
- Traceability is key to monitoring legal compliance, and delivers environmental benefits. Local institutions involved in marketing such as COCOBOD should seek to innovate and improve it.

- Efforts to promote sustainability of commodities should learn from REDD+ and Forest Law Enforcement, Governance and Trade (FLEGT) processes, and think more towards contributing to a green and circular economy, so all actors along the supply chain should be involved in promoting sustainability. There is general acknowledgement that certification needs to improve and innovate to find solutions to sustainability challenges. Focusing on ensuring sustainable production practices across the broader landscape is one way to do so.

There is an on-going debate on cocoa on its trade-offs between productivity, profitability, the environment and social aspects. There has been an increased tendency towards crop intensification and full sun cocoa to deliver higher yields on a shorter term, but this may compromise climate change adaptation, and increase farmers' vulnerability to global price volatility and food security. There are several benefits in focusing on a more agroforestry approach, but the system needs to make monetary sense, otherwise it will be just a good idea on paper, without practical application in the field.

As a response to this debate, certification systems have emerged to try to confer more sustainability to the cocoa supply chain. These schemes were developed to help address biodiversity loss, provide incentives to maintain shade on the farms, increase the market share of sustainable products, as well as deliver livelihoods benefits. However, it is still considered a very bureaucratic and costly process, and poses many entry barriers to smallholders. This is particularly the case with cocoa as most production takes place in smallholdings, which become costly to certify on their own. There is a need to invest in more national certification bodies with international credentials to help reduce the costs. This is something that the Alliance of Cocoa Producing Countries (COPAL), for example, could spearhead. Certification provides third party assurance and legitimacy, which companies themselves might not have in the eyes of the consumer. However, it is not always clear who should pay for certification, and who ultimately benefits.

The three main certification schemes for cocoa are Fairtrade[41], Rainforest Alliance[42] and UTZ.[43] They are largely similar in terms of aiming to promote more sustainable practices along the cocoa chain, even though they adopt different structures in relation to, for example, how they pay premiums and specific requirements related to climate change.

Fairtrade focuses more on developing sustainable trade relations, while UTZ and Rainforest Alliance have a greater focus on increasing farmer productivity and yields as a way to strengthen farmers' production systems. Table 11 summarises the biodiversity and climate change approaches of each certification scheme.

41 www.fairtrade.net
42 www.rainforest-alliance.org
43 www.utz.org

It was estimated that certification schemes covered 6 per cent of the market in 2010, which was a 100 per cent increase from 2009, when it was estimated that 3 per cent of cocoa production was certified. More recent figures suggest that about 20 per cent of world cocoa is eco-certified (ICCO 2014), including 13 per cent by the Rainforest Alliance which has certified more than 927,000 ha, mostly in the Ivory Coast, Ghana and Indonesia (SAN 2014). However, there are debates over double-certification; cocoa that has more than one certificate, and leakage to conventional channels, ie certified cocoa that is sold as non-certified in conventional markets, which may impact the total certified cocoa available (KPMG 2012). One of the main goals of certification is to provide a premium to encourage sustainable management.

Table 11: Certification schemes – biodiversity and climate change

Scheme	Biodiversity and climate change
Fairtrade	Fairtrade provides recommendations on the more efficient use of energy and the replacement of non-renewable sources by renewables whenever possible in the processing facilities. It also will require the registration of greenhouse gas emissions savings where initiatives are in place by 2017. There are no requirements concerning shade trees.
Rainforest Alliance	Rainforest Alliance has specific requirements for farmers to maintain existing shade trees or plant new ones. Farmers need to have plans in place to reduce their carbon emissions or increase carbon sequestration, and they are also required to report their energy use per source annually and have a plan for energy efficiency.
UTZ	UTZ also has specific requirements for farmers to maintain existing shade trees or plant new ones. Even though farmers should have a risk assessment and environmental impact action plan, no direct recommendations are given in relation to GHG emissions, as it argues that mitigation is addressed through forest cover and other environmental aspects, and energy use is minimal.

As seen, there are three main standards which overlap with each other. Some stakeholders interviewed in Ghana for this study could not differentiate between standards and felt that there was competition between standards, rather than a genuine interest to push the sustainability agenda forward.

Recognising these overlaps, in 2014, ICCO held a workshop to discuss developing a common framework for the different standards. This would use a set of commonly agreed pre-competitive, minimum requirements, up to a threshold level, beyond which individual certification standards would be free to compete with one another based on their unique specific requirements, taking into account the demands of individual consumer market segments. There was a common understanding that all players in the supply chain would gain from a more simplified approach and a common simplified language. In addition, transparency about the roles and actions of the stakeholders involved was imperative, as well as affordability; comparable KPIs for impact assessment/measurements; and a reduction in auditing procedures and transaction costs.

Additionally, a voluntary framework for sustainable cocoa that could help align industry efforts is planned for 2016. The European Committee for Standardisation (CEN) and the International Organisation for Standardisation (ISO) are creating a joint standard for traceable and sustainable cocoa. The system aims to set up a low-entry level to help ensure that sustainable cocoa becomes mainstreamed and is no longer just a niche product.

From farm to landscape: could certification make this leap?

Given the limited benefits of the current cocoa certification standards, an alternative could be that certification looks more at the landscape, rather than just the cocoa farm, thereby complementing efforts with other initiatives to promote increased biodiversity conservation and restoration. The three main cocoa certification standards recognise the need to look more at the landscape. Boxes 4 and 5 summarise some examples of their reactions to the issue.

Box 4: Rainforest Alliance's landscape approach

As a response to inefficient cocoa production in Ghana, the Rainforest Alliance is developing a landscape approach by linking the forestry and cocoa sectors in Western Ghana. In identifying a site for a REDD+ project in the Bia/Juabeso region in Western Ghana under the Forest, Climate & Community Alliance (FCCA) programme, it was concluded that most forests had been converted into cocoa lands and decided to integrate cocoa certification and REDD+ into one innovative landscape approach.

For cocoa farms, the Rainforest Alliance has developed an approach where certification against the Sustainable Agriculture Network (SAN) standard is extended by adopting the new SAN Climate Module, enabling communities to adapt to the changing climate while also mitigating climate change through using climate-friendly practices on their farms.

This integrated approach achieves the interactive benefits from combining trees with better management of cocoa crops, not only on isolated farming practices but at a relevant landscape level. These benefits are: more trees (shade), carbon (soil and above ground) and mulch, better farm management, higher yields, less waste and greater efficiency.

Working at the landscape level provides a stronger assurance that improving performance at farm level will reduce incentives for farmers to expand their farms. This is the intended result of intensified production, better land tenure arrangements and improved management of forested lands. This is critical in this part of the Western Region where cocoa completely dominates the landscapes and illegal encroachment into forest reserves is still observed. The project concept is ultimately to replicate this model in other biodiversity hotspots in the cocoa growing countries.

Source: Brasser 2013

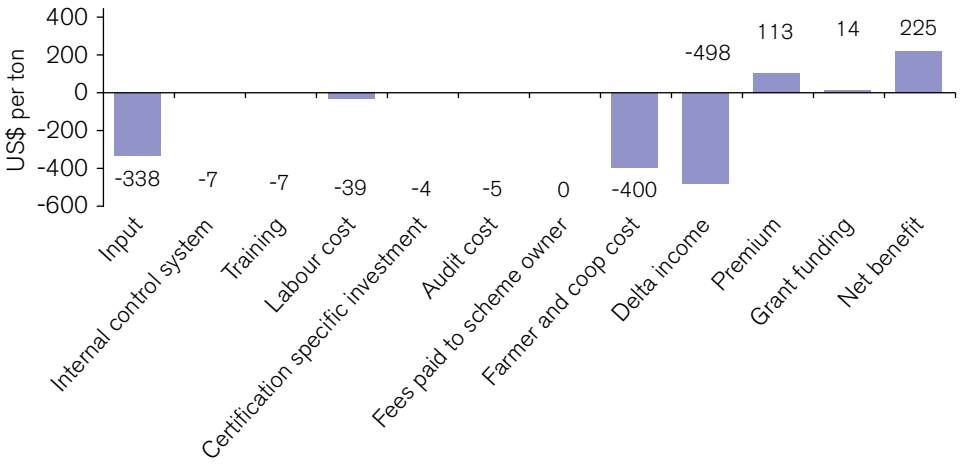
Box 5: Fairtrade's landscape approach

Landscapes are complex environments that consist of forests, plantations, farmland and human settlements. One of the biggest challenges of a landscape approach is the need to balance economic needs, such as improving agricultural productivity and rural livelihoods, whilst addressing the threats posed to forests, farmland, water and biodiversity. The Gold Standard Foundation together with FSC, Fairtrade International and WWF, have joined forces, pooling their extensive expertise to develop a set of comprehensive schemes that will effectively help to address this challenge. A landscape approach requires safeguards, community engagement and fairness, and a rigorous Measurement, Reporting and Verification (MRV) of both emission reductions and wider social and environmental benefits.

The business case for certification

Studies have suggested that the net benefit of certification after six years in the Ivory Coast is US$114/ton, and US$382/ton in Ghana (KPMG 2012)[44]. These estimates are based on 101 per cent yield improvements in the Ivory Coast and 89 per cent in Ghana within three years of implementing good practice guidelines and complying with the eco-label criteria. However, the same study highlights that the net benefit decreases to US$84 in the Ivory Coast and US$38 in Ghana without any productivity increase. Despite the drop, the study argues that there is still a business case for certification.

Figure 28: Net benefit per ton over a six-year period based on averages of model variables



Source: KPMG 2012

44 The payback time in the Ivory Coast is between two to three years and in Ghana approximately one year.

As shown in Figure 28, input and labour are the most important cost factors.

Another study calculated that, with a premium of US$40/ ton, the profitability of Rainforest Alliance certified cocoa agroforestry systems was less than that of an intensive monoculture, which is estimated to produce 20 per cent more than a well-managed cocoa agroforest (Gockowski *et al.* 2013). Adding to that, Asante *et al.* (2014) demonstrated that the on-farm economic benefits of cocoa agroforestry systems in Ghana (including sales of cocoa and timber after 20 years) are not sufficiently attractive to farmers. The study argues that even a US$200 premium/ton for Rainforest Alliance- certified cocoa beans would not be significant enough to compensate for the loss of cocoa productivity in comparison to full sun, intensive cocoa cultivation.

Therefore, there is an agreement that additional revenues should be generated, if agroforestry systems are to be pursued. These could come, for example, from carbon sequestration. But, as noted, the current cocoa schemes do not account for GHG emissions. Adding GHG accounting could potentially lead to more benefits, but it is not clear if the costs to set it up would be compensated by benefits at farm level. However, the short-term high return from intensified, full sun cultivation systems have higher climate vulnerability, therefore an equal risk of higher losses in returns in the medium to long term. The trade-offs are significant, therefore the choice towards some shade production systems should be considered as a necessary step to insetting emissions and more resilient landscapes.

Climate change mitigation and adaptation

It is not clear if third-party cocoa certification, as it is currently designed, contributes to climate change mitigation and adaptation goals. There is currently no way to measure this. To explore this issue, it is important to identify the unit of analysis, ie the farm versus landscape.

A review compared Rainforest Alliance certified shade-grown cocoa and intensified full-sun production system in terms of yield, profitability and environmental impacts (Gockowski *et al.* 2013). It concluded that full-sun is the most profitable, but RA and shade-grown deliver more ecosystem services. Nonetheless, for RA to achieve the same yield as full-sun (eg to meet global demand), another 222,000 ha would be required, putting into question which system would impact environmental services the least in the short run (Gockowski *et al.* 2013). This has fuelled debates over 'land sharing' versus 'land sparing' strategies (Burney *et al.* 2010; Gockowski *et al.* 2013; Vaast and Somarriba 2014).

To understand the trade-offs between intensification, land use change and climate emissions, Burney *et al.* (2010) conducted a global macro-analysis and found that while the per-hectare emissions of intensive agriculture were greater than from low-

input organic agriculture, the avoided expansion of agricultural land use, mostly due to development of modern practices, makes the latter a more attractive option in terms of avoiding emissions. Gockowski and Sonwa (2011) reached the same conclusion in Ghana when they analysed the issue of land sparing at a broader scale.

If one adopts a broader analysis, this puts into question which regime would be best if the goal is to address climate change not only at the landscape level, but also at the global scale, given that the Rainforest Alliance's approach may actually result in a higher level of environmental degradation.

Nonetheless, as previously discussed, the authors continue to raise the long-term disadvantages of full-sun, and argue that very little research has been conducted on the replanting and rehabilitation of intensified perennial systems. In addition, there is currently no system in place that pairs intensification with avoiding the expansion of production. One would have to develop a system that somehow certifies intensification – using proper hybrids and more advanced technologies so as not to lead back to the boom and bust cycle – together with conserving analogous forests.

Market access

Several companies have made commitments towards promoting and sourcing sustainable cocoa, which could suggest that the share of certification will increase. These include commitments from Mars and Ferrero to source 100 per cent sustainable cocoa by 2020. Organic cocoa, though, does not seem to be a market preference (Ministry of Foreign Affairs, Netherlands 2011). Successful implementation of climate-smart production will certainly need an understanding of consumer behaviour and critical drivers of consumer preference.

These commitments, together with the concern to secure supply, have led to several partnerships between the different actors along the supply chain, including, for instance, Mars working with three main certification schemes, together with IDH, the German International Cooperation (GIZ) and other private sector actors (Barry Callebaut, ADM and Armajaro) with the support of the World Cocoa Foundation to boost the capacity of the cocoa sector in Western Africa (KPMG 2012).[45]

Nonetheless, interviews with chocolate supply chain actors in this study revealed that cocoa is not being sold at a premium, and that actual market demand has been low. So this poses a critical challenge to achieving the pledges towards zero-deforestation supply chains.

45 See also www.idhsustainabletrade.com/cacao-cce

5 Looking ahead

Managing the landscape, not a fenced forest

As discussions around zero-deforestation have found, initiatives should not aim to protect isolated patches of forests, but promote synergies with efforts to increase ecosystem resilience and improve livelihoods. Additionally, experience from REDD+ pilot projects suggests that the boundaries of these initiatives should not be restricted to small areas where production is concentrated, but rather the broader landscape, integrating different land uses and actors. The broader the scope and the more actors involved, the higher the likelihood of ensuring permanence and avoiding leakage (Nhantumbo and Camargo 2015).

There is a global agreement that we should work at landscape level, but research is needed to define the borders of that landscape (political, geographic, ecosystem). Conservation of remaining forests is important but restoration of degraded land can help address deforestation (zero-net-deforestation). Focus should also be more on creating synergies between adaptation and mitigation activities. This is best addressed using a landscape approach.

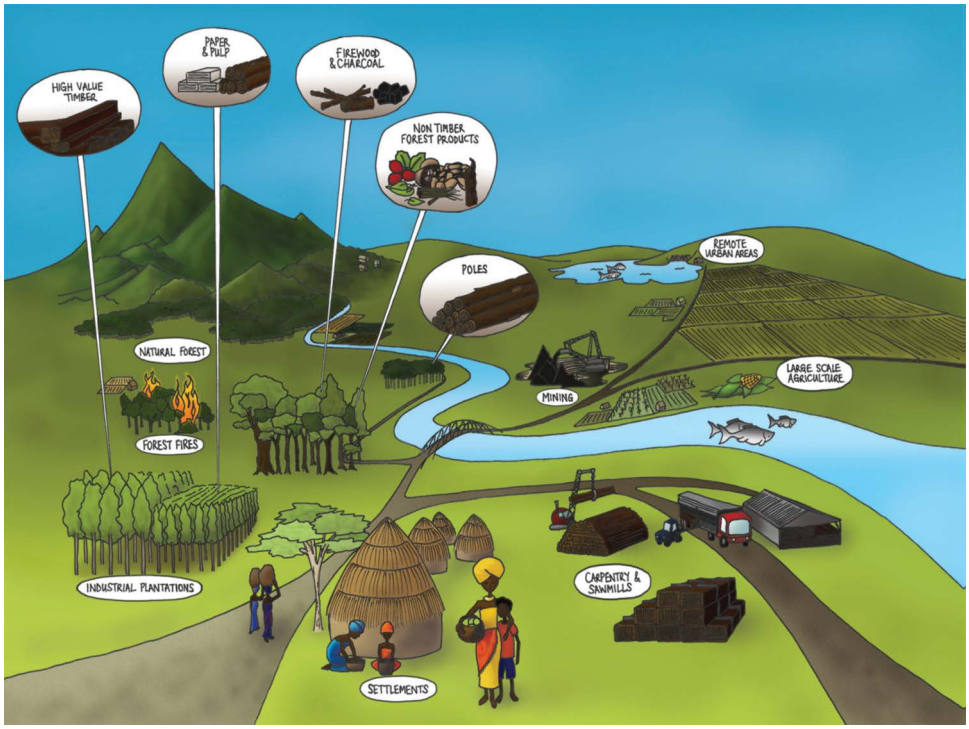
Even though there is some acknowledgement that suboptimal management of cocoa plantation will likely reduce productivity of the farm over time, farmers do not (cannot afford) to think long term. Incentives have to be put in place to stimulate an integrated approach to sustainable land use.

NGOs believe that by developing successful projects (eg landscape wide projects; market campaigns) will help make the business case for sustainability, attract more investors, and convince the government of the potential that cocoa has to improve economy. This needs buy in from large investors and government to promote increase in scale.

Cocoa in the landscape: leading the way

Cocoa farms are embedded in a landscape where different actors co-habit, and different land uses compete (see Figure 29). These include mining, forests, fisheries, and slash and burn agriculture. Therefore, these multiple drivers and actors need to come together and build integrated approaches to optimise production, deliver different goods, build ecosystem resilience, and improve livelihoods, eg ensuring food security and diversified income.

Figure 29: The landscape and its diverse uses and users



On the environmental side, one cannot ignore the prediction of climate change impact on West Africa, and how this might impact land uses such as cocoa (see appendix 2). Estimates are that there will be a shift and decrease of cocoa growing area over the next 40 years due to climate change. Therefore, building ecosystem resilience by strengthening the landscape with forest resources is extremely important to secure supply of commodities such as cocoa over time.

However, integrating forest conservation and restoration in the landscape comes with its challenges, as farmers in countries like Ghana understand the services that the forest provide but feel disenfranchised to maintaining them and do not have a relationship with the areas through other uses such as tourism and recreation. Forest reserves are fenced areas, which the government struggles to defend against encroachment. There is a need

to change the current forest and tree ownership arrangement influencing the farmers' mind-set, and promote efforts for their integration and engagement with the forests. A clear financial incentive is also necessary to move ahead in pursuing sustainability. Forests are currently seen as wasteland; land that could be planted, but is just sitting there unused.

