

PUBLICATION INFORMATION

This is the author's version of a work that was accepted for publication in the Environmental Conservation journal. Changes resulting from the publishing process, such as peer review, editing, corrections, structural formatting, and other quality control mechanisms may not be reflected in this document. Changes may have been made to this work since it was submitted for publication. A definitive version was subsequently published in <https://doi.org/10.1017/S0376892918000243>

Digital reproduction on this site is provided to CIFOR staff and other researchers who visit this site for research consultation and scholarly purposes. Further distribution and/or any further use of the works from this site is strictly forbidden without the permission of the Environmental Conservation journal.

You may download, copy and distribute this manuscript for non-commercial purposes. Your license is limited by the following restrictions:

1. The integrity of the work and identification of the author, copyright owner and publisher must be preserved in any copy.
2. You must attribute this manuscript in the following format:

This is an accepted version of an article by Camargo, M.C., Hogarth, N.J., Pacheco, P., Nhantumbo, I., Kanninen, M. 2019. **Greening the Dark Side of Chocolate: A Qualitative Assessment to Inform Sustainable Supply Chains.** *Environmental Conservation*, 46 (1): 9-16. DOI: <https://doi.org/10.1017/S0376892918000243>



1 Marisa Camilher Camargo et al.

2 **Greening the Dark Side of Chocolate: A Qualitative Assessment to Inform**

3 **Sustainable Supply Chains** <TS: Please insert blurb for Thematic Section: Forests in

4 **Flux**>

5 Marisa Camilher Camargo¹, Nicholas J. Hogarth¹, Pablo Pacheco², Isilda Nhantumbo³

6 and Markku Kanninen^{1,2}

7 ¹*Viikki Tropical Resources Institute (VITRI), Department of Forest Sciences, PO Box*

8 *27 (Latokartanonkaari 7), FI-00014, University of Helsinki, Finland, ²Center for*

9 *International Forestry Research (CIFOR), Jalan CIFOR, Situ Gede, Bogor Barat*

10 *16115, Indonesia and ³International Institute for Environment and Development*

11 *(IIED), 4 Hanover St, Edinburgh, EH2 2EN, UK*

12 **Author for correspondence:** Marisa Camilher Camargo. Email:

13 marisa.camargo@helsinki.fi <AQ1><AQ2>

14 Supplementary material can be found online at <http://dx.doi.org/> <Note to TS:

15 **INSERT DOI**>

16 Received: 15 May 2017; Accepted: 30 May 2018

17

18 **Summary**

19 Despite the plethora of discourse about how sustainable development should be

20 pursued, the production of agricultural commodities is held responsible for driving

21 c. 80% of global deforestation. Partially as a response, the private sector has made

22 commitments to eliminate deforestation, but it is not yet clear what factors these

23 commitments should take into account to effectively halt deforestation while also

24 contributing to broader sustainable development. In the context of private sector

25 commitments to zero-deforestation, this study characterizes the perceptions of

26 different types of stakeholders along the cocoa and chocolate supply chain in order to

27 determine the main challenges and solutions to encourage sustainable production. The
28 main purpose is to understand the key factors that could facilitate a transition to a
29 more sustainable supply while harmonizing the multiple actors' interests. A
30 qualitative thematic analysis of perceptions was conducted based on responses from
31 59 interviews with different stakeholders along the cocoa and chocolate supply chain
32 in six key producing and consuming countries. Thematic analysis of the responses
33 revealed six main themes: (1) make better use of policies, regulations and markets to
34 help promote sustainability; (2) improve information and data (e.g., impacts of
35 climate change on cocoa) to inform sound interventions; (3) focus on the landscape
36 rather than the farm-level alone and improve integration of supply chain actors; (4)
37 promote better coordination between stakeholders and initiatives (e.g., development
38 assistance projects and corporate sustainability efforts); (5) focus on interdependent
39 relationships between social, environmental and economic dimensions to achieve
40 sustainable development; and (6) engage with the private sector. The study shows the
41 importance of identifying different stakeholder priorities in order to design solutions
42 that accommodate multiple interests. It also emphasizes the need to improve
43 coordination and communication between stakeholders and instruments in order to
44 address the three different dimensions of sustainability in a synergistic manner,
45 considering the interactions from production of raw material to end consumer.

46 **Keywords:** Cocoa; chocolate; supply chain; sustainability; sustainable development;
47 deforestation; private sector

48

49 **Introduction**

50 Proponents of sustainable development suggest that economic growth should be
51 designed to meet the needs of the present generation without jeopardizing the rights of

52 generations to come (Brundtland 1987). Sustainable production and supply chains
53 should thus find an optimal long-term balance between economic, social and
54 environmental issues (Fay 2012, Borel-Saladin & Turok 2013).

55 Despite the omnipresent discourse that sustainable growth should be pursued,
56 production of agricultural commodities to supply the needs of the world's growing
57 population is increasing hastily and is responsible for driving c. 80% of global
58 deforestation (Hosonuma et al. 2012). These include 'forest risk commodities' such as
59 beef and leather, cocoa, palm oil, rubber, soya, pulp and paper (Newton et al. 2013,
60 Rautner et al. 2013, Lawrence & Vandecar 2015). In response, businesses, scholars
61 and governments have turned their attention to supporting sustainability in
62 commodity supply chains (Brickell & Elias 2013, Green 2015). A 'zero-deforestation
63 movement' has emerged based on the notion that more radical efforts had to be made
64 to delink commodity production from deforestation (Lambin et al. 2018).

65 Consumer goods manufacturers, traders and corporate processing groups have
66 pledged to eliminate deforestation from their supply chains, although they use
67 different definitions of forests and compliance timeframes (Hower 2014, United
68 Nations 2014). In 2017, 12 of the world's leading cocoa and chocolate companies
69 collectively committed to end deforestation and forest degradation in the global cocoa
70 supply chain, with an initial focus on Côte d'Ivoire and Ghana (2017).<AQ3>

71 It is, however, not yet clear what factors these zero-deforestation commitments should
72 take into account in order to effectively ensure that social, environmental and
73 economic issues are addressed according to the principles of sustainable development.
74 Moreover, the challenge is to ensure that these pledges are not reduced to simply
75 conserving remnant forest plots adjacent to agricultural production areas, but that they
76 contribute towards enhancing the sustainability of the landscapes where the raw

77 materials are sourced, as well as the supply chains from farmer to consumer. The
78 latter will entail actions aimed at ensuring forest protection, and thus securing the
79 provision of ecosystem services, but also on stimulating the uptake of improved
80 production practices that should result in improved cocoa farmer income and well-
81 being.

82 So far, the literature on zero-deforestation commitments has focused mostly on the
83 challenges and risks associated with implementing these on the ground, with a heavy
84 focus on deforestation, but with less attention given to the actions at different stages
85 along the supply chain that are needed to address the environmental issues found
86 upstream in the chain (primary production stage). This is problematic for three main
87 reasons: (1) drivers of unsustainable commodity production are sometimes found
88 elsewhere in the end-product supply chain, such as the lack of demand for certified
89 sustainable products in consuming countries; (2) deforestation and its associated
90 carbon emissions and biodiversity loss represent only some of the many
91 environmental externalities related to the production of end products (e.g., chocolate);
92 and (3) the livelihoods of smallholder farmers, who are the main cocoa suppliers,
93 constitute a major challenge that needs to be addressed concomitantly with
94 environmental concerns (Kopnina 2017). Therefore, a limited focus on the
95 commodity and deforestation at the farm level might not help address the problem in
96 the long term.

97 Cocoa is a very important cash crop for millions of farmers and the national
98 economies of several countries in West Africa, as well as in Brazil and Indonesia
99 (FAO 2014). Notwithstanding the benefits that cocoa brings, it has been directly
100 linked to deforestation and forest degradation in production areas (Gockowski &
101 Sonwa 2011). Although cocoa production has a lower contribution to deforestation

102 compared to other commodities such as beef and soy (Henders et al. 2015), research
103 suggests that over the last 50 years, cocoa cultivation has contributed to the
104 disappearance of 14–15 million ha of tropical forests globally (Clough et al. 2009).
105 Moreover, production continues to expand to meet the growing international demand,
106 further increasing pressure on forest areas. Yet it is still important to address the
107 impacts of cocoa on forest conversion since it has been leading to local and regional
108 climatic changes (Laderach et al. 2013) that will likely impact not only cocoa
109 production, but also the livelihoods of millions of cocoa producers and their
110 dependants living in the cocoa belt (Schroth et al. 2016, Coulibaly et al. 2017).
111 Cocoa production is only one part of the chain, with several other sectors still needing
112 to interact before chocolate – the final product – can be produced, including other
113 basic ingredients (sugar, lecithin, vanilla, milk powder, nuts, etc.), the agricultural
114 inputs industry (e.g., seedlings, fertilizers), local buyers (traders), processors,
115 manufacturers, transporters, the packaging industry, retailers and final consumers
116 (Afoakwa 2014; Camargo & Nhamtumbo 2016) (Supplementary Material S1,
117 available online).