But cocoa could help change that reality and lead the way for promoting more sustainable landscapes. As discussed, cocoa grown in 'smart' agroforestry systems have the potential to not only increase yield over time, but also contribute to increased ecosystem resilience and biodiversity protection, which can render important environmental services to support the growth of other commodities. It also contributes to diversify farmers' income, and reduce their dependence in one commodity.

Additionally, as previously discussed, research indicates that certification should also go from a farm to landscape focus. This larger approach would help build climate resilience of not only the larger area, but also of individual cocoa farms; help sequester carbon (giving another source of income); and avoid expansion of cocoa farms into conservation areas. Such system is complex as land users across sectors need to understand the value of certification and be able to afford it. Here is where programmes implemented in the cocoa landscapes can contribute and development agencies as well as private sector should come together to develop and implement an integrated resource use plan. In both Ghana and Brazil there are initiatives that can help with such efforts: the Emission Reduction Programme (ERP) and Atlantic Rainforest Restoration Pact.

The variety of benefits associated with managing the landscape in an integrated manner can outweigh the short term costs of interdisciplinary technical challenges and can be more costly when compared with promoting isolated initiatives (eg certification of a cocoa farm).

Better coordination of stakeholders along the supply chain

All actors interviewed along the supply chain emphasised the importance of coordinated collective action and individual responsibility to engage multiple actors in the dialogue for a transformative change agenda on sustainable commodities. Multi-stakeholder platforms are very useful fora to bring actors together and chart joint initiatives. Policies and incentives need to be enacted targeting actions at different levels from landscape to foreign consuming countries (see Figure 30). Furthermore, the different actors can select a range of instruments to work with as indicated in Figure 31.

Figure 30: Concerted policies at different levels to promote sustainable cocoa-chocolate

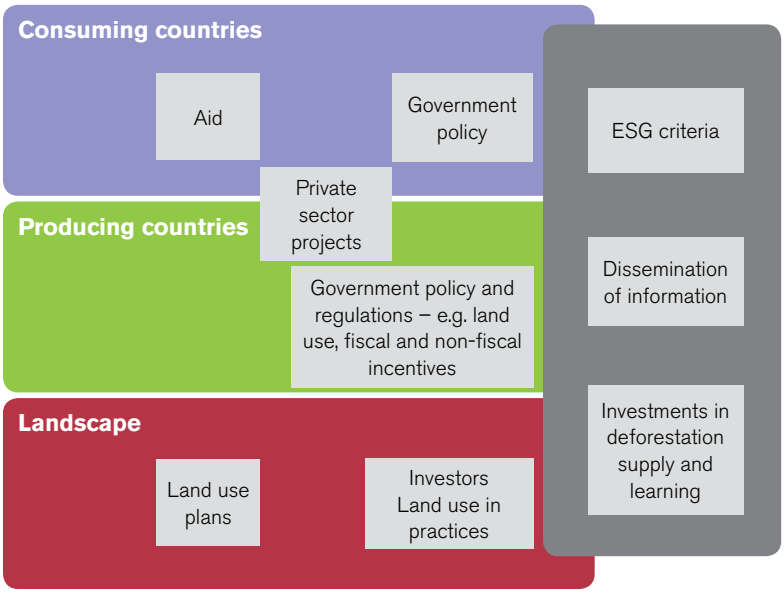
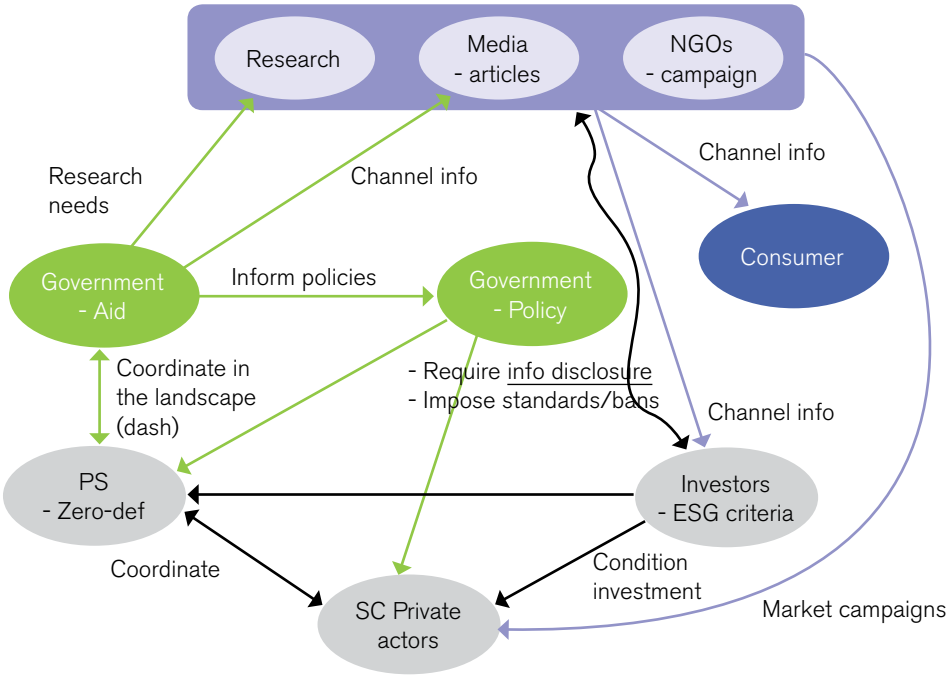


Figure 31: Example of tools that can be used by different actors to promote sustainability of cocoa-chocolate



Governments

Coordination between different consuming and producing government departments should increase, to allow for more synergies as should engage other stakeholders to ensure concerted interventions. The National Cocoa Platform in Ghana for example has allowed stakeholders from across the board to work together.

Government officials also need to improve capacity in understanding the issues and potential solutions in order to lead the search for solutions. Governments need this knowledge to lead the development of regulations on key issues (such as land tenure, fiscal and non-fiscal instruments including performance based incentives/payments, transparency and information disclosure) that can contribute to positive and long-term change towards sustainable commodities. For example, there were calls for the Government of Ghana to enact legislation requiring transparency to enable traceability of commodities. Taxation instruments help address sustainability on the ground – an opportunity for consuming and producing countries to cooperate in defining options for effective application.

Often local governments are not included in the platforms that discuss and make decisions about sustainability. Yet they are responsible for ensuring compliance with legislation and good production practices on the ground. Messages and opportunities need to reach high level government officials as at decentralised level so change can happen.

Traders have been working on the ground with farmers and have a very good understanding of local challenges. Government should engage them more actively in finding solutions to challenges faced by farmers – eg provide extension services, with partial funding from the government/other institutions). The several programmes such as the World Bank Climate FCPF, UNDP and IDH can be used as levers for that.

Communication and information sharing is fundamental to avoiding duplication of efforts.

Private sector

Efforts need to be put in place to stimulate both supply and demand of cocoa/chocolate – there are several benefits of bringing together stakeholders along the supply chain to learn how to build synergies and increase efficiency and sustainability of the end product. Climate change will affect cocoa growing areas, so there is a need for adaptation and to feature prominently on corporates' agenda. Hence, industry is considering **how** to implement zero-deforestation commitments.

Engaging private actors is key, but like governments, companies have several departments, hence requiring high level leadership for setting up and following through on a sustainability agenda. It is also important to bring to the table the adoption of insetting by private sector to cover the different roles along the supply chain including retailers and

packaging. Competitiveness should not constitute a hindrance for cooperation amongst corporates. Furthermore, corporates should share lessons about sustainable cocoa but also sustainable chocolate and bring other sectors such as dairy and sugar to join the efforts to promote zero-deforestation and sustainability in general. The cocoa sector should also be more active and learn from other the experience of other commodities, such as wine and coffee. Industry associations/foundations provide an important platform to bridge between different players along the supply chain making it easier to identify sustainability challenges and opportunities for change. The industry is (to a certain extent) willing to cooperate/coordinate more with other stakeholders, such as the government. However, the latter has to take an active role in engaging private companies. For example, there are some platforms established in consuming countries (eg at EU level) but engagement is mostly limited to consultations, not joint policy/programme planning. The industry is ready and willing to cooperate and build more Public-Private Partnerships. There are some private sector leaders, such as Unilever, but we need to find a way to also encourage slow adopters or risk-averse companies to join the sustainability movement. The leaders or front runners in the market should inspire small enterprises to join the sustainability movement. Governments should enable dialogue. The collaboration also should foster integration of industry sustainability programmes with large-scale government programmes implemented in different landscapes, including the ER programmes that are undertaken in the context of REDD+. There are benefits of working at landscape level (as cocoa farmers are in any case scattered) in order to improve broad ecosystem resilience, which in turn will also secure the long term supply of cocoa. Overall inter-sectorial dialogue and coordination has to be enhanced to address drivers of deforestation. This integration also enables addressing different aspects of sustainability including food safety, labour conditions, gender equity, empowerment, transfer technology to farmers (eg mobile), improve agriculture practices, provide training, and identify markets.

Academia and research, donors (aid), and governments should be more proactive in engaging with the private sector too to understand the issues and unanswered questions, such as the costs of change in practices to achieve sustainability.

NGOs

It is very important for stakeholders such as NGOs to continue pressuring government to move from commitment to transformative changes in addressing sustainability, but also taking responsibility to present workable options to the challenges at hand. Both governments and private sector are heterogeneous in mandate and capacities. NGOs need to identify the best tailored strategies that work for different types in order to encourage them to become more sustainable (eg some are more exposed to public opinion than others). NGOs also play a key role in delivering support to farmers at

local level. However, coordination is not an easy task. To bring stakeholders together and align interests requires willingness and strong leadership.

Governments often face difficulties in promoting coordination within their subdivisions (eg ministries of agriculture, environment, and finance), as these tend to compete for funds and agendas, leading to a situation where self-interests might dominate the process, taking away the focus on the issue at hand and debates over which institution is actually more capable to deliver outcomes.

Thus, leadership must be strengthened. Processes and frameworks need to be established to avoid that competition for funds between different agencies take over. After all, if better coordination is promoted, processes are likely to be more effective and less resource consuming, which is a broad societal gain.

Private companies' departments (eg sustainability, marketing, sourcing) are also often in disagreement in terms of priorities, and these can shift rapidly with a change of staff and CEO. There is also strong competition between companies, which are not likely to cooperate if the issue at hand might compromise their competitiveness. For example, companies are not willing to disclose suppliers and prices.[46] To prevent these realities, an independent forum could be created, offering an overarching framework that brings all these stakeholders together to draw up agreements, roadmaps, and commitments that bind institutions, bullet-proofing them from organisations' internal disagreements and changes.

There are some emerging initiatives such as the Sustainable Trade Initiative (IDH) and Tropical Forest Alliance 2020 (TFA 2020).[47] However, given the size of the global sustainability challenge we are facing, more action is needed.

Incentives for greening: sharing the sustainability bill

As highlighted, there are several actors along the chocolate supply chain who benefit, and even depend on cocoa production; as without cocoa, there is no chocolate. Therefore, private sector actors along the supply chain could be persuaded to share the costs of promoting sustainability of the raw commodity they depend on (or benefit from) to operate. These include cocoa traders and manufacturers, but also fertiliser producers, transporters, retailers, and packaging companies.

46 The first World Cocoa Conference in 2012 acknowledged that the sector must increase coordination of initiatives implemented, thereby allowing for more coherent and efficient actions to address the existing challenges

47 A global partnership formed to address deforestation, by mobilising action by governments, the private sector and civil society organisations to reduce tropical deforestation related to the sourcing of key agricultural commodities such as palm oil, soy, beef, pulp and paper. www3.weforum.org/docs/WEF_Tropical_Forest_Alliance_2020.pdf [Accessed 7 March 2016]

The majority of these actors already have sustainability and CSR programmes in place showing their willingness (and budget) to address global negative externalities. However, coordination between actors to allow the design of more structured interventions that aim to internalise the externalities of the chocolate supply chain is still scarce.

There are several individual companies which have made sustainability commitments and that are promoting projects, for example on the ground with some communities. Even though these are generating positive social and environmental externalities, their impacts are limited. If instead, the industry organises itself to work on larger and more structured programmes, the potential to increase efficiency and replicate activities in a larger landscape would be greater.

In Ghana, for instance, one notices a number of very good, but somehow isolated initiatives. A lot is already on going, but an effort to coordinate these activities and bring the supply chain actors (including private sector and others) together to avoid overlap and strengthen the picture is needed.

Incentives at local level are critical to enabling farmers to change land use practices as they are a key actors in achieving the zero-deforestation pledges, but they face several challenges. The low wages of cocoa farmers contribute to this. Prices paid to farmers are still one of the key sustainability problems in cocoa production. Apparently farmers get less than 5 per cent of the benefit derived from a chocolate bar. But this has to be taken into perspective given the many commodities that are part of it. Some companies provide upfront payments to secure supply, which makes the farmers dependant. It is the guarantee-buyer of cocoa that still ties farmers to it. But sustainable supply cannot rely on this dependence but rather on positive economic and social impact derived by farmers engaging in cocoa process.

The key aspect is however the perception (or reality) that the middle men (who buy cocoa from farmers and transport to the factories) have a significant share of the net revenue often seen as villains. However, they provide a key service and there is indication that they are paid very little compared to other players in the supply chain in the case of Brazil for example. Retailers also seem to accrue the largest share of chocolate sales. Overall and understandably so, social issues are still more important for farmers than environmental challenges such as biodiversity conservation.

Traceability and mapping of supply chain and net benefits of players along it is critical in identifying opportunities for fairer benefit sharing. There is need to look at market and non-market incentive systems applicable to different actors in order to stimulate greening actions. Certification is one such instrument especially if adequate share of the premium can reach the different players along the supply chain including farmers. Carbon benefits if farmers adopt agroforestry systems for example or demonstrated avoided deforestation can also offer incentives linked to results. Besides potential benefits from carbon credits

there is need to ensure other co-benefits are integrated in the programmes/projects/policies. For example besides income security, farmers also need food security.

Cocoa farmers in Ghana are aging and are not encouraging their children to continue their work, but instead these migrate to cities seeking employment. Therefore there needs to be incentives to attract younger generation to engage in cocoa production. Key to keeping the youth in rural areas and interested in cocoa is to build their entrepreneurship skills.

Incentives to the industry might include tax breaks to sustainable products if confirming with international standards and free trade rules under WTO. The companies should innovate their practices and be proactive in building a business case for sustainable coco-chocolate. It is in the companies' long term interest to do so and to demonstrate to stakeholders and shareholders the contribution to mitigation of climate change.

Rethinking benefit sharing

This report has highlighted that there are several stakeholders along the supply chain benefiting from chocolate. But it has also brought attention to the sustainability challenges of the chain. Various efforts should be put in place to help address these challenges, which will likely increase the benefits of all actors. It is a win-win approach, but it requires significant changes, including raising the awareness of supply chain actors that with benefits comes responsibility; responsibility to share the costs of producing sustainable goods; to internalise sustainability practices – insetting – along the supply chain.

In order to promote real transformation change, one must start at the base. The farmers are the weakest link in the supply chain, given that they lack technical knowledge and access to finance, which renders them with little leverage skills. There needs to be processes focusing on empowering these stakeholders rather than just providing targeted technical assistance to increase production.

After all, building a new green economy is not only focusing on environmental issues, or allocating a premium to farmers. The idea is to critically ask whose values, priorities and interests are shaping the concept. We should rethink the current power structure, and transform existing structural inequalities that underpin poverty and vulnerability, instead of reproducing them. The risks of maintaining current dominant ways of thinking and excluding new perspectives are that innovative lessons and ideas might be lost. There is valuable knowledge at local level that needs to be better channelled into the policy process.

Focusing on empowering farmers and associations might seem threatening to some sectors, as strong associations are likely to increase the power of producers, including a more fair benefit sharing scheme and greater market share. But the upside is that

educated farmers and associations are also more likely to deliver increased outputs and help the industry meet the increasing demand including contributing to enforcing actions towards zero deforestation in the cocoa supply chain.

Structural inequalities, such as access to or control over resources, are determinant when it comes to exposure to risk, levels of vulnerability, as well as resilience. Why should farmers bear the risks of production when they receive so little of the end-product value? Thus, training and capacity building should form an integral part of sustainability programmes that should also include farmer empowerment, strengthening their bargaining position.

Additionally, there are also short-term gains in building a more fair relationship with farmers. Given the future outlook of land scarcity and competition between commodities, one of the incentives to speed up this process is the potential threat that these farmers will shift to produce other commodities such as palm oil.

There are several paths to promote this approach. As mentioned, the industry cannot do it all. Associations like the World Cocoa Foundation can assist in building alliances with other initiatives such as NGOs and capacity building institutions.

Further engaging the private sector

Private sector is a very heterogeneous term. It can include consumers, households, corporations, small and medium enterprises, private foundations and charities, service providers, and so on. Therefore, when referring to private sector, it is important to identify a specific group of actors to avoid being misunderstood and developing strategies that are incompatible.

A recent analysis of 115 REDD+ pilot projects and private sector engagement revealed that the majority of private actors involved are lending technical assistance to the projects rather than financially contributing to develop the initiatives and help bridge the financial gap from the limited public funds available for climate change. The handful of private companies that are paying for carbon credits are not making connections between their core business strategy and the project they are supporting. This is problematic because it suggests that they are trying to deflect attention from their own supply chain negative externalities. By avoiding focusing on increasing the sustainability of their own business and supply chain, and integrating sound strategies to mitigate the various risks being posed by, for example, climate change, companies might be contributing to their own downfall.

Climate change presents different types of risks to companies. These include, for instance, policy risks from potential emerging regulations on, for example, carbon tax; physical risks related to impacts on the supply of raw material due to climatic changes in the landscape; structural risks related to changes in market forces on the supply of

and demand for a company's products and services; or changes in investors' perceptions regarding the investments types they want to pursue given potential risks. Image-related risks are also growing in importance. Brand value is becoming a key factor determining the value of a company.

This reality should inspire organisations to rethink how they approach social and environmental issues in their supply chain. Instead of supporting random CSR projects that might render some publicity in their reports, companies should focus efforts on further understanding their own supply chain and the various risks associated with it, building strategies to mitigate them.

Despite these red signs, a recent study looking into disclosure from companies about the material risks posed by their reliance on natural capital concluded that even though there has been an increase in quantity and sophistication of natural capital reporting, there is still incomplete information for investors to assess risks and opportunities (KPMG, FFI and ACCA 2014). It suggests that companies are not yet realising, measuring and mitigating risks appropriately.

Discussions about promoting zero-deforestation supply chains are an excellent first step to help inspire (and pressure) companies to ensure that their operations and suppliers do not impact forest resources. But, as discussed previously in this report, deforestation in the landscape is not the only negative externality that needs to be addressed. There are several externalities coming out of the production of chocolate. Thus, in addition to contributing to a more sustainable landscape from where their raw material comes from, actors along the supply chain should look into their own externalities and work towards mitigating them.