118 In this study, findings from a thematic analysis of perceptions from different types of
119 stakeholders connected to the production of cocoa and chocolate – in both producing
120 and consuming countries – are systematically characterized in terms of what they
121 believe are the main challenges and solutions to encouraging the sustainability of
122 supply chains. This study aims to understand the factors shaping the challenges and
123 potential solutions to transitioning towards more sustainable production of cocoa
124 (commodity) and chocolate (end product) in the context of commitments to zero
125 deforestation. The results can be used to inform what elements zero-deforestation
126 pledges should take into account in order to contribute to sustainable development,

127 especially in terms of addressing livelihoods. This will also help inform the future
128 directions, policies, investments and other decisions that could contribute to the
129 transition from a singular focus on zero deforestation to a more holistic approach that
130 embraces sustainability.

131 **Methods**

132 *Sample*

133 Stakeholders were interviewed in six countries: Ghana and Brazil (the second and
134 sixth largest producers of cocoa in the world); The Netherlands (the largest global
135 importer and processor of cocoa); the USA and Belgium (major consumers of
136 chocolate); and Denmark (during an international cocoa conference).

137 Stakeholders were selected using purposive and snowball sampling approaches. They
138 included farmers, manufacturers, investors, government representatives, non-
139 governmental organizations (NGOs), researchers and technical assistance (TA)
140 providers working on cocoa or similar agricultural commodities. Fifty-nine interviews
141 with 69 stakeholders were carried out between October 2014 and July 2015 (six
142 interviews accommodated two or three people). Supplementary Material S3 provides
143 more details on the methods.

144 *Interviews*

145 The majority of the interviews were carried out in person by the first author of this
146 paper (MCC). Because the pool of stakeholders ranged from cocoa farmers to
147 industry representatives, the interviews were not designed to have one set of specific
148 questions. Instead, an interview guide was developed based on five pertinent topics
149 drawn from a review of the literature. This helped give focus to the interviews, but
150 also allowed the interviewer to customize questions to individual stakeholders'
151 realities. The open-ended approach was based on the understanding that stakeholders'

152 preferences are mainly socially constructed, based on different interests and
153 experiences and shaped by social interaction (Rubin & Rubin 2011).
154 At the start of each interview, interviewees were informed that the research was
155 examining the three dimensions of sustainable development (social, environmental
156 and economic) and that their responses would be kept anonymous. In most interviews,
157 except with farmers and some producing country actors, we explained that the
158 research was being carried in the context of the recent industry commitments to
159 promote zero-deforestation supply chains. The interview guide is summarized in
160 Supplementary Material S3.

161 *Analysis*

162 Both Atlas Ti (qualitative data analysis and research software) and open coding
163 procedures (Strauss & Corbin 1990) were used to analyse the interview responses and
164 to identify codes and themes. A final list of 38 codes organized into six themes was
165 developed. A sample of five coded interviews were checked by one of the co-authors
166 (NJH) to ensure suitability of the codes and coding process before all remaining
167 interviews were coded.

168 **Results**

169 *Stakeholder Typology*

170 Approximately half of the stakeholders interviewed were from cocoa-producing
171 countries and the other half were from cocoa-importing and/or cocoa-consuming
172 countries (Table 1). The respondents represented nine different stakeholder groups
173 (Table 2).

174 *Thematic Analysis*

175 From the stakeholders' responses, six main themes emerged: (1) policies, regulations
176 and markets; (2) knowledge; (3) landscape and supply chain approaches; (4)

177 coordination; (5) relationship between sustainability dimensions; and (6) private
178 sector engagement.