This will not only contribute to internalising the costs of sustainability, but also help businesses address the range of risks that are surging because of climate change, and confer themselves with a greener image, a sustainable raw material supply, and improved investment relations. Thus, increasing the overall sustainability of supply chains presents a win-win for forests, local livelihoods, and companies alike.

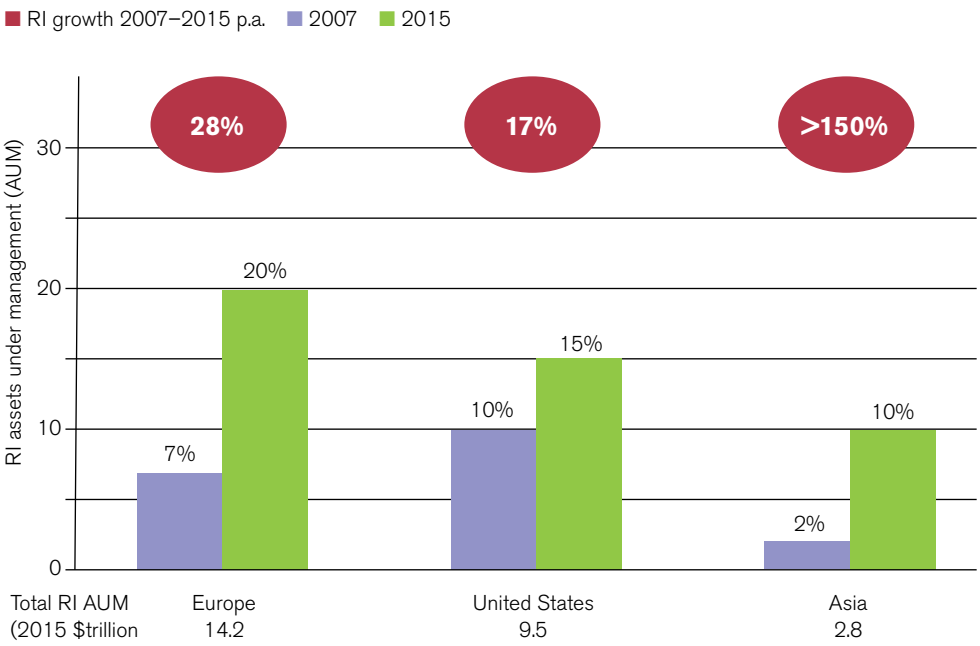
Investors' role in driving sustainability

Building the awareness of the financial sector and of investors is important for encouraging individual and collective action towards sustainable cocoa-chocolate. The financial sector needs to be better briefed on the challenges at hand and how they can play a role in addressing them. They can demand transparency and accountability from companies for example on sustainability (including insetting) and fairer benefit sharing practices along the supply chain.

Investors are important stakeholders in the supply chain. Without finance, companies would not be able to operate. Social responsible investment (SRI) and impact investment

are increasing exponentially (see figure 32). There are several sides to these. There is acknowledgment that production and economic growth should not be pursued at the expense of environmental and social issues, but also there is increasing understanding that there are real risks to business if they do harm to the environment in which they are embedded and the people (eg farmers) on whom they depend.

Figure 32: Responsible Investments (RI) Market Growth, 2007–2015



Source: World Economic Forum 2010 reproducing Robeco, Booz & Company (October 2008)

But while consumer goods companies have been responding to pressure and demand to address deforestation in their supply chains, the same has not happen at scale with financial institutions so far. This is problematic because the financial sector might be funding activities that undermine the progress made by others (Gilbert 2015)

But there is some movement. A 2012 report suggested that investors are increasingly looking at companies' supply chains and using factors such as third party auditing, sustainability reporting and other supply chain responsibility initiatives to determine market worthiness (Eurosif 2012). It argues that, even though it is quite complex to take into account social and environmental risks, these can lead to loss of reputation, supply chain disruptions, product safety problems or cost increases. Therefore, it can go from being ethical to financially risky and if not addressed properly can jeopardise the business, and consequently the investment. This new twist makes responsible supply chain management more attractive as it has the capacity to reduce risk and improve the attractiveness of an investment opportunity.

However, it is important to also educate investors on this matter. Pension funds, for instance, are long-term investors that could be an ally towards promoting more sustainable investment. However, more efforts should be made towards educating fund managers of these potential risks, especially related to deforestation.

Governments from producing and consuming countries should lead

The government has to develop or reform policies and put in place enforcement systems and monitoring instruments to help promote sustainability throughout the supply chain. This includes creating instruments to enable easy-to-access finance to farmers; addressing tree tenure issues to ensure that farmers see value in keeping them standing; support more investment for national manufacturing; stimulate transparency in sharing information; contribute to design and implementation of fair benefit sharing schemes and devise fiscal and non-fiscal incentives for sustainable products – for example, interviewees called the government of Ghana to re-evaluate subsidies and increase the share paid to farmers.

The governments of both producing and consuming countries can build national platforms to promote dialogue between different stakeholders and sectors within government for harmonised policies and institutional arrangements that can support the transformation of pledges into practical actions that deliver results. Together they are able to identify synergies and common issues that need to be addressed for the benefit of a broad range of stakeholders, and inform more sound policies that will lead to long-term improvements.

For producing countries bringing together all key relevant actors in the landscape will also contribute to integrating farming practices across different land uses, making it easier to work with cocoa farmers who are fragmented but complementary to broader land use within landscapes. The government can also leverage on its leadership in operationalising various international processes including REDD+ and FLEGT to improve the governance systems that can help in sustainable commodities. For example, monitoring effectiveness of commitments to sustainability can be aligned and can capitalise on instruments developed for these processes, including those used by companies for third party verification.

The role of international institutions

International institutions should also have an active role to help coordinate and implement efforts towards achieving a green economy. These will include environmental regulation, economic adjustments necessary when the environmental regulation are incomplete, framework and processes that allow stakeholders to interact and work together.

This has been the role, for instance, of the World Bank through FCPF and the FIP; Stakeholders in Mexico, for instance, have argued that the FIP has helped create a framework that allowed different national institutions to work together. It gave the country a structure that allowed institutions to dialogue and coordinate.

In Ghana, there has also been the acknowledgement that the FCPF readiness process and Carbon Fund established a platform that encouraged COCOBOD and the Forestry Commission to work more closely together. There is continued need to build on such efforts

South-south exchanges

Additionally, coordination should also be promoted between different countries from the global South. Producing countries face several similar barriers. Therefore, exchange of ideas between them could pave the way towards improved global coordination. This includes not only planting and harvesting practices, but regulatory solutions (both that worked and did not), and market strategies to engage private companies more actively and demanding that they act on high standards in the different geographies where they operate.

South-south cooperation between Brazil and the development programmes in Africa, for example, could render the first with beneficial tools. One example is the Cocoa-link[48] programme led by the World Cocoa Foundation in West Africa. It uses low-cost mobile technology to deliver practical agricultural and social information to cocoa farmers, enabling any farmer in Ghana and Ivory Coast to receive and share practical information.

However, it is paramount that south-south cooperation is well planned. Additionally, south-south coordination is a new opportunity for the international community to re-think international development cooperation and build a new aid paradigm, which focuses more on the strategic needs of the partner countries than on advancing the ideological interests of the donor countries to re-think how knowledge transfer can be done (Quadir 2013).

48 More information available at: http://worldcocoafoundation.org/cocoalink-connecting-communities/

Dealing with answered questions

There are various research issues that can help in clarifying the greening of supply chain of cocoa-chocolate:

- Cocoa market trends in different landscapes and countries.
- Cocoa vulnerability to climate change and impacts on supply.
- Shade and non-shade cocoa – species mix and yield for broader ecosystem resilience and other social and environmental benefits.
- How much deforestation is actually being curbed as a result of initiatives to reduce deforestation. Develop and apply performance metrics to assess current effectiveness of interventions and draw future strategies. How combination of certification schemes with new traceable sustainability standards can strengthen their effectiveness in addressing climate change.
- More evidence on options that work best is key to motivating the financial sector to invest in sustainability, to enable companies and farmers to implement these options and to help donors design their interventions for broader impact.
- Innovative solutions to address key problems in the cocoa sector such as recruiting young population into farming or replace aging farmers and child labour.
- Effective market and non-market incentives for green cocoa-chocolate.

6 Conclusions

Stakeholders who were interviewed highlighted key issues and challenges related to the cocoa to chocolate supply chain and the implication of the pledges for zero-deforestation. Farmers' organisations were considered a prerequisite to giving farmers a stronger voice in policy and negotiating deals with the private sector. This also helps facilitate technical assistance to influence land use practices.

Incentives to farmers and to other actors along the supply chain enable insetting and offsetting. For farmers, food security and the co-benefits of emission reducing related land use changes can provide that added value drive to transformation beyond income. Collaboration, coordination and collective and individual actions of stakeholders along the supply chain as well as supporting institutions (government, multilateral agencies, investors, researchers etc.) are fundamental. For example governments need to lead in setting policies in producing and consuming countries; also the media has a role to play in informing consumers; and investors also need to know where they are putting their money and demand more transparency and accountability.

Market mechanisms driving sustainability offer views on whether certification can be made to work better compared to other company-led sustainability tools including looking at monitoring the implementation and effectiveness of these tools. Demand-side measures are equally important. The consumers' conscience can play a key role in demanding and paying a premium for sustainable chocolate. But traceability of net revenues along the chain will be critical in defining a fairer benefit sharing mechanism.

Large-scale interventions at landscape level that address multiple dimensions of sustainability and integrated land use planning will enable complementary of actions in curbing deforestation. Research is important in bringing evidence on technically viable growing options (for example – shade versus non shade coffee); the business case for sustainability – companies still care about the bottom line. Can profitability and resilience be the drivers of zero-deforestation in practice?

To ensure the supply of chocolate and other commodities over time, national governments from producing countries and the international community – in particular multilateral agencies promoting climate change mitigation and adaptation – need to look at the challenges in a more holistic manner to see that issues are interconnected and that solutions should be more inclusive.

This report has highlighted the interconnectivity between different issues:

- We cannot discuss deforestation without taking into account agricultural commodities as one of the main drivers of deforestation worldwide.
- Commodities are not produced in isolation, but integrated in a landscape that houses diverse resources, land uses and a wide range of actors, so synergies need to be built.
- The landscape is not only composed of pristine standing forests, so efforts towards zero-deforestation supply chain should be spread more broadly to also promote rehabilitation and sustainable forest management.
- Productivity cannot be addressed in isolation as it requires a resilient ecosystem and willing people to support it.
- Certification might generate more positive benefits (especially climate benefits) if it focuses on the broader landscape, rather than on isolated farmers.
- Sustainable cocoa cannot be disassociated from sustainable chocolate.
- The chocolate supply chain has other actors beyond the physical landscape, and because they all benefit, they should also share the costs of internalising sustainability.
- Unsustainable production might not only threaten healthy ecosystems, but also threaten a reliable supply of commodities and long-term investments.
- With the growth of the middle class, more societal scrutiny is likely to take place, putting additional pressure on business to deliver sustainable goods.
- The chocolate supply chain generates other externalities than just emissions at landscape level, so efforts to green the whole chain should be pursued.

To ensure that these issues are addressed in a synergetic manner, internalisation of externalities should be promoted at all stages and by all actors along the cocoa-chocolate supply chain. Instead of designing isolated CSR strategies or development assistance projects that aim to solve an immediate, but isolated problem, interventions should be planned in a way that addresses several issues concomitantly, bringing a variety of stakeholders together with a long-term outlook to the challenges.

There are incremental benefits of building synergies between projects and processes and building bridges between stakeholders. Practice has shown that engaging a diverse range of stakeholders spread throughout the supply chain contribute to the generation of better

solutions (Brito and OTB 2007; De Bono 1985;[49] Freeman *et al.* 2004; Sundaram and Inkpen 2004).[50]

A green economy cannot be achieved if issues are not dealt with in an integrated manner. The pieces of the puzzle need to come together to form the big picture, to see the full landscape, and to build more resilient processes and sustainable supply chains. Working at all levels of the supply chain starts with knowledge of players and roles. This broad picture is essential to inform strategies to enable efficiency and effectiveness in efforts to green the supply chain. All stakeholders along the supply chain should have the knowledge and clear understanding of opportunities to contribute to change. One of the key ways to do this is to provide information and an opportunity to work closely together. This can be achieved through a large programme at landscape level and different fora which brings different actors – from producers to retailers (and across these groups) to the table to discuss how to promote change.

At production level, stakeholders need to rethink social structures and institutions, as well as power relations that are currently underpinning poverty. It is not possible to talk about sustainable supply chains when the farmer, at the bottom but the heart of the chain, still lives in poverty. Additionally, with the growing urbanisation and competition from other land uses, the cocoa industry needs to start increasing the interest of farmers to stay in the business. Brazil is already seeing a shortage of labour to work on cocoa farms. In Ghana youth migration will affect the future of cocoa production. The same trend is reaching Asia where the younger generation is no longer interested in staying on the farm. Not only does farming pay little, it also reduces their life opportunities.

Benefit sharing should be read beyond technical assistance and price premium, but true empowerment that will allow changes to continue taking place with farmers at the lead, not national or international NGOs representing them. Building entrepreneurship at farm level is likely to contribute not only to improve productivity, but also to keeping youngsters on the farms interested in restoring their plantations and ensuring that chocolate reaches the shelves. The growing middle class which is demanding chocolate in producing countries can also play a key role in finding sustainable ways to address growing demand. This might also drive industrialisation in the producing countries.

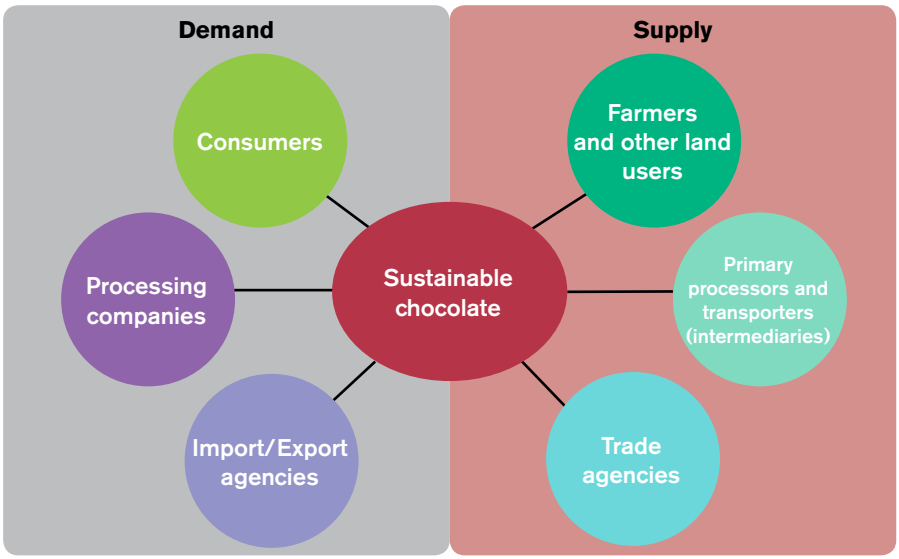
Additionally, strategies should focus on those that have the highest likelihood to drive change. Despite the importance of producing sustainable commodities to feed the market, strategies need to ensure that there is demand for these. On the other side of the chain, we need to sensitise people to choose more as citizens rather than as consumers. It is should not just be about the price[51] of the global goods, but the value that they have.

49 On techniques for problem solving.
50 On stakeholders influencing business practice.
51 Which is important as purchasing power matters, but so does the impact of consumption patterns on natural resources and climate – both play their part in footing the bill.

Consumers drive markets. Another key strategy is to work more closely raising the awareness of investors, because, ultimately, money is the driving force of all things. It is the button that when pressed can escalate change.

In the end, no one approach can address everything, nor can one tool solve it all. It is a broad, on-going process. But what stakeholders must have in mind is that a clear long-term path must be drawn and that there is a shared purpose. Otherwise, good, but isolated, initiatives might help to draw up a nice CSR report, but have no broader impact. We need to approach the issue in a more holistic manner, provide the broad context, so the right questions are raised and solutions developed in a timely manner.

Figure 33: Demand and supply of sustainable chocolate



One argument towards improving is that better performance today will become the norm tomorrow as governments will step in and will start regulating these things, especially if it improves labour conditions, for example. The ones that stay are those that are able to innovate. Sustainability needs innovation. We are at a time that we have the opportunity to do something different. Not short-term tricks, but a change in the way we govern issues to ensure true sustainability. Continuous improvement is needed and is possible.

Demand for chocolate is growing. Asian markets are just starting to wake up to the wonders of mixing cocoa, milk, and sugar, and will soon likely overtake western countries as the main consumer market, and it will demand new levels of value and innovation from consumer goods companies. Rising access to information through the internet will likely change the dynamics of consumption, in which consumers will be able to demand more information at a click of a button.

Population growth is being accompanied by an increase in the middle class and in smart phones. It is easier and easier to access information. So why not build on the positive aspects of technology and present sustainability as a trendy thing? Just scan the QR (Quick Response) Code, and get information about where your product comes from.

This trend of easier access to information might benefit consumer good companies and present an opportunity to differentiate themselves from competitors. But to prevail, they must move fast and start ensuring that their supply chain is actually sustainable, having something positive to present to consumers. The current lack of information and transparency along the supply chain is a real issue. If consumers were sure that they could make a difference and would benefit farmers, they would likely be more willing to pay a higher price. Thus, there needs to make structural changes along the chain, if we want to witness real transformational change.

Research should support studies of best sustainable production systems, optimal combination of trees and cocoa that not only provides carbon sequestration functions, hence a premium from carbon, but also provide additional source of income from selling produce. There has to be funding from government and companies to identify the solutions and options that work in the landscapes of Brazil and Ghana, as well as other cocoa producing countries.

Figure 34: Actors and actions towards sustainable chocolate

Governments from both producing and consuming countries should enact legislation promoting sustainable production and consumption. Non-fiscal policies including stronger tenure arrangements should be complemented by taxation and incentives. Tax on emissions from cocoa-chocolate can provide the needed instrument to drive innovative insetting. A policy mix is needed to address the various issues of sustainable and deforestation free chocolate chains.

Companies involved in different stages of the supply chain need to develop norms and adopt sustainability criteria that are adhered to by all. This needs a profound knowledge, engagement and negotiation of standards and practices with actors along the supply chains. Market campaigns need to be balanced, providing unbiased information to consumers, investors and the general public. Education is also key to building awareness of the issues, as well as giving current and future generations the necessary skills.

Richard P. Feynman once said that "we are at the very beginning of time for the human race. It is not unreasonable that we grapple with problems. But there are tens of thousands of years in the future. Our responsibility is to do what we can, learn what we can, improve the solutions, and pass them on". Hopefully this report will inspire people to look at the issue with different eyes, and continue developing innovative solutions that will contribute to a more sustainable tomorrow.