179 A sample of interviewees' responses provide details underpinning the findings
180 (Supplementary Table S2).

181 *Policies, Regulations and Markets*

182 Approximately half the stakeholders, with representatives from all categories, agreed
183 that policies featured as both a challenge and a solution when it comes to encouraging
184 the sustainability of commodities at local and global levels. One NGO representative
185 summarized, "If there is no basic rule of law it all fails. We need property rights, and
186 other structure systems. The market push is important, but it cannot do it all alone, as
187 it would lead to inequality." A TA provider contested, "We should not try to regulate
188 everything, only if there is a direct driver, as too many regulations are not efficient
189 because they require monitoring and are costly."

190 About a quarter of stakeholders suggested focusing on market-based approaches. One
191 TA noted, "Industry commitment is more sustainable than government-imposed
192 regulations, as it is a more stable driver for sustainability. The private sector always
193 looks for gaps in regulations to avoid anyway, so making the business case is better."
194 Nonetheless, a small group of mostly industry stakeholders commented on the lack of
195 market demand for good-quality, sustainable or certified cocoa and noted that supply
196 and demand 'come hand in hand'. Thus, a handful of stakeholders suggested that
197 policies should focus on encouraging demand for sustainable products to support
198 market-based approaches.

199 Certification as a market tool was widely discussed. The majority of industry
200 stakeholders consider it a flawed process. A trader noted, "There are many
201 sustainability challenges that certification does not touch upon, so certification bodies

202 should be more of a driver and a guide of sustainability, identifying gaps (e.g.,
203 deforestation) and proposing ways for all to address them. Instead, they are lobby
204 groups that hold companies to ransom.” The majority of farmers, on the other hand,
205 reported more benefits than downsides, with one stating, “It is a tool to help manage
206 farms in a better way.”

207 *Knowledge*

208 The majority of stakeholders, with representatives from all categories, agreed that
209 there is still very little information and data available to the different actors to
210 improve sustainability. Examples include: lack of market, social and environmental
211 information, as well as tools to guide development assistance and corporate
212 sustainability projects; lack of TA to farmers; and a lack of information on the real
213 impacts of climate change, on sustainable production practices and to inform the
214 business case for the private sector. To address this, a government representative from
215 a producing country suggested, “A lot of it boils down to research. We need to get the
216 basis of what is happening and show the trends to the private sector that this ‘business
217 as usual’ is leading to decreased productivity. This is a way to have a win–win
218 scenario for all.” A TA provider added, “Farmers also need training on managerial
219 and bargaining skills, not only on how to increase yield,” a comment that
220 demonstrates how TA is sometimes designed to address industry needs, rather than
221 farmers’ interests and long-term well-being.

222 *Landscape and Supply Chain Approaches*

223 Led by NGOs, approximately half of the stakeholders from all groups, except
224 investors and farmers, noted the benefits of adopting a landscape approach. One NGO
225 commented, “Different companies source from different farmers spread in the land, so
226 the same patches of mosaics of the environment, in a way, belong to different

227 companies. If one company is trying to address deforestation and the other is not, this
228 poses a problem. If not all the farmers within that landscape are certified; it is difficult
229 to address deforestation. Monitoring is also very difficult patch per patch.” Only a few
230 stakeholders noted the challenges associated with promoting landscape-wide
231 interventions.

232 Climate change was also widely discussed by about half of the stakeholders from all
233 groups. The main argument was that synergies between the reducing emissions from
234 deforestation and forest degradation (REDD+) framework and efforts to ‘green’
235 commodities (e.g., monitoring systems and safeguards) should be explored instead of
236 having processes running in parallel. But c. 10% of the stakeholders saw carbon as a
237 wrong single focus. A government representative from a producing country
238 summarized, “The focus should not only be on carbon, but also on other benefits
239 because that is when people will start getting interested. Carbon does not drive
240 farmers’ interest as much water, for example.”

241 Focusing on the rest of the supply chain, more than half of the stakeholders from all
242 groups, but not investors, spoke about the importance of working with different actors
243 along supply chains to inform them about the benefits of becoming more sustainable.
244 A trader noted, “We need to raise awareness of all players in the supply chain, for
245 example stimulate retailers to demand certified products.” A private company
246 complemented this by saying, “Sometimes companies do not understand the risks and
247 rewards, so this exercise to explore the supply chain might ensure better
248 sustainability. It is an exercise to discover challenges.” Only a handful of stakeholders
249 highlighted the role of the investment sector in helping to promote change.

250 *Coordination of Activities and Stakeholders*

251 The majority of stakeholders were in favour of promoting more cooperation and
252 coordination between different initiatives. A government representative from a
253 producing country mentioned, “If you look around Ghana, there are many projects
254 and programmes from industry and international organizations trying to deal with
255 cocoa, but I am not sure how these are working together.” Stakeholders noted that
256 more coordination would allow higher cumulative results, including opportunities for
257 scaling up.

258 Approximately 20% of the interviewees, most of whom were from international
259 institutions from consuming countries, also brought attention to the need to promote
260 better policy coordination. One industry representative summarized, “I am on the
261 board of the International Cocoa Initiative, which was created to look into labour
262 issues along the supply chain. I am mostly concerned about putting in place policies
263 in consuming countries such as boycott campaigns and trade barriers. But these don’t
264 resolve the problem. Cocoa-producing countries should have better policies on the
265 ground on sanitation, teaching/education, which contributes considerably to child
266 labour. In most cases, the child labour is simply related to lack of close schools,
267 which gives farmers no options, so I feel that boycotts alone would only punish the
268 farmers. Policy coherence is very important.”

269 Some half of the stakeholders highlighted the importance of improving
270 communication and information, especially to consumers and retailers. A TA provider
271 noted, “Consumers do not understand what goes on in the field, so we need to
272 stimulate them to check data, scan the bar code in their smartphone and be interested
273 in how things are produced.”

274 Approximately 20% of the stakeholders noted that emerging stakeholder platforms
275 are positive forums to bring together diverse groups. However, they also noted that

276 they should be more innovative, integrate the private sector more systematically and
277 overcome competitiveness issues among stakeholders, such as between certification
278 schemes.

279 *Relationship between Sustainability Dimensions*

280 More than half of the stakeholders, but not investors, discussed some type of positive
281 relationship between the sustainability dimensions. Overall, stakeholders agreed that
282 to ensure the delivery of the long-term supply of cocoa and livelihoods, both farms
283 and the landscape where they reside need to be ecologically and socially resilient to,
284 for example, the impacts of climate change. But for that to happen, there is a need for
285 a clear and evidence-based business case on sustainable supply chains and on tested
286 production models and information dissemination and education of farmers on many
287 aspects such as the impacts of climate change in ecosystems that are not resilient. This
288 will allow them to increase yield over time and reduce the pressure on natural forests,
289 while ameliorating their livelihoods.

290 Nonetheless, about half of the stakeholders highlighted the competition between
291 sustainability dimensions and that economic aspects often take precedent, leaving
292 environmental aspects to be addressed last. Approximately 15% of the stakeholders
293 indicated that sustainability encompasses too many issues that cannot be addressed
294 simultaneously due to limited budgets and human resources.

295 *Private Sector Engagement*

296 Overall, the majority of stakeholders saw added value in engaging the private sector
297 to promote sustainability through identifying and communicating risks (e.g., impacts
298 of climate change, reputation), a view that was led by NGOs, or identifying positive
299 incentives (e.g., de-risking investments), which mostly came from industry, investors
300 and TA providers. Nonetheless, stakeholders highlighted several challenges, such as

301 difficulty in communication (e.g., limited forums to promote discussions), secrecy of
302 information due to competitiveness and a strong emphasis on economic aspects to the
303 detriment of social and environmental issues.

304 Approximately 20% of the stakeholders, mostly industry and TA providers,
305 highlighted that the private sector is diverse, with differences in perspectives also
306 existing within the same companies; different solutions need to be developed to
307 engage different types of players. A government official from a producing country
308 noted, “Small- to medium-sized enterprises cannot look 20 years ahead of their
309 business; this is different from something that Unilever has to do to survive. We need
310 to come up with innovative options.”

311 The majority of stakeholders noted that the industry commitments and pledges
312 towards zero deforestation and sustainability are steps in the right direction. One TA
313 summarized, “For cocoa, the big breakthrough to start dealing with sustainability is
314 the fear that cocoa will run out. So industry began committing to use sustainable
315 cocoa only. For them it is a business case – without cocoa there is no Mars –
316 sustainability is guaranteeing the future.”

317 **Discussion**

318 Five areas that deserve further reflection are: stakeholder preferences and power
319 imbalances; policy mix; going from deforestation to sustainability; landscape
320 approach; and supply chain approach.