References

Accenture (2011) *Asia Consumer Product Trends: Implications for Retailers and Manufacturers*. Available from www.accenture.com/us-en/~/media/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Industries_2/Accenture-Emerging-Trends-Online-Version.pdf [Accessed 15 April 2016]

Acheampong, E, Dawoe, E, Bosu, P and Asante, W (2014) Moving Forward with REDD+ in Ghana: Shade Systems, Crown Cover, Carbon Stocks and Socio-Economic Dynamics of Smallholder Cocoa Agroforestry Systems.

Afoakwa, EO (2010) Chocolate production and consumption patterns. Chocolate science and technology, 1–11.

Afoakwa, EO (2014) *Cocoa Production and Processing Technology*. CRC Press.

Alger, K and Caldas, M (1994) The declining cocoa economy and the Atlantic Forest of Southern Bahia, Brazil: conservation attitudes of cocoa planters. *Environmentalist*, 14(2), 107–119.

Anglaaere, LC, Cobbina, J, Sinclair, F and McDonald, MA (2011) The effect of land use systems on tree diversity: farmer preference and species composition of cocoa-based agroecosystems in Ghana. *Agroforestry systems*, *81*(3), 249–265. Springer, Netherlands.

Asare, R, Afari-Sefa, V, Osei-Owusu, Y and Pabi, O (2014) Cocoa agroforestry for increasing forest connectivity in a fragmented landscape in Ghana. *Agroforestry systems*, 88(6), 1143–1156.

Asante, FA and Amuakwa-Mensah, F (2014) Climate Change and Variability in Ghana: Stocktaking. *Climate*, 3(1), 78–99.

Asante, J, Nketiah, S, Murillo, J and Vellema, H (2014) Projects on 'Sustainable cocoa production in Ghana related to forests'. Available at: www.tropenbos.org/file.php/1750/report-sustainable-cocoa-production-ghana.pdf [Accessed 7 April 2016]

Auld, G, Bernstein, S and Cashore, B (2008) The New Corporate Social Responsibility *Annual Review of Environment and Resources* 33(1): 413–435.

BBC (2011) Ivory Coast cocoa farms child labour: Little change. 10 November 2011. Available at: www.bbc.co.uk/news/world-africa-15681986

Berlan, A and Bergés, A (2013) *Cocoa Production in the Dominican Republic: Sustainability, Challenges and Opportunities*. Report of findings commissioned by Green & Black's October 2013. Available at: www.cocoalife.org/~/media/CocoaLife/News%20Articles%20PDF/SCI_cocoa_report.pdf [Accessed 7 April 2016]

Biswas, A and Roy, M (2015) Green products: an exploratory study on the consumer behaviour in emerging economies of the East. *Journal of Cleaner Production, 87*(0), 463–468.

Bloomberg (2014) *Cocoa Jumps to 28-Month High on Concern Output May Trail Demand.* Available at www.bloomberg.com/news/2014-01-27/cocoa-jumps-to-28-month-high-on-concern-output-may-trail-demand.html

Borel-Saladin, JM and Turok, IN (2013). The green economy: Incremental change or transformation? *Environmental Policy and Governance*, 23(4), 209–220.

Borg, J and Selmer, JK (2012) *From Ghana to Magnum Ice Cream. Tracking Down the Organisation of Sustainable Cocoa Product Chains.* Available from: http://publications.lib.chalmers.se/records/fulltext/170927/170927.pdf [Accessed 15 April 2016]

Branigan, T (2008) Chinese figures show fivefold rise in babies sick from contaminated milk, 2 December 2008. The Guardian (London). Available at: www.guardian.co.uk/world/2008/dec/02/china

Brasser, A (2013) *Reducing Risk: Landscape Approaches to Sustainable Sourcing*. Olam International and Rainforest Alliance Case Study. Washington, DC. EcoAgriculture Partners, on behalf of the Landscapes for People, Food and Nature Initiative.

Brito, MP & OTB, T (2007) *Towards sustainable supply chains: a methodology*. SIMPOI/POMS Proceedings, 8–10.

Brundtland, GH (1987) Our Common Future: *Report of the World Commission on Environment and Development.* United Nations.

Bumpus, AG & Liverman, DM (2008) Accumulation by decarbonisation and the governance of carbon offsets. *Economic Geography* 84(2): 127–155.

Burney, JA, Davis, SJ & Lobell, DB (2010) Greenhouse gas mitigation by agricultural intensification. *Proceedings of the National Academy of Sciences*, *107*(26), 12052–12057.

Büsser, S and Jungbluth, N (2009) LCA of Chocolate Packed in Aluminium Foil Based Packaging. *ESU-services Ltd., Uster (CH).*

Caldas, MM and Perz, S (2013) Agro-terrorism? The causes and consequences of the appearance of witch's broom disease in cocoa plantations of southern Bahia, Brazil. *Geoforum*, *47*, 147–157.

Carsan, S, Stroebel, A, Dawson, I, Kindt, R, Mbow, C, Mowo, J & Jamnadass, R (2014) Can agroforestry option values improve the functioning of drivers of agricultural intensification in Africa? *Current Opinion in Environmental Sustainability*, *6*, 35–40.

Cerda, R, Deheuvels, O, Calvache, D., Niehaus, L., Saenz, Y., Kent, J., Vilchez, S, Villota, A, Martinez, C and Somarriba, E (2014) Contribution of cocoa agroforestry systems to family income and domestic consumption: looking toward intensification. *Agroforestry systems, 88*(6), 957–981. Springer, Netherlands.

Chatham House (2013) Deforestation-related Commodity Supply Chain Controls. Meeting held during 18–19 March 2013.

Chclt.net (2013) Kakaopreis und Schokoladenpreis, 26 March 2013. Available at: http://de.chclt.net/kakaopreis-und-schokoladenpreis [Accessed 7 April 2016]

Clough, Y, Faust, H and Tscharntke, T (2009) Cacao boom and bust: sustainability of agroforests and opportunities for biodiversity conservation. *Conservation Letters*, *2*(5), 197–205.

CNN (2014) *Cocoa-nomics: Will the chocolate industry now end child labor and slavery?* 17 February 2014. Available at: http://thecnnfreedomproject.blogs.cnn.com/2014/02/17/cocoa-nomics-will-the-chocolate-industry-now-end-child-labor-and-slavery/ [Accessed 7 April 2016]

COCOBOD (2012) Official press release, 27 April 2012. Available from: www.ghana.gov.gh/index.php/information/press-releases/12441-launch-of- national-cocoa-rehabilitation-programme-rescheduled-for-friday-27th-april-2012

Corbett, JJ, Wang, H and Winebrake, JJ (2009) The effectiveness and costs of speed reductions on emissions from international shipping. *Transportation Research Part D: Transport and Environment, 14*(8), 593–598.

Cunningham, RK and Arnold, P (1962) The shade and fertiliser requirements of cacao (*Theobroma cacao*) in Ghana. *Journal of the Science of Food and Agriculture*, *13*(4), 213–221.

Cunningham, RK, Smith, RW and Hurd, RG (1961) A Cocoa Shade and Manurial Experiment at the west African Cocoa Research Institute, Ghana: II. Second and Third Years. *Journal of Horticultural Science*, *36*(2), 116–125.

De Bono, E (1985) The CoRT thinking program. In Costa, AL (*ed.*) *Developing minds: A resource book for teaching thinking* (pp.203–209). Alexandria, VA: ASCD.

De Foresta, H and Michon, G (1997) The Agroforest Alternative to Imperata Grasslands: When Smallholder Agriculture and Forestry Reach Sustainability. Agroforestry Systems 36: 1–3105–120.

Deheuvels, O, Avelino, J, Somarriba, E and Malezieux, E (2012) Vegetation structure and productivity in cocoa-based agroforestry systems in Talamanca, Costa Rica. *Agriculture, Ecosystems & Environment*, *149*, 181–188.

Demeter, P (1996) *Combatendo o desemprego na Região Cacaueira da Bahia: o papel dos movimentos sociais populares*. Federação de Órgãos para Assistência Social. FASE, Itabuna, Bahia.

Ecobank (2013) Overview of global cocoa, coffee and sugar markets. Presentation by Dr Edward George, 12 November 2013, available at: www.globalgrainevents.com/pdfs/Geneva%202013/EdwardGeorgeEcobankOverview.pdf [Accessed 7 April 2016]

Eurosif (2012) European SRI Study. www.eurosif.org/publication/view/european-sri-study-2012/ [Accessed 15 April 2016]

Eyring, V, Köhler, H, Van Aardenne, J and Lauer, A (2005) Emissions from international shipping: 1. The last 50 years. *Journal of Geophysical Research: Atmospheres (1984–2012),110*(D17).

FAO (2008) FAOSTAT Online Database; The Food and Agriculture Organization of the United Nations: Rome, Italy

FAO (2009) Global Trends And Future Challenges for the Work of the Organization. Available from: www.fao.org/docrep/meeting/025/md883E.pdf

FAO (2010) Global forest resources assessment 2010.

FAO (2013) Climate-Smart Agriculture Sourcebook. Rome, Italy. Available at: www.fao.org/docrep/018/i3325e/i3325e.pdf

FAO (2014) FAOSTAT Online database. http://faostat.fao.org

Fay, M (2012) *Inclusive green growth: the pathway to sustainable development*. World Bank Publications.

Feynham, RP (1955) *The value of science*. A public address given at the 1955 autumn meeting of the National Academy of Sciences. www.math.ucla.edu/~mwilliams/pdf/feynman.pdf [Accessed 15 April 2016]

Fisher, B (2010) African exception to drivers of deforestation. *Nature Geoscience, 3*(6), 375–376.

Forestry Commission (2012) Ghana Investment Plan. Available from: www.climateinvestmentfunds.org/cifnet/?q=country/ghana

Forestry Commission (2010) Ghana Readiness Preparation Proposal for the World Bank Forest Carbon Partnership Facility. Available at www.fcghana.org/assets/file/Programmes/Reduced%20Emmissions%20for%20Deforestation%20&%20Degradation/Revised%20Ghana%20R-PP_1%20Nov.pdf [Accessed 7 April 2016]

Forestry Commission (2014) Ghana's Emission Reductions Program Idea Note (ER-PIN). Available at: www.forestcarbonpartnership.org/sites/fcp/files/2014/February/Ghana%20ER-PIN%20CF9.pdf [Accessed 15 April 2016]

Freeman, RE, Wicks, AC, and Parmar, B (2004) Stakeholder theory and 'the corporate objective revisited'. *Organization science*, *15*(3), 364–369

Furtado, C (1963) *The economic growth of Brazil: a survey from colonial to modern times*. Univ of California Press.

Garcez, ANR and Freitas, FG (1975) *Diagnóstico Sócioeconômico da Região cacaureira da Bahia: História e Economia Social*. Carta Gráfica, Rio de Janeiro.

Geist, HJ and Lambin, EF (2001) What drives tropical deforestation. *LUCC Report series*, *4*, 116.

Geist, HJ and Lambin, EF (2002) Proximate Causes and Underlying Driving Forces of Tropical Deforestation Tropical forests are disappearing as the result of many pressures, both local and regional, acting in various combinations in different geographical locations. *BioScience,* 52(2), 143–150.

Gilbert, K (2015) Financial Institutions Play Catch-up in Deforestation Fight. Available from www.institutionalinvestor.com/article/3420138/banking-and-capital-markets-corporations/financial-institutions-play-catch-up-in-deforestation-fight.html?ArticleId=3420138#.VNEIGEJGwlJ

Gockowski, J, Tchatat, M, Dondjang, JP, Hietet, G and Fouda, T (2010) An empirical analysis of the biodiversity and economic returns to cocoa agroforests in southern Cameroon. *Journal of Sustainable Forestry*, *29*(6–8), 638–670.

Gockowski, J and Sonwa, D (2011) Cocoa intensification scenarios and their predicted impact on CO2 emissions, biodiversity conservation, and rural livelihoods in the Guinea rain forest of West Africa. *Environmental management,* 48(2), 307–321.

Gockowski, J, Afari-Sefa, V, Sarpong, DB, Osei-Asare, YB and Agyeman, NF (2013) Improving the productivity and income of Ghanaian cocoa farmers while maintaining environmental services: what role for certification? *International Journal of Agricultural Sustainability, 11*(4), 331–346.

Government of Ghana (2015) *Forestry Commission Ghana: National REDD+ Strategy* www.fcghana.org/userfiles/files/REDD%2B/Ghana%20National%20REDD%2B%20Strategy%20Final.pdf [Accessed 15 April 2016]

Greendex (2014) *Consumer Choice and the Environment – A Worldwide Tracking Survey.* (September 2014). Available at http://images.nationalgeographic.com/wpf/media-content/file/NGS_2014_Greendex_Highlights_FINAL-cb1411689730.pdf [Accessed 7 April 2016]

Groeneveld, JH, Tscharntke, T, Moser, G and Clough, Y (2010) Experimental evidence for stronger cacao yield limitation by pollination than by plant resources. *Perspectives in Plant Ecology, Evolution and Systematics, 12*(3), 183–191.

Hainmueller, J, Hiscox, M and Tampe, M (2011) *Sustainable development for cocoa farmers in Ghana.* MIT and Harvard University. www.responsibleagroinvestment.org/sites/responsibleagroinvestment.org/files/Ghana%20Cocoa%20Baseline%20Report_Jan%202011.pdf [Accessed 15 April 2016]

Humbert, S and Peano, L (2014) *Developing inventory data for chocolate: Importance to consider impacts of potential deforestation in a consistent way among ingredients (cocoa, sugar and milk).* Paper presented at the 9th International Conference on Life Cycle Assessment in the Agri-Food Sector, San Francisco, California.

Hosonuma, N, Herold, M, de Sy, V, de Fries, RS, Brockhaus, M, Verchot, L, Angelsen, A and Romijn, E (2012) An assessment of deforestation and forest degradation drivers in developing countries. *Environmental Research Letters* 7(4): 4009.

ICCO (2010) The World Cocoa Economy: Past and Present. (EX/142/6) [Online] Available from: www.icco.org/about-us/international-cocoa-agreements/cat_view/30-related-documents/45-statistics-other-statistics.html

ICCO (2012) The World Cocoa Economy: past and present (E. Committee, Trans.) (pp. 43). London: International Cocoa Organisation.

ICCO (2014) Quarterly Bulletin of Cocoa Statistics. Available from: www.icco.org/about-us/icco-news/259-may-2014-quarterly-bulletin-of-cocoa-statistics.html

Johns, ND (1999) Conservation in Brazil's chocolate forest: the unlikely persistence of the traditional cocoa agroecosystem. *Environmental Management*, *23*(1), 31–47.

Johnston, A (2012) Governing Externalities: The Potential of Reflexive Corporate Social Responsibility. *Centre for Business Research, University of Cambridge, Working Paper*(436)

Kan, J (2010) Environmentally Friendly Consumers Emerge. *China Business Review,* 2 May 2010.

Katoomba (2009) *Sweetening the Deal for Shade-Grown Cocoa: A Preliminary Review of Constraints and Feasibility of 'Cocoa Carbon' in Ghana* www.katoombagroup.org/~foresttr/documents/files/doc_2352.pdf [Accessed 15 April 2016]

Khoo, SM (2012) Re-interpreting the citizen consumer: Alternative consumer activism and the rights to health and development. *Social Science & Medicine, 74*(1), 14–19.

Kissinger, G, Herold, M and de Sy, V (2012) D*rivers of Deforestation and Forest Degradation: A Synthesis Report for REDD+ Policymakers* (pp. 48). Vancouver Canada: Lexeme Consulting.

KPMG (2012) Study on the costs advantages and disadvantages of cocoa certification. Available at: www.icco.org/about-us/international-cocoa-agreements/cat_view/30-related-documents/37-fair-trade-organic-cocoa.html

KPMG, FFI, ACCA (2014). Business and investors: providers and users of natural capital disclosure. Available at: www.kpmg.com/UK/en/IssuesAndInsights/ArticlesPublications/Documents/PDF/Audit/natural-capital-reporting.pdf [Accessed 7 April 2016]

Koh, LP and Wilcove, DS (2008) Is oil palm agriculture really destroying tropical biodiversity? *Conservation Letters*, *1*(2), 60–64.

Kremen, C, Williams, NM, Aizen, MA, Gemmill-Herren, B, LeBuhn, G, Minckley, R, Packer, L, Potts, SG, Roulston, T, Steffan-Dewenter, I, Vázquez, DP, Winfree, R, Adams, L, Crone, EE, Greenleaf, SS, Keitt, TH, Klein, A.-M, Regetz, J and Ricketts, TH (2007) Pollination and other ecosystem services produced by mobile organisms: a conceptual framework for the effects of land-use change. *Ecology Letters*, 10: 299–314.

Kusters, K, Pérez, MR, De Foresta, H, Dietz, T, Ros-Tonen, MA, Belcher, B, Manalu, P, Nawir, AA and Wollenberg, E (2008) Will agroforests vanish? The case of damar agroforests in Indonesia. *Human Ecology*, *36*(3), 357–370.

Läderach, P, Martínez-Valle, A, Schroth, G and Castro, N (2013) Predicting the future climatic suitability for cocoa farming of the world's leading producer countries, Ghana and Côte d'Ivoire. *Climatic Change* 119(3–4): 841–854.

Lawrence, D and Vandecar, K (2015) Effects of tropical deforestation on climate and agriculture. *Nature Clim. Change, 5*(1), 27–36.

Laven, A and Boomsma, M (2012) *Incentives for sustainable cocoa production in Ghana – moving from maximizing outputs to optimizing performance.* Amsterdam: Royal Tropical Institute. www.worldcocoafoundation.org/wp-content/uploads/files_mf/laven201297.pdf [Accessed 15 April 2016]

LEK Consulting (2013). Spotlight on the ASEAN Consumer: An Emerging Middle Class Continues to Drive Consumption Growth. *Consumer Spotlight.* 2015, from www.lek.com/sites/default/files/1213_ASEANSpotlight_WEB.pdf

Levins, N (2012) *Chocolate: A Sweet Solution to Tropical Deforestation?* 11 April 2012, National Geographic. Available from: http://newswatch.nationalgeographic.com/2012/04/11/chocolate-a-sweet-solution-to-tropical-deforestation/ [Accessed 7 April 2016]

Lima Silva, JP *et al.* (2013) Mercado e concentração espacial da cultura do cacau no Estado do Pará. In: *Congresso brasileiro de economia, administração e sociologia rural*, 51, 2013, Belém. Anais eletrônicos. Belém: SOBER, 2013.

Marton, S (2012) *Bittersweet comparability of carbon footprints*. In Corson, MS, van der Werf, HMG (*eds*) Proceedings of the 8th International Conference on Life Cycle Assessment in the Agri-Food Sector (LCA Food 2012), 1–4 October 2012, Saint Malo, France. INRA, Rennes, France, pp. 767–768. https://colloque4.inra.fr/var/lcafood2012/storage/fckeditor/file/Proceedings/Proceedings%20-%20LCA%20Food%202012%20-%20ISBN.pdf [Accessed 15 April 2016]

Matos, D (2013) Plano ABC vai financiar 265 mil hectares de cacao. Available from: www.ceplac.gov.br/restrito/lerNoticia.asp?id=2120 [Accessed 7 April 2016]

Mbow, C, Smith, P, Skole, D, Duguma, L and Bustamante, M (2014) Achieving mitigation and adaptation to climate change through sustainable agroforestry practices in Africa. *Current Opinion in Environmental Sustainability*, *6*, 8–14.

Minifie, B (2012) *Chocolate, cocoa and confectionery: science and technology*. Springer Science & Business Media.

Ministry of Foreign Affairs, Netherlands (2011) Cocoa beans in the Netherlands. Available at: www.cbi.eu/system/files/marketintel/2011_Cocoa_beans_in_the_Netherlands.pdf

Morris, DS (1882) *Cocoa: how to grow and how to cure it*. Government Printing Establishment.

Müller, I (2012) *Brazilian Cocoa yearbook*. Retrieved from www.grupogaz.com.br/editora/anuarios/show/3433.html

Nepstad, DC, Boyd, W, Stickler, CM, Bezerra, T and Azevedo, AA (2013) Responding to climate change and the global land crisis: REDD+, market transformation and low-emissions rural development. *Philosophical Transactions of the Royal Society B: Biological Sciences, 368*(1).

Newton, P, Agrawal, A and Wollenberg, L (2013) Enhancing the sustainability of commodity supply chains in tropical forest and agricultural landscapes. *Global Environmental Change*, 23(6), 1761–1772.

Nhantumbo, I and Camargo, M (2015) *REDD+ for profit or for good? Review of private sector and NGO experience in REDD projects*. Natural Resource Issues No. 30. London: IIED. Available at: http://pubs.iied.org/17570IIED.html

Nierhoff, A (2014, 1 December) *Asia's growing appetite for chocolate.* Deutsche Welle. Available at: www.dw.de/asias-growing-appetite-for-chocolate/a-18100633

Ntiamoah, A and Afrane, G (2008) Environmental impacts of cocoa production and processing in Ghana: life cycle assessment approach. *Journal of Cleaner Production, 16*(16), 1735–1740.

Ntiamoah, A and Afrane, G (2009) Life cycle assessment of chocolate produced in Ghana *Appropriate Technologies for Environmental Protection in the Developing World* (pp. 35–41). Springer, Netherlands.

Ntiamoah, A and Afrane, G (2014) *Environmental impacts of cocoa production and processing in Ghana: Life cycle assessment approac*h. J. Clean. Prod. 2008, 16, 17–1740 – See more at: www.mdpi.com/2225-1154/3/1/78/htm#B28-climate-03-00078

Oxfam (2013) Equality for women starts with chocolate. Available at: www.oxfam.org/sites/www.oxfam.org/files/equality-for-women-starts-with-chocolate-mb-260213.pdf [Accessed 15 April 2016]

Persson, M, Henders, S and Kastner, T (2014) Trading Forests: Quantifying the Contribution of Global Commodity Markets to Emissions from Tropical Deforestation. Center for Global Development *Climate and Forest Paper Series* #8.

Priess, JA, Mimler, M, Klein, AM, Schwarze, S, Tscharntke, T and Steffan-Dewenter, I (2007) Linking deforestation scenarios to pollination services and economic returns in coffee agroforestry systems. *Ecol. Appl*. 17, 407–417.

Quadir, F (2013) Rising Donors and the New Narrative of 'South–South' Cooperation: what prospects for changing the landscape of development assistance programmes? *Third World Quarterly*, 34(2), 321–338.

Rainforest Alliance (2013) *REDD+ Projects Create New Source of Income for Cocoa Farmers* Available at: http://thefrogblog.org.uk/2013/11/12/redd-projects-create-new-source-of-income-for-cocoa-farmers/

Rautner, M, Leggett, M and Davis, F (2013) The Little Book of Big Deforestation Drivers, Global Canopy Programme: Oxford.

Rice, RA and Greenberg, R (2000) Cacao cultivation and the conservation of biological diversity. *AMBIO: A Journal of the Human Environment*, *29*(3), 167–173.

Ricketts, TH, Daily, GC, Ehrlich, PR. and Michener, CD (2004) Economic value of tropical forest to coffee production. Proc. Natl Acad. Sci. USA 101, 12579–12582.

Robeco, Booz & Co (2008) *Responsible Investing: A Paradigm Shift From Niche to Mainstream.*

Rolim, SG and Chiarello, AG (2004) Slow death of Atlantic forest trees in cocoa agroforestry in southeastern Brazil. *Biodiversity & Conservation*, 13(14), 2679–2694.

Ruf, F (2009) Liberalisation, political cycles and cocoa cycles: the historical time-lag between Côte d'Ivoire and Ghana. *Cahiers Agricultures*, *18*(4), 343–349.

Ruf, F (2011) The myth of complex cocoa agroforests: the case of Ghana. *Human ecology*, *39*(3), 373–388.

Ruf, F, Deheuvels, O and Sarpong, D (2010) Intensification in cocoa cropping systems: Is Agroforestry a solution for sustainability? The case of Manso Amenfi, Western Region, Ghana. In *15th International conference on cocoa research* (9 October 2006/14 October 2006) (Vol. 1, pp. 355–364).

Russel, SN and Allwood, JM (2007) Sustainable manufacturing: options for physically changing the way in which goods are made, submitted to *Journal of Industrial Ecology*.

SAN (Sustainable Agricultural Network) (2014) Available from: http://san.ag/ web/our-impact/

Sandker, M, Campbell, BM and Collier, N (2009) *A model to explore REDD payments in an agroforest landscape in South-West Ghana.* Available at: www.cifor.org/conservation/publications/pdf_files/Ghana%20model.pdf [Accessed 15 April 2016]

Schroth, G, Faria, D, Araujo, M, Bede, L, Van Bael, SA, Cassano, CR, Oliveria, LC and Delabie, JH (2011) Conservation in tropical landscape mosaics: the case of the cacao landscape of southern Bahia, Brazil. *Biodiversity and Conservation*, 20(8), 1635–1654.

Smith Dumont, E, Gnahoua, GM, Ohouo, L, Sinclair, FL and Vaast, P (2014) Farmers in Côte d'Ivoire value integrating tree diversity in cocoa for the provision of ecosystem services. *Agroforestry systems, 88*(6), 1047–1066.

Somarriba, E, Beer J, Alegre-Orihuela, J, Andrade, HJ, Cerda, R, DeClerck, F, Detlefsen, G, Escalante, M, Giraldo, LA, Ibrahim, M, Krishnamurthy, L, Mena-Mosquera, VE,

Mora-Degado, JR, Orozco, L, Scheelje M and Campos JJ. (2012) 'Mainstreaming agroforestry in Latin America' In Nair, PK Ramachandran, Garrity, D (*eds*). *Agroforestry – The Future of Global Land Use*, pp 429–453. Springer, Netherlands.

Sonenshine, J (2013) *Can Consumer Goods Companies Achieve Zero Deforestation by 2020?* From http://blog.conservation.org/2013/05/can-consumer-goods-companies-achieve-zero-deforestation-by-2020-2/#sthash.73pZnsoZ.dpuf [Accessed 7 April 2016]

Steffan-Dewenter, I, Kessler, M, Barkmann, J, Bos, MM, Buchori, D, Erasmi, S, Faust, H, Gerold, G, Glenk, K, Gradstein, SR, Guhardjai, E, Harteveld, M, Hertel, D, Höhn, P, Martin Kappash, M, Köhler, S, Leuschner, C, Maertens, M,, Marggraf, R, Migge-Kleian, S, Johanis Mogea, J, Pitopang , R, Schaefer, M, Schwarzer, S, Sporn, SG, Andrea Steingrebe A, Sri S. Tjitrosoedirdjo ,SS, Tjitrosoemito, S, Twele, A, Weber, R, Woltmann, L, Zeller, M and Tscharntke, T (2007) Tradeoffs between income, biodiversity, and ecosystem functioning during tropical rainforest conversion and agroforestry intensification. *Proceedings of the National Academy of Sciences, 104*(12), 4973–4978. Available at: www.ncbi.nlm.nih.gov/pmc/articles/PMC1829249/pdf/zpq4973.pdf [Accessed 15 April 2016]

Sundaram, AK and Inkpen, AC (2004) Stakeholder theory and 'The corporate objective revisited': A reply. *Organization Science*, *15*(3), 370–371.

Sutton, J and Kpentey, B (2012) *An enterprise map of Ghana*. International Growth Centre (IGC). http://eprints.lse.ac.uk/64082/1/Enterprise_map_Ghana_author.pdf [Accessed 15 April 2016]

Tavares, HD (2001) *História da Bahia*. 10a edição. UNESP, São Paulo.

ten Brink, P, Mazza L, Badura T, Kettunen, M and Withana, S (2012) *Nature and its Role in the Transition to a Green Economy*. Available at: http://img.teebweb.org/wp-content/uploads/2013/04/Nature-Green-Economy-Full-Report.pdf [Accessed 7 April 2016]

TFD (2014) *Understanding 'Deforestation-Free': the State of Play and Issues to Consider during TFD's October 2014 Dialogue*. Available at: www.theforestsdialogue.org/sites/default/files/files/Understaning%20Deforestation-Free_background_Final%20(1).pdf [Accessed 15 April 2016]

The Guardian (2013): 'Child labour can't be carpeted over by a logo, but it's a step in the right direction'. Available at www.theguardian.com/global-development/2013/aug/15/child-labour-product-certification

Tscharntke, T, Clough, Y, Bhagwat, SA, Buchori, D, Faust, H, Hertel, D, Hölscher, D, Juhrbandt, J, Kessler M, Perfecto, I, Scherber, S, Schroth, G, Veldkamp, E and Wanger, TC (2011) Multifunctional shade-tree management in tropical agroforestry landscapes–a review. *Journal of Applied Ecology, 48*(3), 619–629.

Tseng, M-L, Chiu, SF, Tan, RR and Siriban-Manalang, AB (2013) Sustainable consumption and production for Asia: sustainability through green design and practice. *Journal of Cleaner Production, 40*(0), 1–5.

Tulane University (2011) Final Report on the Status of Public and Private Efforts to Eliminate the Worst Forms of Child Labour (WFCL) in the Cocoa Sectors of Côte d'Ivoire and Ghana.

UN (2013) World Economic and Social Survey 2013: Sustainable Development Challenges https://sustainabledevelopment.un.org/content/documents/2843WESS2013.pdf [Accessed 15 April 2016]

Vaast, P and Somarriba, E (2014) Trade-offs between crop intensification and ecosystem services: the role of agroforestry in cocoa cultivation. *Agroforestry systems, 88*(6), 947–956.

Van Hoek, RI (1999) From reversed logistics to green supply chains. *Supply Chain Management*, 4, 129–135

Vegro CLR, de Assumpção, R, José Roberto da Silva, JR (2014). *Aspectos socioeconômicos da cadeia de produção da amêndoa do cacau no eixo paraense da transamazônica*. Available from: ftp://ftp.sp.gov.br/ftpiea/publicacoes/IE/2014/tec5-0814.pdf [Accessed 7 April 2016]

Vogel, D (2006) *The market for virtue: The potential and limits of corporate social responsibility.* Brookings Institution Press.

Wood, GAR and Lass, RA (2008) *Cocoa*. John Wiley & Sons.

World Bank (2013) *Supply Chain Risk Assessment- Cocoa in Ghana*. Washington. http://documents.worldbank.org/curated/en/2013/01/17694705/ghana-cocoa-supply-chain-risk-assessment

Wright, AL (1992) *Land tenure, agrarian policy, and forest conservation in southern Bahia, Brazil: a century of experience with deforestation and conflict over land*.

WWF (2015, 1 June) Global Network Position: Deforestation-free production and finance. *WWF Position.* Available at: wwf.panda.org/about_our_earth/deforestation/forest_publications _news_and_reports/position_papers_forest/

Appendices

Appendix 1: List of interviewees

Organisation	Person
Ghana	
World Cocoa Foundation	7
Forestry Commission	2
OLAM	1
COCOBOD	3
Barry Callebaut	1
UNDP	2
PWC	1
ECOM Agrotrade	1
Kuapa Kokoo	2
Community association	1
WWF	1
Solidaridad	1
UNDP Cocoa Platform	1
World Bank	1
Environmental Protection Agency	1
Forest Trends	1
CRIG	1
University	1
IFC	1
	30

Organisation	Person
Brazil	
OCT	6
Odebrech Foundation	1
Cooperbahia	1
Fazenda Juliana	1
Instituto Federal Baiano	1
M21 communications, marketing, events	1
Mars research centre	6
	17
Netherlands	
CREM sustainability	1
FrieslandCampina	1
European Committee for Standardisation	1
Chocoa	1
LEI Wageningen	1
IDH	3
KIT Sustainable Economic Development	1
Ministry of Economic Affairs, Agriculture and Innovation	1
	10
Belgium	
European Commission – Smart Regulation	1
Directorate General for Development and Cooperation (DEVCO) – REDD+ and FLEGT	1
DG DEVCO – Agriculture Growth	1
DG DEVCO – Private Sector Development	1
European Commission – DG CLIMA	1
European Forest Institute	1
FAO	1
The European Cocoa Association (ECA)	2
	9

Organisation	Person
WCF Copenhagen Conference	
Fair Trade	1
Mars	1
Cargill	1
	3
USA	
USAID	1
State Government	1
IUCN	4
Climate Focus	1
Centre for International Environmental law (CIEL)	1
Environmental Defence Fund	2
The Nature Conservancy	1
World Resources Institute	1
Climate Advisers	1
Ecosystem Marketplace	1
Oxfam	1
CGF	1
	16

Appendix 2: At the landscape: land use challenges

Under the shade?

Traditionally, cocoa grows under the shade of other trees and starts bearing pods after three years. The yield increases up to the eighth or ninth year, but varies greatly depending on factors such as the method of cultivation and the nature of the hybrid. A typical farm (which normally covers 0.25–5 ha) yields 300–600 kg/ha/year in Africa and the Americas, and about 500–700 kg/ha/year in Asia (FAO 2014).

Most cocoa trees will produce commercially-acceptable yields until they are 25–30 years old (Wood and Lass 2008). After that, productivity reduces and the plantation needs to be restored. But one of the hurdles of renewing is the lack of income to the small-scale farmers[52] for three years until the first pods are produced. Thus, it is challenging to balance the trade-off between renewing the plantation to increase productivity versus the absence of upfront investment. This is particularly difficult because the size of the farm does not permit a creation of mosaic of trees of different ages that could cushion the loss of yields due to maturity of crops.

There are numerous debates on shade versus non-shade cultivation. Even though the shade resembles natural habitat, the plant also grows without a canopy cover and some argue that it bears pods sooner (Ruf 2011). Research points that removing some shade from cocoa has resulted in significant increases in yield, with a positive interaction between increased light and applied nutrients (Cunningham and Arnold 1962). Others go further and argue the full sun cocoa increases yield, becoming more profitable than shaded cocoa, given the earlier and higher pick yield, and introduction of hybrids (Cunningham *et al.* 1961).

A Cocoa Research Institute of Ghana (CRIG) trial found that the yield of cocoa grown under a moderate level of shade (34 trees/ha) was only 78 per cent of that of the non-shaded system, while under a heavy level of shade (68 trees/ha), the yield was only 50 per cent of that of the non-shaded system (Gockowski *et al.* 2013).

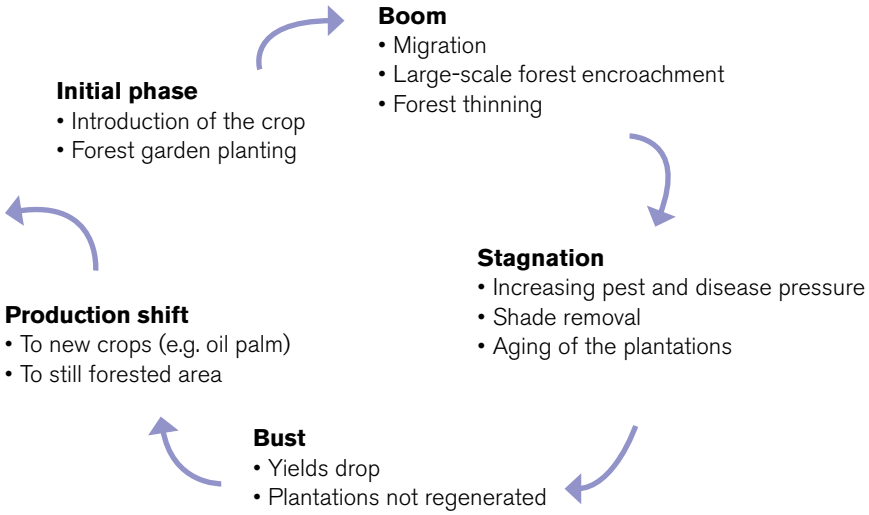
Additionally, some research indicated that intensification in cocoa fields, which supposedly requires less land to achieve the same output, reduces the pressure on forests (Ruf 2011; Vaast and Somarriba 2014). This tendency towards non-shade and monoculture practices has been taking place in West Africa and in Brazil (Ruf 2011).

Estimates are that, globally, around 70 per cent of cocoa is cultivated under shade (Gockowski and Sonwa 2011; Somarriba *et al.* 2012). However, given the increasing

52 As discussed further in this report, estimates are that 80 per cent of cocoa come from 7–8 million small family-managed farms.

demand for cocoa, there has been a trend of removing trees from the plantations to increase short-term productivity (Johns 1999; Steffan-Dewenter *et al.* 2007). In the western part of Ghana, for instance, 90 per cent of farmers were reported to be eliminating trees to reduce shade, given that there was a general perception that new cocoa hybrids were intolerant of shade (Ruf *et al.* 2006). Nevertheless, when the trees reach 25–30 years under the full sun, there is a reduction in yield and increasing pressure from insect pests (Johns 1999). This reality leads many to abandon the farms and move to new forest areas, on what is known as the 'boom and bust cycle' (see Figure 35).

Figure 35: Boom and bust model



Source: Clough *et al.* 2009

This practice also has considerable negative impacts on soil fertility. In the absence of organic matter and addition of fertiliser over many years following forest clearing, soil fertility reduces and is highlighted as one of the major causes of declining cocoa yields (Gockowski *et al.* 2013; Tscharntke *et al.* 2011), posing a threat also to the renewing of the plantation (Vaast and Somarriba 2014).

Nonetheless, research argues that new hybrids complemented by pesticides, fertilisers, and herbicides could improve this reality (Ruf 2011). There is a growing recognition that the use of superior genotypes is essential for increasing cocoa yield, limiting incidence of pests and diseases, and producing high quality chocolate (Vaast and Somarriba 2014). Therefore research institutes in Brazil, Costa Rica, and Ghana, to name a few, are looking into improving the species for yield outputs, resilience to pests and diseases, and response to fertilisers regimes. There are commercial examples in dry regions of

Brazil and Ecuador where there is focus on planting full sun cocoa, with irrigation, heavy inorganic fertilisation, and use of high yielding clones to avoid pests and pathogens.

Although there might be short-term gains through intensifying production in full sun, researchers point out the numerous downsides of such approaches, as well as the long-term benefits of growing cocoa under shade and in an agroforestry system. The main argument is that, in the longer term, all three aspects of sustainable development (ie social, economic and environmental) are better off with a more sustainably-managed cocoa.

This include benefits such as increased long-term yield, landscape and farm resilience to climate change impacts, buffers from cocoa price volatility, diversification of land uses and products (eg timber for construction), reduction of risks of pest and diseases outbreaks, and food security (Bentley *et al.* 2004; Duguma *et al.* 2001; Vaast and Somarriba 2014; Mbow *et al.* 2014. Agroforestry systems also have the ability to help regulate ecosystem functions such as nutrient recycling, water use, and species diversity, which directly or indirectly support productivity (Carsan *et al.* 2014).

While the economic lifespan of intensively managed hybrid cocoa ranges from around 18 to 29 years (Obiri *et al.* 2007), a recent study in Cameroon points out that by constantly eliminating low yielding, damaged or diseased trees, farmers in complex cocoa agroforestry systems can extend the productive life of a plantation up to over 40 years (Smith Dumont *et al.* 2014).

As detailed later in this report, the foreseen impacts of climate change in West Africa are likely to impact cocoa production, leaving farmers at the mercy of the weather and carrying the risk of lower production. Therefore, researchers argue that even though crop intensification might increase productivity, it may also reduce the ecological resilience of cocoa production systems (Tscharntke *et al.* 2011; Duguma *et al.* 2001).

When maintaining shade trees in smallholders' systems it is also a risk mitigation strategy, not only with respect to climate change impacts such as drought and heat, but also price volatility. Gockowski *et al.* (2010) state "with a shaded system, when prices fall or illness strikes, the farmer can reduce labour input or use of chemicals, without seriously affecting the future productive potential of the cocoa stock. Producers with full sun systems facing pressure from capsids and mistletoe do not have this option. If they do not spray, then their investment will be lost".

The majority of cocoa farmers (338 out of 355) interviewed in the Ivory Coast were pleased with integrating trees in their cocoa fields. They agree with the need to build resilience by stating that drier climatic conditions were the major driver for wanting shade in their fields, especially to protect cocoa trees from water stress in the dry months of

January and February. Farmers also mentioned that trees help increase the probability of rain, and contribute to soil fertility (Smith Dumont *et al.* 2014).[53]

A sustainably managed cocoa site can contribute to generating and maintaining environmental services not only at the plantation site, but spilling over to the landscape (Vaast and Somarriba 2014). This includes benefits that might have a global impact, such as conservation of biodiversity (Schroth *et al.* 2011), carbon sequestration (Somarriba *et al.* 2012), climate adaptation (Vaast and Somarriba 2014), among others (Anglaaere *et al.* 2011; Smith Dumont *et al.* 2014). Nonetheless, these need to be managed in a way that does not jeopardise the income and of farmers.

For example, cocoa agroforest corridors were seen as a good connector between isolated protected areas, which could contribute to broader landscape resilience. However, a socio-economic study which looked into turning existing farmers into agroforestry systems revealed that the income from the shaded cocoa yield are lower than the current full-sun-production system, even taking into account the potential income from timber trees that could be planted (Asare *et al.* 2014). Therefore, to ensure that the landscape also benefits, it would be necessary to compensate farmers for loss in income to realise such strategy. A broader landscape approach would be needed.

A new approach to agroforestry?

Experts argue that the long-term viability of cocoa cultivation in producing countries 'is endangered by increases in pest and disease pressure as the area planted with cocoa and the age of the plantations increase, which, in conjunction with socio-economic factors, increases the likelihood of abandoning cocoa and crop switching' (Clough *et al.* 2009). This is coupled with limited technical knowledge, extension services, and access to proper hybrids and fertilisers.

A study with cocoa farmers in Ghana[54] showed that the majority consider agroforestry systems obsolete and that the future of cocoa is closer to timber production through a 'light commercial-oriented agroforest' or a kind of 'mosaic landscape' (Ruf 2011).

Therefore, the promotion of any intervention, such as agroforestry, requires proper planning and management. Many traditional agroforestry systems are rapidly disappearing because they are not economically attractive, and because the forest trees that shade traditional crops are now perceived to be overly detrimental to agricultural yield (Waldron 2014). Researchers argue that we are going towards the development of commodity-based agroforestry systems, where instead of having complex systems, or the full-shade approach, we settle for more practical oriented strategies (Ruf 2011).

53 The authors note that this might be due to the fact that most of the cocoa in the Western part of the Ivory Coast, different from Ghana, is not of hybrid origin (Gockowski and Sonwa 2011).
54 Field surveys were conducted in 2005 and 2008 with 180 migrant and native farmers in four districts of Ghana, including some measurements at the farm plot level and satellite images in a fifth district.

So the original concept of agroforestry that was introduced as 'anthropogenic forests composed of numerous individually owned and managed plots, but which appear as a forest massif' (De Foresta and Michon 1997 and De Foresta, quoted by Kusters *et al.* 2008) is now giving room to a more simple approach which can be composed for example of one tree species mixed with one annual crop (Ruf 2011). The focus is on selecting species that not only provide shade and interact well with cocoa cultivation, but that also provide other tangible benefits to the farmer.

Therefore, a throughout examination of market-friendly species (eg timber, fodder and fuel) is needed to help build agroforestry systems. But that requires both analysis of market demand for forest and non-timber forest products (NTFPs) at the local and international levels, and the assessment of the types of tree species that can be produced in cocoa agroforestry systems. Alongside, tangible efforts should be made towards developing practical venues to link the farmer to the timber market, rather than just state that such is needed.

The demand for timber and NTFPs, for instance, is increasing in Africa due to the growth of urban and peri-urban centres. Thus, there is, in theory, a local market for this production. While most of cocoa produced in Africa is exported, timber and NTFPs could be consumed domestically, contributing to local rural livelihoods and domestic markets.

However, there is still a lack of knowledge and information about compatible tree species for cocoa. Research should be combined with local knowledge[55] to develop approaches to promote tree diversity in cocoa. This approach would assist on the identification of knowledge gaps that both research and extension should address and help refine current understanding of field, farm and landscape niches for different tree species (Smith Dumont *et al.* 2014). There is still little knowledge on shade versus non-shade aspects (Vaast and Somarriba 2014; Tscharntke *et al.* 2011; Ruf 2011), therefore more research is needed. But there also needs to be technical support to farmers on the ground to harness the information generated by those researches.

The reality of production is quite harsh across the globe. Farmers in Africa, for instance, struggle with low yields, pests and diseases that attack their cocoa trees (an estimated 30–40 per cent of the crop is lost), difficulty obtaining farming supplies, and limited access to credit. The situation in Brazil is not very different, especially as there seems to be more development assistance projects focused on Africa than in Brazil, sometimes given the perspective that the country does not require international assistance. But the

55 A study conducted in the Ivory Coast found that there seems to be great potential to build on local knowledge as farmers provided knowledge on how these current trees (about 32 different species) are positive in terms of soil moisture retention, soil fertility improvement and pest and disease interactions. Nonetheless, farmers traded off negative impacts of some species against their productive livelihoods, some examples being: attracts rodents, unclear timber value, and competitive for nutrients (Smith Dumont *et al.* 2014).

reality is that the disparity in income in the country leaves the smaller scale farmers in an even worse situation.

Over the last 50 years, cocoa cultivation has contributed to the disappearance of 14–15 million ha of tropical forests globally (around 2 million in Ivory Coast, 1.5 million in Ghana and over 1 million ha in Indonesia) with around 10 million ha currently in production (Clough *et al.* 2009).

In the Ivory Coast, for instance, the significant growth of the cocoa sector, aided by a favourable policy environment, has attracted migrants from neighbouring countries and paved the way towards the destruction of large parts of the Guinea rainforest (Clough *et al.* 2009). This cocoa-led deforestation has severely impacted the provision of ecosystem services raising the concern of conservationists regarding the sustainability of cocoa land use (Rice and Greenberg 2000; Clough *et al.* 2009).

Agriculture: a victim of climate impacts?

In the forest-agriculture debate, the latter is often seen as a villain. But research has shown that agriculture productivity can also be a victim of deforestation. Observations have pointed out that tropical deforestation leads to drier and warmer weather at the very local scale. Therefore, local agriculture productivity is at risk if neighbouring forests are cut down (Lawrence and Vandecar 2015).

Deforestation has also been associated with changes in rainfall patterns and intensity, which affect productivity cycles. Changes in the spatial pattern of rainfall are also likely to affect agricultural production. On this note, one should re-think the importance and vulnerability of farmers. As the system currently stand, farmers all take risks, but with limited benefits.

Estimates are that, due to climatic changes, the current cocoa growing zone in both Ivory Coast and Ghana is likely to decrease over the next 40 years, as portrayed Figure 36 (Läderach *et al.* 2013). This is due to a projected increase in global temperature and changes in yearly and monthly precipitation, leading to a drier climate.

Figure 36: Suitability of cocoa production in Ghana and Ivory Coast for current and future (2050) conditions

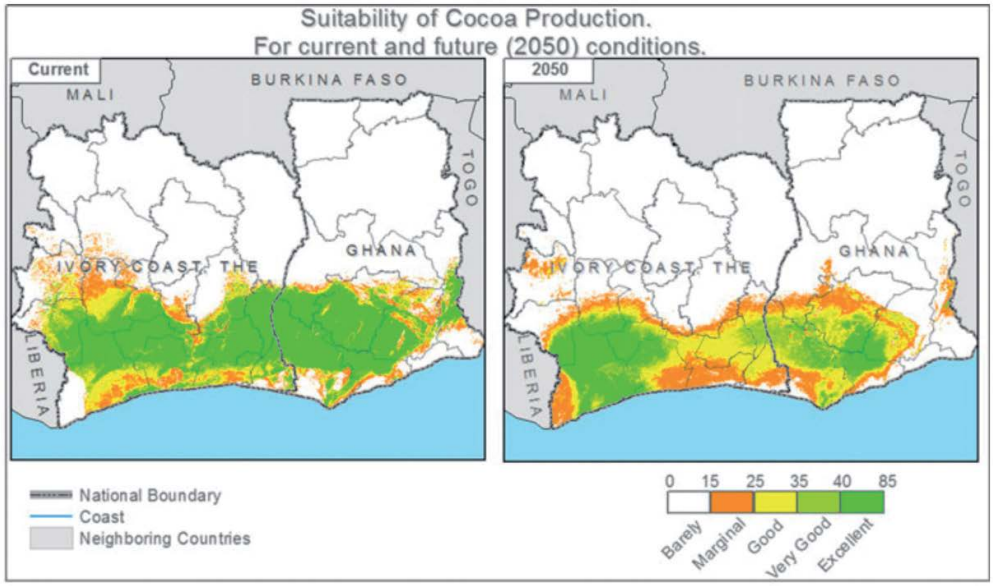
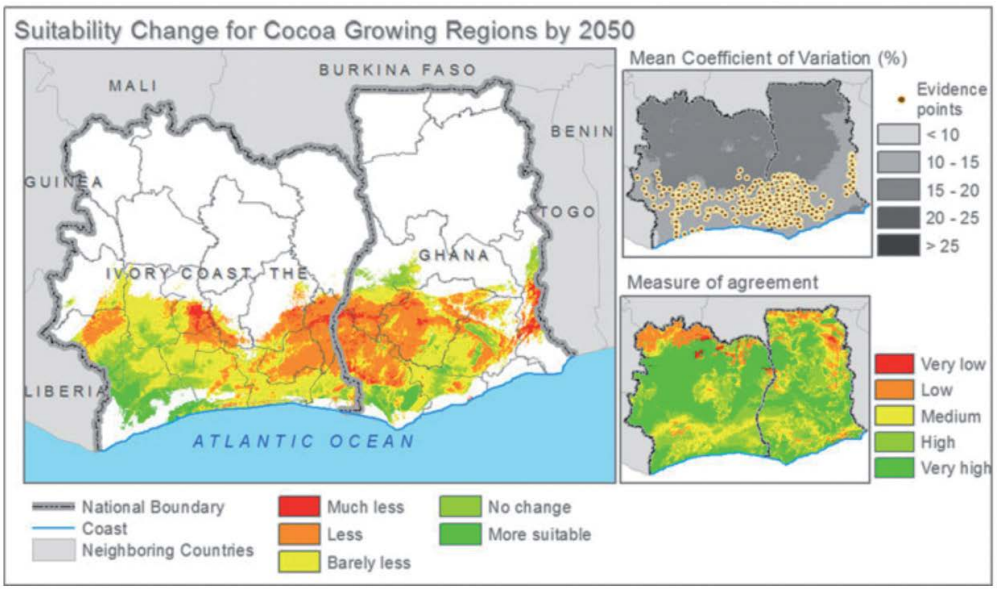


Figure 37: Suitability change for cocoa growing regions (Ghana and Ivory Coast) by 2050



Source: Läderach *et al.* 2013

Even though 40 years seems to be a long period, changes need to start now if the cocoa sector aims to reduce its vulnerability, especially when it comes to minimising impacts on farmers' livelihoods. Aside from focusing on agroforestry systems that could contribute to ecosystem resilience, research on breeding more drought-resistant cocoa varieties is very important (Läderach *et al.* 2013).

Farmers should also be encouraged to diversify production to reduce reliance on one crop (Läderach *et al.* 2013). This diversification is positive for two reasons; i) it is adaptive to both market and environmental conditions; ii) it gives the choice to farmers to also plant other commodities such as soy, rubber, palm oil, and capitalise on those that best suit them. This diversification empowers farmers to make their own adaptation decisions.

Cocoa: an ally for mitigation and adaptation strategies

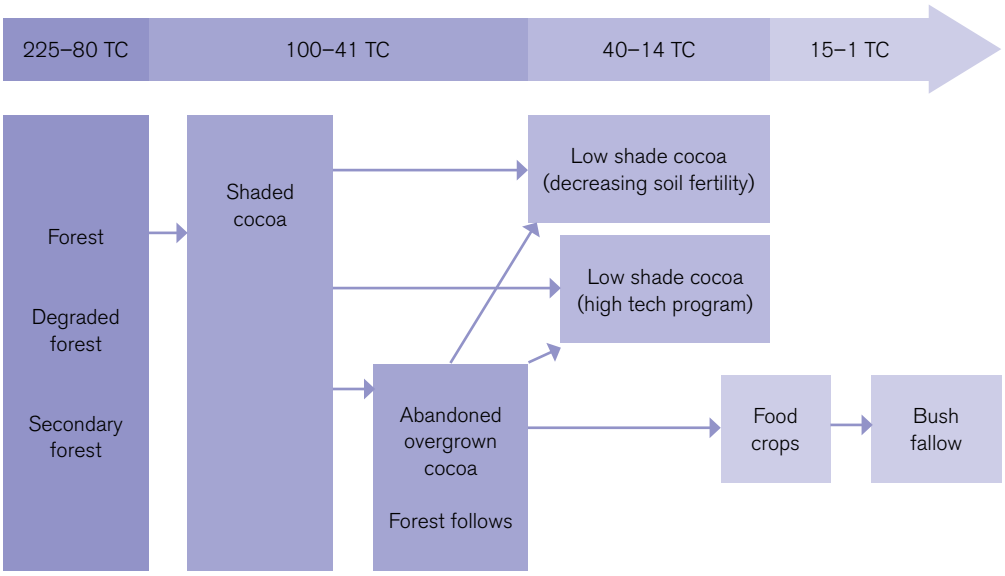
While cocoa can drive emissions (eg through LUC, transportation, manufacturing), it can also be an ally in the fight against climate change on both adaptation and mitigation fronts. Given that cocoa grows well under shade trees, it has the potential to assist on carbon sink strategies and contribute to adaptation measures. In addition, wel- managed cocoa agroforestry systems can raise the resilience of the ecosystem where it is placed. There seems to be contradictory findings regarding the yield benefits of shaded versus non-shaded coffee. Although further research is needed, gains in resilience might outweigh the apparent short term losses in yield.

Concerning GHG storage potential, preliminary research has suggested that traditional shaded-cocoa farms store over twice as much carbon as non-shade crops. However, there is mounting evidence that carbon alone does not compensate farmers enough for the transition from non-shade to shade (Katoomba 2009; Asante *et al.* 2014).[56] This is particularly so in the current context of limited market and price volatility. The Paris Agreement however, if adopted by governments, might encourage the development of stronger regulatory framework to drive the demand. There needs to be income generated from other environmental services, as well as focus on more productive agroforestry systems such as combining species that can replenish the soil, control pests and diseases and produce other commercial timber and non-timber products.

Figure 38 gives estimates of carbon stock in different land uses.

56 www.ecosystemmarketplace.com/pages/dynamic/article.page.php?page_id=7135

Figure 38: Land use change patterns and carbon stocks in the cocoa-forest landscape



Source: Asare *et al.* 2014

A study conducted in Brazil demonstrates the significant contribution that traditional agroforestry systems with shaded tree crops can make to biodiversity conservation and landscape carbon storage, thereby serving also as a climate change mitigation tool (Schroth *et al.* 2011).[57] Results indicated that in agroforests as in natural forests, carbon stocks are highly concentrated in the largest trees, suggesting that the intensification of traditional agroforests, through increasing the density of cocoa and other tree crops and reducing the density of shade trees, is possible without greatly affecting their carbon storage if large trees are conserved.

Therefore, intensification of production is possible, but diversification should be promoted if these land use systems are to sustain over the long term.

It is, after all, a trade-off analysis between several goals, including agricultural yields, biodiversity and ecosystem services (including climate regulation). Wade (2010) suggests two options: land sparing or wildlife-friendly farming. The first focuses on high yield, intensive farming that allows land to be spared elsewhere for conservation; while the latter is a low yield, extensive farming over a greater area that retains more biodiversity and protects ecosystem services.

57 Using published allometric relationships and tree inventories of 55 shaded cocoa farms, 6 mature forests, 8 disturbed forests and 7 fallows, we calculate average above ground C stocks of 87 and 46 Mg ha—1 in traditional and intensified cocoa agroforests, respectively, 183 Mg ha—1 in old-growth forests, 102 Mg ha—1 in disturbed forests and 33 Mg ha—1 in fallows.

Appendix 3: Current debate on cocoa/cacao

'Cacao' refers to the tree and its fruits, which includes pods and seeds. 'Cocoa' is the bulk commercial dried fermented beans and the powder that can be derived from the beans. Cacao is native to the Amazon. Mayas and Aztecs civilisations cultivated cacao and mixed it with water, maize and spice and called it *chocolatl.* It was later scientifically renamed to *Theobroma cacao*, which means 'food of the Gods' in Greek (Minifie 2012).

Cacao first came to Europe through Columbus, and once the Spaniards added sugar, the drink gained popularity. Up to the 1900s, South America and the West Indies were the main suppliers of cocoa, but were taken over by West Africa where the growing conditions proved to be very favourable to the newly introduced bean.

After being spread around countries, two different species developed: *Criollo* and *Forastero* – the latter developed into new varieties (Morris 1882).The cross between these two was called *Trinitario*.

Cacao grows naturally in tropical forests underneath a canopy of high trees. It adapts to humid tropical climates with regular rains and a short dry season. Therefore, cacao cultivation is restricted to only those countries within a certain latitude, so most of the world's production is grown in a narrow belt 10 degrees either side of the equator.

A tree grows to four to eight metres in height. Many flowers are produced, but only some are pollinated and develop into pods. These flowers are bisexual and the pollen is not dispersed by the wind, thus relying on agents for pollination, mainly midges (*Diptera: Ceratopogonidae*). But cocoa pollination is still an open topic which requires better knowledge to help boost production, since the *Theobroma cacao* yield is determined, at least on the short term, by the number of flowers pollinated (Groeneveld *et al.* 2010). Farmers also confess their key gaps in knowledge around alternative hosts of mirids and mistletoe (Smith Dumont *et al.* 2014).

This raises questions, related, for instance, to the need to conserve biodiversity in cocoa sites, which might have a role in pollination, and therefore, in boosting production, and consequently on landscape configuration in human-dominated landscapes (Groeneveld *et al.* 2010). This becomes challenging, as in many cases, both farmers and researchers do not yet fully grasp the relationship between the loss of ecosystem services, such as crop pollination, that could result from diminished vegetation cover and diversity. Nonetheless, there is concrete evidence that adjacent forest provides pollination and yield increases in coffee plantations (Ricketts *et al.* 2004; Priess *et al.* 2007).

Kremen *et al* (2007) have brought attention to the fact that several ecosystem services are delivered by organisms that depend on habitats that are segregated spatially or temporally from the location where services are provided. Therefore, one should consider biodiversity and land use change dynamics when thinking about pollination agents. This approach should be reflected in programmes and cross-sectorial policies on markets and land use management. Further, this gives an emphasis to look at broader interactions between natural resources and land uses within landscapes.

Appendix 4: National policy and institutional framework: playing a role in Ghana's deforestation?

The main guiding policies on forestry in the country are the 1994 Forest and Wildlife Policy (FWP), revised in 2011, and the 1996 Forestry Development Master Plan (FDMP). The FWP aims to achieve "conservation and sustainable development of the nation's forest and wildlife resources for the maintenance of environmental quality and perpetual flow of benefits to all segments of society". There is a clear focus on sustainability, especially when it comes to the management of the off-reserve forest areas. In order to achieve this, the FWP set out several strategies, including:

I. Revision of forest reserve management planning procedures for sustainable forest management, including development of biodiversity conservation and environmental protection in the High Forest Zone;

II. Establishment of databases, and information and communications technology (ICT) to facilitate decision-making and policy analysis;

III. Local community participation in the management of forest and wildlife resources, with rights to consultation, access and benefits;

IV. Private sector investment in plantation development, focusing on the conversion of the timber industry into a low volume, high value industry; and

V. Legislative reform in support of these strategies.

To assist the implementation of the FWP, the government approved a Forestry Development Master Plan (FDMP) in 1996. The four key elements of the Master Plan are:

I. Ensuring the legality of timber;

II. Ensuring sustainable financing for the sector;

III. Improving the quality of forest management and;

IV. Ensuring transparency in distribution of resources to forest communities.

To further strengthen these two pieces of legislation, several others were approved, focusing on efficient resource allocation and the prevention of illegal logging and chainsaw lumbering.[58] Nonetheless, the Timber Resources Management Act has made it **illegal for farmers** and other users of off-reserve lands to **harvest any naturally growing trees** for commercial or domestic purposes, even if it is growing on their land. It also prohibited logging without prior authorisation from concerned groups or individuals.

58 The Timber Resources Management Act (547/1997 and 617/2002) and the Timber Resources Management Regulations (1649/1997).

However, changes have made it legal for farmers and landowners to have **legal rights to planted trees**. Despite that, the majority of farmers are still unaware of this fact, making it necessary to build awareness for both farmers and forestry and agricultural officials on this new status of tree tenure (Acheampong *et al.* 2014).

When Timber Utilisation Contracts are granted off-reserve, the contract holder is obliged to engage in a Social Responsibility Agreement (SRA) with the concerned communities in the proposed area of logging. According to the SRA, 5 per cent of the stumpage fees should be directed to the community as compensation for damaged crops[59]. However, this fee is often captured during the process and the SRAs have not been sufficiently effective in rewarding the farmers and communities for trees on their lands (FIP IP 2012).

The forest sector fiscal regime has eight main instruments. Pre-harvest involves the Timber Rights Fee and a Contract Area Rent (concession rent). Stumpage fees are the key harvest level instrument, and the main source of government revenue from the forestry sector. Post-harvest fees include a 2 per cent export levy, a 1 per cent export levy and an export levy on air-dried lumber. In addition to these forest sector fees, there are two government tax instruments: corporate tax and import tariffs.

The government is also committed to tackling deforestation and illegal logging through various instruments, especially the revised Forest and Wildlife Policy (2011), and other on-going processes, such as the Voluntary Partnership Agreement (VPA), part of the EU's Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan[60], REDD+ and the non-legally binding instrument (of UNFF).

The FWP revisions are aimed at enabling the forestry sector to address issues such as **climate change mitigation and adaptation**, by removing major barriers to investments in forestry, such as **tree tenure**, complexities of land ownership, forest encroachment, weak infrastructure, and insufficient implementation of legal instruments. These aims were also debated in the REDD+ readiness process. The revised policy also focuses on public and private sector investments in **rehabilitation and restoration of degraded landscapes**; the promotion of good governance through accountability and transparency; and the promotion of forest enterprise development as a means of wealth creation. However, the revised policy is **yet to be approved** and it is anticipated that the FWP will be implemented through an updated 20-year Forest Sector Master Plan.

59 Timber Resource Management Regulations (L.I. 1649) 1998 and Economic Plants Protection Act (AFRCD 47 1979).

60 In September 2008, it was the first tropical timber-producing country to sign a Voluntary Partnership Agreement (VPA) with the EU. The VPA mechanism forms part of the EU's Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan to tackle the causes of illegal logging. The essence of the agreements is a commitment by exporting countries to verify the legality of timber exports to the EU in exchange for which the EU contribute toward the cost of putting in place the required verification systems. Ghana recognises that legality is an important first step towards sustainability.

But despite efforts, Ghana still struggles with illegal logging and good governance of the forest sector (RoG 2011a); the problems being mostly in the chain saw milling sector and the domestic timber supply. Although parliamentary oversight of forest agencies is relatively good, information management and use of best practice in law enforcement remains weak (FIP IP 2012).

Ghana's first Environmental Policy was adopted in 1995 and reviewed in 2000. Its focus is on building linkages between long-term economic growth, social transformation, poverty reduction and environmental sustainability. One of the main objectives of the revised EP was to **reduce deforestation through the integration of climate change and disaster risk reduction into national development policy and planning processes**.

The first Food and Agriculture Sector Development Policy (FASDEP) was developed in 2002, and in 2006 it was revised to encourage the formation of **inter-ministerial teams** to ensure environmental sustainability in agricultural production systems. The emphasis, though, was more on **increased production at the national level instead of increased yield** per unit area. As a result of this approach, and combined with other factors such as lack of credit and insufficient extension, most of the increased production at the national level has been achieved through expanding the area used for agriculture. A clear example is cocoa, which has not only grown rapidly, but is also partly disconnected from the main agricultural policies as it operates under the Ministry of Finance and Economic Planning (MoFEP), and not under the Ministry of Food and Agriculture (MoFA) (FIP IP 2012).

The MoFA has also approved a tree crops policy dealing with cocoa (1.6 million ha) among other commodities. But, the policy seems to have been developed without much contact with the forestry sector. Nonetheless, it proposes measures for environmental protection (eg agroforestry) and interventions.

The land tenure system in the country is administered through a complex legal pluralism system with the co-existence of statutory laws and customary rights. The customary landowners (stools, clans, families, and *tendamba)* who hold the allodial[61] title, own approximately 78 per cent of the total land area, while the State has 20 per cent, and the remaining 2 per cent is held in dual ownership (ie the legal estate by the government and the beneficiary/equitable interest by the community).

The customary owners hold land in custody for communities and various arrangements on land use for community members prevail. The situation has been further complicated by internal migration related primarily to expanding cocoa, and in many areas more than

61 Allodial title is a real property ownership system where the real property is owned free and clear of any superior landlord. In this case, the owner will have an absolute title over his or her property. Property owned under allodial title is referred as allodial land.

50 per cent of the population are from other parts of Ghana engaged through various arrangements, (lease, share-cropping etc.) in cocoa and other farming activities. Even though the state has elaborate institutional and legal structures for the management of all these types of land, the management of this resource is characterised by incoherent, conflicting and sometimes out-dated legislation (FIP IP 2012).

Income from mineral and natural resources including timber is distributed according to a constitutional formula: the Forestry Commission (FC) deducts a management fee of 60 per cent from timber revenues (technically known as stumpage fees) in the on-reserves and 40 per cent in the off-reserves; 10 per cent is given to the administrator of stool lands; and the remaining is shared between the district assembly (55 per cent), the stool (25 per cent) and the traditional council (20 per cent). As individual farmers, who often hold the management responsibilities, are left out from the revenue sharing formula, the small farming population is not adequately encouraged to protect trees (UNDP-DDC 2007). They would rather keep economic timber trees off their land than risk collateral damage from timber operations to their beverage and food crops.

Additionally, insufficient consultation and engagement of stakeholders in land management has contributed to increased encroachment of acquired lands (including forest reserves), unapproved and haphazard development schemes, uncertainties about titles to land and land litigation.

On the REDD front, there seems to be a coherence with the overarching aims and guiding principles of all the government policies dealing with forests. However, there are inconsistencies such as with tree tenure regimes. As previously mentioned, the Timber Resources Management Act prohibits farmers from harvesting any naturally occurring trees and is at the core of the deforestation problem. The farmer, landowner or rural land users are not benefiting sufficiently economically from timber resources growing on their own land. Additionally, there are no national provisions on carbon tenure so far. More agroforestry in cocoa farming could be stimulated by government transfer of tenure to trees on farmland to farmers.

Partly as a result of this reality, domestic demand for timber is met from illegally harvests in off-reserve areas and agricultural landscapes, and largely supports the existence of the illegal chain saw logging sector. There is also popular support for chain saw milling as it provides some real benefit sharing from commercial exploitation with farmers and landowners. The existing tree tenure regime is a major disincentive for maintaining and managing trees, especially high value trees on farms.

Thus, the existing incentive framework is leading to overharvesting and major loss of revenue, estimated at around 26 million per year. The challenge for the Forestry Commission (FC) and the Ministry of Lands and Natural Resources has been to address

the inefficiencies in the forest revenue system, and to meet the fiscal policy objectives and revenue potential of the forest sector (FIP IP 2012).

This reality was recognised by the revised Forest and Wildlife Policy (2011), which aims to address the **tree tenure** provisions in the country to help address the issue of deforestation. There are several aspects related to tree tenure that need to be addressed, one of the most important being the benefit sharing scheme. Nonetheless, because there are already some provisions in the Constitution on this regard, it is likely to be difficult to change in the short term. Therefore, the challenge becomes to create mechanisms within the available policy, legal and administrative framework, and to revise the policies and the regulatory framework that can be addressed, including institutional arrangements and mandates, to review regimes and the rights to manage, decide and to benefits from trees on farm.

To improve coordination of and guide policy, an inter-sectorial Technical Coordinating Committee (TCC+) was established in 2007. It will also oversee REDD+ implementation, including FIP, addressing coordination between the various agencies involved in the implementation.

Governing cocoa at national level

Ghana is considered a successful case when it comes to cocoa production and regulatory framework. The country increased production significantly in the 1990's earning the country the second largest producer globally, right after Ivory Coast. Different than many countries, Ghana opted for a tightly regulated system to determine the logistics and price of cocoa production in the country. To this date, Ghana remains the only major cocoa producing country in the world without a fully liberalised marketing system.

The Ministry of Finance and Economic Planning oversees Ghana's economic policies and programmes, national budget and resource allocation. The importance of cocoa in the country is such that the entire industry falls under this ministry rather than the Ministry of Agriculture.

Another key institution in the country is the Ghana Cocoa Board (COCOBOD) and subsidiaries, which implements government policies and programmes on cocoa and selected cash crops. COCOBOD was established by the colonial government in 1947 and has a key role in maintaining quality and ensuring a set price for stakeholders' in the country's supply chain. It was created mainly to address concerns over market-sharing and price-fixing arrangements among the foreign trading firms; and a general desire to stabilise domestic prices to producers, given the sharp fluctuations in world market prices.

Despite falling production and pressure from the World Bank in the 1980s to liberalise the cocoa sector, Ghana decided not to dismantle COCOBOD, but, instead, promote several reforms, including raising the fixed producer price to 70 per cent of the FOB

international price, and permitting private companies to enter internal marketing of cocoa beans. The Government of Ghana decided to keep COCOBOD on the control of several strategic functions, from setting of producer prices to the export of beans. This decision proved to be beneficial over the years, as currently Ghana is recognised as the best managed cocoa sector in Africa, especially when compared with Ivory Coast, whose cocoa sector became fragmented after a disastrous liberalisation in the early 2000s.

After having undergone several reforms, the present structure of COCOBOD has five main subsidiaries:

- **Quality Control Company:** responsible for maintaining the quality of cocoa and other exportable crops.
- **Cocoa Marketing Company:** located in Accra with a satellite office in London, CMC is a wholly-owned subsidiary of COCOBOD with the sole responsibility of marketing and exporting Ghana cocoa beans to local and foreign buyers. Its major responsibilities include: 1) procurement of graded and sealed cocoa beans from the LBCs at the three takeover centres; 2) stocking of cocoa prior to shipment; 3) securing optimal prices and maximising foreign exchange revenue; 4) managing sales and collecting receipts; and 5) settling of any disputes via direct arbitration.
- **Cocoa Research Institute of Ghana:** carries out research and development for the industry, but also provides consultancy work to external clients.
- **Cocoa Health and Extension Division:** responsible for the control of cocoa swollen shoot virus disease, rehabilitation of old and unproductive cocoa farms and extension services.
- **Seed Production Unit (SPU):** multiplies and distributes the best quality planting materials in the most efficient and cost effective manner in adequate quantities to farmers.

Put simply, COCOBOD and its subsidiaries and divisions are involved in the following operations:

- Marketing of cocoa beans and cocoa products
- Cocoa quality assurance
- Buying, processing and transportation
- Research and training
- Crop diseases and pest control
- Crop rehabilitation projects
- Farmer extension services

- Test and distribution of inputs
- Sole exporter of cocoa.

The government role in producer price determination ceded to a PPRC from the 1983/84 cocoa crop season. The objective was to establish an independent PPRC to regularly review and adjust producer prices.

Given Ghana's strict quality controls, the country has developed a reputation for superior bean quality, which has rendered Ghanaian cocoa a premium on the international market. To maintain product quality, COCOBOD's Quality Control Company (QCC) carries out three inspections: up-country store; take-over point; at the point of export. According to Bloomberg data, over the past decade, Ghanaian main crop beans have enjoyed an average premium over Ivorian main crop beans worth US$106/MT, rising to a peak of US$160/MT in late 2009, before plugging to around US$85/MT currently.

Appendix 5: Ghana's Forest Investment Programme

The Forest Investment Programme (FIP) is being managed by the Ministry of Natural Resources, while the Readiness Preparation Proposal (R-PP) and the Emission Reduction Programme (ERP) are under the Forestry Commission. Additionally, cocoa policies and activities are under the Ghana Cocoa Board (COCOBOD). The ERP has made great efforts towards bringing these stakeholders closer together, but coordination between the programmes and stakeholders could further improve to maximise outputs. The Cocoa Platform is already up and running and could help develop this dialogue process, but it should increase membership to also host international actors that might bring new ideas and financial resources to the sustainable cocoa efforts in the country. The World Cocoa Foundation is one of the donors of the Cocoa Platform and already has a long relationship with COCOBOD and local NGOs. The Foundation has also been keen to further promote sustainability along the supply chain, integrating issues such as climate change, but also helping to coordinate industry efforts into large programmes, instead of focusing on isolated projects. It is partnering with international institutions such as IUCN, which has been heavily focusing on the Bonn Restoration Challenge, as well as IIED, which has a long track record on development issues and REDD+ in Africa, to develop a climate-smart cocoa programme aligned with the ERP.

As illustrated in Table 12, FIP has three projects planned.

Table 12: Ghanas' Forest Investment Programme: planned projects

Project	MDB	Objectives	Status
1. Reducing pressure on natural forests through an integrated landscape approach[62]	IBRD	Develop, pilot and validate replicable and up-scalable participatory forest resources management models in and off forest reserves.	Approved on 19 December 2014
2. Engaging local communities in REDD+ / Enhancing carbon stocks[63]	AfDB	Enhance carbon stocks in the off reserve areas in the HFZ by engaging communities in approaches that generate direct financial and environmental benefits for them, leading to reduced deforestation and forest degradation in the landscape. (i) build capacity among local communities to enable them to participate effectively and efficiently in decision making and sustainable activities; (ii) implement policy pilots to test the effectiveness of intended tree tenure, benefit sharing, and carbon rights for REDD+ on the ground, including strong mechanisms for farmers to retain existing trees and plant new ones; (iii) develop alternative livelihoods for communities.	Approved on 25 September 2013
3. Engaging the private sector in REDD+[64]	IFC	Transform the ways in which private actors in the forestry and agricultural sector operate. The project will aim this by addressing key barriers that discourage private sector engagement, primarily: (1) high cost of borrowing; (2) lack of technical expertise; (3) high upfront, operational and transaction costs; and (4) high investment risks for forest investments.	Under design (no information on approval).

62 Project summary available at: www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/PID_Ghana.pdf
63 Project document available at: www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/AfDB_FIP_Ghana_Project_Document_6Sept2013.pdf
64 See www-cif.climateinvestmentfunds.org/sites/default/files/meeting-documents/3_ghana_forest_investment_program_pilot_countries_meeting_-_updates.pdf and also www-cif.climateinvestmentfunds.org/sites/default/files/knowledge-documents/fip_incentivizing_private_sector_involvement_in_redd_0.pdf

1. Reducing pressure on natural forests through an integrated landscape approach

This FIP-financed World Bank Project is designed to upstream policy interventions, practical landscape level pilot demonstrations, capacity building, and communications efforts to improve understanding and practices and to prepare for wider replication and scale up. The project will have four main components:

- Comp. 1: Policy Reforms and Institutional Strengthening (US$3 million)
- Comp. 2: Pilot Investments for Improved Forest and Landscape Management (US$22 million)
- Comp. 3: Innovation, Capacity Building, and Communications (US$3 million)
- Comp. 4: Project Management, Monitoring and Coordination (US$1.5 million)

The core of the project (Component 2) is a set of pilot activities implemented in a few target landscapes, designed to address key drivers of deforestation. The policy reforms, institutional strengthening, capacity building, and communications activities in other components aim to support and sustain the pilot/demonstration activities and lay the ground work for later replication and scale up. The final component provides resources for management, monitoring, and coordination across the range of FIP- financed activities. Each of the components is further described below.

The Forestry Commission – under the management umbrella of MLNR – is said to be engaged in these activities and will work with partners with skills in communication, community engagement, landscape management practices, to implement the activities.

2. Engaging local communities in REDD+ / Enhancing carbon stocks – AfDB

The purpose of the project is to increase carbon stocks and reduce poverty in the off-reserve areas of the High Forest Zones by engaging communities in land management approaches that generate direct financial and environmental benefits. It will run from 2013 to 2019.

The Bank-financed portion of the project supports: (i) restoration of degraded agricultural landscapes; (ii) climate-smart agriculture; (iii) livelihoods improvement; and (iv) capacity building. With a total cost of US$15.8 million, the project will be at a regional level, focusing on the Western and Brong Ahafo regions. The project's direct beneficiaries are estimated to be 12,000 people, with women representing about half of the targeted population. Furthermore, the project is expected to indirectly benefit 175,000 people (5 per cent of the population of the two regions). Direct beneficiaries will be supported with

capacity building, inputs (eg seeds), equipment, and financial incentives through benefit-sharing agreements, to develop forestry, agroforestry and alternate livelihoods activities.

The project document does not have any evidence of being linked to the ERP, but aims to inform the REDD strategy and the country's National Climate Change Policy Framework.

3. Engaging the private sector in REDD+

In Ghana, the IFC aims to work with the private sector, to give out loans to commercially viable projects. They have had a long relationship with several private companies in Ghana, so there is already an open channel of communication. In order to develop and detail a project under FIP, they have conducted a scoping mission to try to identify the types of projects they could finance. At this point, they decide not to work with the cocoa sector, but are open to discuss the matter in case a cocoa company approaches them with a business idea.

During the interviews carried out under this project in Ghana, and conference call with IFC, we could not find evidence that IFC is coordinating closely with the ERP.

Appendix 6. Other initiatives in Ghana

Ghana has partnered with the international community to address forest and climate issues at country level. The main initiatives in place are: the readiness process under the Forest Carbon Partnership Facility (FCPF) managed by the World Bank, and the Emission Reduction (ER) Programme under the World Bank Bio-Carbon Fund, the Investment Plan, and projects under the Forest Investment Programme (FIP), and UN-REDD.[65] Ghana became a pilot country under the FCPF in 2008, with its Readiness Preparation Proposal (R-PP) completed in 2010.[66] Ghana's National REDD Strategy led by the Forestry Commission was finalised in 2015.

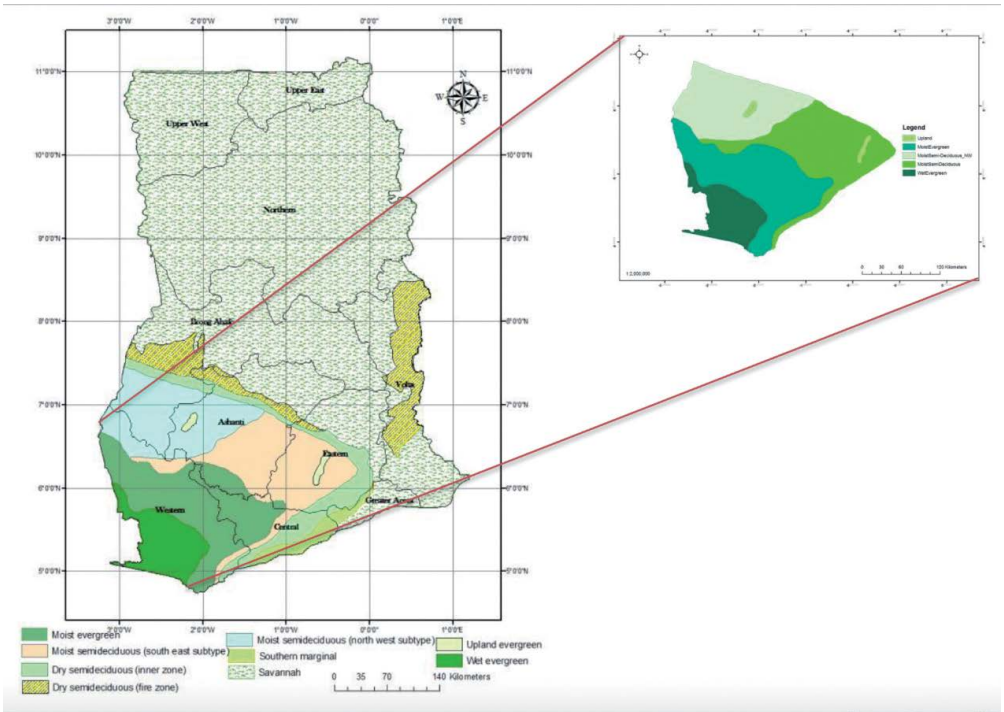
The ER Programme focuses on the mosaic cocoa landscape. It recognises that addressing cocoa and deforestation requires significant changes in how cocoa is produced, shifting from the current BAU (Business as Usual) situation of low productivity, the tendency to reduce shade, and spread production to new forest areas. The answer should be more on a landscape scale, with cross-sector, multi-stakeholder engagement, including from the private sector.

Ghana's ERP will be implemented at sub-national scale, following the ecological boundaries of the five high forest eco-zones that together cover approximately 5.9 million ha (see Map 3). If successfully implemented, the programme has the potential to deliver climate-smart cocoa beans grown in a sustainable landscape, which is beneficial to farmers and the government – as it promotes a more sustainable production system and improved livelihoods. For private sector actors, it secures supply, and long term access to markers. Additionally, the programme aims to achieve a number of non-carbon benefits, including strengthening tenure and rights, biodiversity conservation and the sustainable and secure supply of cocoa.

This is a very diverse eco-zone with significant carbon stocks. Over 1.6 million ha (27 per cent) of the programme area is gazetted as forest reserves and national parks, both of which are commonly referred to as the 'on-reserve' area. In contrast, the 'off-reserve' represents all land outside of protected areas. In the programme area, the off-reserve covers approximately 4.3 million ha of land. There is no national information available on the total number of cocoa farms or total area under cocoa in the country, however, it is estimated that cocoa farms cover 1.8 million ha of the off-reserve (Forestry Commission 2014).

65 In 2012, Ghana was also included in the UN-REDD programme.
66 Forestry Commission of Ghana 2010.

Map 3: Ghana's forest eco-zones



The 20-year-long programme (2016–2036) aims to contain the expansion of production areas including managing the cocoa-forest frontier. It aims to increase yield by more than 200 per cent; increase canopy cover to 40 per cent; ensure that farmers plant more shade trees, but have the right to retain them; account for emissions reductions; and increase forest areas in the country. The expectation is that it will provide US$50 million toward purchasing emissions reduction. The CO^2 emissions reductions payments will be addressed to foster sustainable growth and development in the landscape.

Ghana is also one of the pilot countries for the Forest Investment Programme (FIP), which aims to pilot and provide up front investments for countries to test and initiate REDD+ activities.[67] Cocoa is an important component in these programmes, as it is recognised as being one of the main drivers of deforestation in the country

The coexistence of the two programmes (ER and FIP) will boost investment in emission reducing activities, the nesting of REDD+ and FIP projects, hence streamlining the Forest Reference Level and MRV system. The existence of a buyer for reduced emissions in a very important step towards providing the premium that assures land users that change to sustainable land use practices will be rewarded.

67 The aim of the FIP programme is to address the underlying drivers of deforestation and catalyse transformational change by providing upfront investment to support the implementation of the REDD+ strategy, and generate information and experience for policy and regulatory changes.

It is also recognised that the integration of these programmes will foster cross-sector collaboration between the Forestry Commission and COCOBOD in addressing the sustainable and resilient supply chain of cocoa that does not push the forest frontier further.

The major underlying drivers of GHG emissions that the FIP investment plans to address are:

(1) Agricultural expansion, especially the drivers behind the expansion and transition of cocoa farming;

(2) The tenure and benefit sharing regimes that current represent a disincentive to retaining trees and forests especially in the off- reserve areas;

(3) The financial incentives and market mechanisms, including REDD+, that may change the way business in forestry and the agricultural sector is conducted within the private sector and society in Ghana.

The FIP programme acknowledges that different private sector actors, such as commodities producers and buyers, would benefit from improved cooperation mechanisms to ensure economic, social and environmental sustainability throughout the supply chain. Some of the identified opportunities for private sector engagement include: promoting incentives to improve the efficiency and sustainability in timber harvesting and processing; increasing access to finance for REDD+ projects; Promoting carbon sequestering cocoa and agricultural farming systems; promoting sustainable forest management; training and capacity building activities; and exploring market mechanisms and processes (certification, commodity roundtables), enabling wide scale engagement from various private sector actors to ensure sustainability in commodity' supply chains.

To implement these views of further engaging the private sector, FIP has proposed the following activities:

- A REDD+ investment programme that would either facilitate an on-lending arrangement with a local financial institution or invest directly in businesses. It would provide finance to companies investing in certifiable, climate-friendly cocoa, agriculture or forest plantations, and forest rehabilitation; other products (rubber, bamboo) as alternatives to timber; or in efficiency gains in the timber industry.
- A technical support programme would complement the proposed investments by providing technical assistance and training to various private sector actors (such as financial institutions, companies producing and purchasing cocoa, timber and/or palm oil, and other businesses), in order to promote sustainable forestry and agriculture, certification and resource efficiency.

Cocoa as a lifeline for many farmers in Ghana

Cocoa is a very significant crop for farmers in the country, contributing between 70 to 100 per cent of their household income (Ntiamoah and Afrane 2014; Hainmueller *et al.* 2011), even though questions are raised about the dependency of farmers towards one commodity when there is a high likelihood of climate change impacts increasing their vulnerability (Asante and Amuakwa-Mensah 2014).

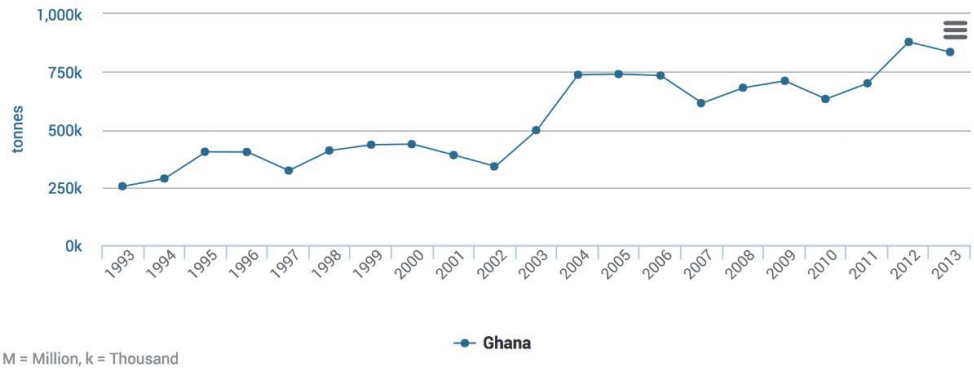
The cocoa sector provides the primary livelihood to an estimated 800,000 farm households. Cocoa farming is one of the dominant land use activities in Ghana, with an estimated cultivation area of over 1.6 million ha (World Bank 2013). Cocoa farm sizes are relatively small with the majority of farms falling in the size range of below 4 ha (Rice and Greenberg 2000; Hainmueller *et al.* 2011).

Table 13: Farm size and ownership by region

Region	Median farm size overall reported (acres)	Percent of farmers who own their farm	Median size of largest farm reported (acres)	Median size of largest farm measured (acres)
Ashanti	4	87%	4.7	4.02
Brong Ahafo	4	74%	6.5	4.78
Central	3	71%	4	2.1
Eastern	2.5	72%	3	2.2
Western	3	77%	4	2.7
Total	3	76%	4	2.51

Ghana's production has nearly doubled over the past decade, going from 340,000 MT in 2001/02 to 632,000 MT in 2009/10. This was mainly due to the improved provision of inputs, new plantings and better husbandry. In 2011/12, there was an output peak at 1,025,000 MT, also due to smuggling of Ivorian beans into Ghana during Ivory Coast's civil war. Output subsequently returned to more characteristic levels, falling to 878,500 MT in 2011/12 and 835,400 MT in 2012/13 (see Figure 39).

Figure 39: Ghana's historical cocoa production



Source: FAO 2014

Despite increasing production, productivity is low, but at similar levels when compared to neighbouring African countries,[68] and above world average. However, by acknowledging the growing demand for cocoa, the industry has been paying increasing attention to productivity increase and rehabilitation rather than expansion of cocoa fields. As well as the private sector actor along the chain, national governments and international donors have also been focusing on improving livelihoods and production in Ghana. Nonetheless, these initiatives are somehow disconnected and not necessarily contributing to increasing the efficiency of the supply chain (Laven and Boomsma 2012).

A 2011 survey in 335 villages in Eastern, Central, Ashanti, Brong Ahafo, and Western region, interviewed approximately 3,000 cocoa farmers (Hainmueller *et al.* 2011). The main results are summarised in Box 6 below. The median cocoa yield among the surveyed Cadbury Cocoa Partnership (CCP) communities is 312 kg per ha; 374 kg per ha among the CARE communities, 313 among the VSO communities, and 254 among the World Vision communities while cocoa is an important lifeline for many farmers, livelihoods are affected in many fronts.

68 Ghana – ranging from 400–500kg/ha, Ivory Coast (400kg/ha), Cameroon (380kg/ha) and Nigeria (320kg/ha).

Farm survey results

Figure 40: Survey results: Crops planted

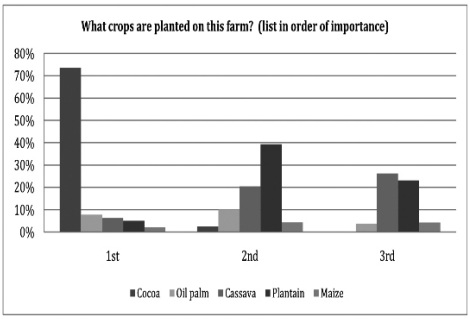


Figure 41: Survey results: Sources of income

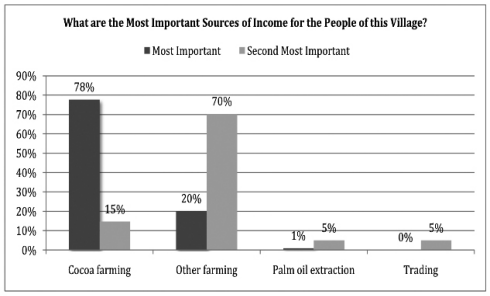
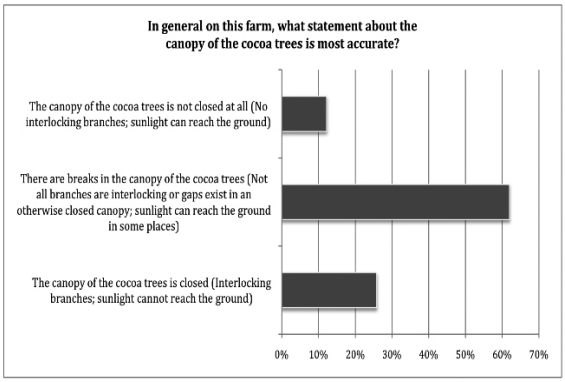


Figure 42: Survey results: cocoa canopy



Source: Hainmueller *et al.* 2011.

Box 6: Results from surveys with farmers in Ghana

- Productivity is low (355 kg/ha in the Eastern Region to 389 in Brong Ahafo and in the Western Region); farming practices are simple and the use of fertilisers is negligible, but there is clear opportunity for significant increases in productivity as some farmers are much more productive than others in the same region.
- Farmers reported losing about 34 per cent of the cocoa harvest due to disease.
- The average income per capita per day for a cocoa farming household is under GHC 1 (US$0.26), which inhibits the adoption of more advanced farming practices, such as use of fertilisers and pesticides.
- Less than 40 per cent of farmers (ranging from 21 per cent in the Western Region to 52 per cent in the Eastern Region) recommend their children continue their cocoa growing activities, as most farmers consider that other sectors might offer better opportunities.
- Most farmers report that their living conditions have worsened over the years, mainly due to decreasing cocoa prices, hence they have no disposable income.
- Less than 10 per cent of farmers interviewed reported being members of a farmers' association.
- In terms of benefits, both farmers and village leaders indicate that the community needs infrastructure such as roads, education, and health.
- The average age of farmers is around 50 years.

On the more specific subject of cocoa and biodiversity, a survey identified 36 initiatives in the country that mainly aim to address:

- Capacity building of cocoa farming communities, commonly on the improvement of agricultural practices for the increases of yields and income.
- Support to the establishment and development of farmers' associations.
- Rehabilitation of cocoa landscapes and intensification, improvement and diversification of cocoa production.
- Promotion of cocoa certification and climate-smart cocoa production.
- Payment for environmental services, enhancement of carbon stocks and reduction of emissions from forest degradation.

Source: Hainmueller et al. 2011.

Knowledge Products

Research Report

March 2016

Forests; Climate change

Keywords:
Reducing Emissions from Deforestation and Degradation (REDD+), carbon, cocoa, private sector

This research report outlines the journey of the cocoa bean on its way to becoming chocolate, showing how sustainability requires all actors to play their role in greening of the whole supply chain – from farmer to consumer. Insights from cocoa production in Ghana, where cocoa farming is one of the dominant land use activities, and Brazil, the largest producer of cocoa in the Americas, illustrate some of the challenges – and opportunities of sustainability.

International Institute for Environment and Development
80-86 Gray's Inn Road, London WC1X 8NH, UK

Tel: +44 (0)20 3463 7399
Fax: +44 (0)20 3514 9055
email: info@iied.org
www.iied.org

iied

UKaid from the British people

This research was funded by UKaid from the UK Government, however the views expressed do not necessarily reflect the views of the UK Government.