321 ***Stakeholder Preferences and Power Imbalances***

322 This is the first study on the cocoa and chocolate supply chain that explores different
323 perspectives of stakeholders on the challenges and solutions to transition towards a
324 more sustainable supply chain. It reveals that different types of stakeholders have
325 disparate concerns on these issues and the likely solutions (e.g., Table 3).

326 In practice, it can be a combination of interventions that satisfies all stakeholder
327 perspectives in order to ensure the long-term success of interventions, as stakeholders
328 will likely show higher levels of commitment to a process that promotes solutions that
329 accommodate multiple interests. However, stakeholders are not always treated
330 equally, nor do they have the same opportunities and skills to voice their concerns.
331 The literature on supply chain management argues that, even though there is a clear
332 interdependence between the different stakeholders, they also have different levels of
333 influence and power over others (French et al. 1959, Park et al. 2017). This power
334 asymmetry allows more powerful stakeholders to have greater leverage in
335 determining suppliers' practices (Ulstrup Hoejmosse et al. 2013). This leads to the
336 situation whereby farmers, who are often not well educated or informed, do not have
337 a strong voice and their preferences are not prioritized. This may eventually diminish
338 their buy-in, putting in question the entire intervention (e.g., zero-deforestation
339 projects promoted by industry). Thus, it is important to integrate farmers well in the
340 development of these interventions and to build their entrepreneurial skills in order to
341 ensure their long-term commitment to continuing to grow cocoa, as they are the
342 centrepieces of the supply chain.

343 ***Policy Mix***

344 The literature and this study have shown that when designing interventions, policy
345 and market instruments can help advance the agenda (Nikolakis & Innes 2017), but
346 they need to be carefully evaluated and coordinated so as not to do more harm than
347 good. In recognizing the strengths and weaknesses of different instruments,
348 Gunningham and Young (1997) argue against a 'single instrument' tactic and have
349 proposed a policy mix approach. The goal is to find an optimal combination between
350 instruments, such as voluntary, property rights, regulatory, price based and

351 motivational and informational, along with identifying which stakeholder groups are
352 in the best position to implement them in order to effectively reach the goal – in this
353 case, sustainable development. In the context of cocoa and chocolate, Figure 1
354 provides examples of what different stakeholders can do in a synergistic manner.

355 *From Deforestation to Sustainability*

356 The results of the qualitative assessment showed that deforestation is not the only
357 challenge, and that it is intrinsically connected to all three dimensions of
358 sustainability. However, there is also tension between the three dimensions. Van der
359 Byl and Slawinski (2015) note four general approaches to how tensions can be
360 examined: (i) ‘win–win’ looks for opportunities to reconcile tensions; (ii) ‘trade-offs’
361 recognizes that the conflict is irreconcilable, so one goal must prevail to the detriment
362 of the other(s); (iii) ‘integrative’ proposes to bring balance between the three goals;
363 and (iv) ‘paradox’ aims to recognize the complex nature of the tensions, as well as
364 how actors work through them, and identify opportunities to generate creative
365 approaches to address them. While the majority of the literature focuses on win–win
366 and trade-off approaches, there is an emerging field proposing an integrative approach
367 combined with paradox analysis (Hahn et al. 2015, Van der Byl & Slawinski 2015). It
368 proposes to embrace tensions and recognize that the three elements are
369 interconnected, so none should be prioritized over the others. If this is ignored, the
370 problem is not solved and eventually resurfaces.

371 Thus, zero-deforestation definitions and interventions should acknowledge and
372 embrace this interconnectivity to ensure long-term impacts. This serves to recognize
373 both the interdependence between livelihoods and deforestation at the landscape level
374 and also the interactions and the chain of events from the production of raw material
375 to the end consumer.

376 Nonetheless, there is still too little evidence to convince a broad range of stakeholders
377 to address the dimensions concomitantly. Thus, it is paramount that different groups
378 not only focus on pointing out the potential risks, but also help to test and develop
379 incentive systems and benefit-sharing mechanisms that support the uptake of
380 improved production practices. All of this should be while still favouring private
381 sector needs of maintaining a competitive position in the markets, which will
382 increasingly be based on green investment models.

383 *Landscape Approach*

384 Many stakeholders highlighted the need to look at the challenges in the broader
385 landscape where different commodities are produced, rather than being limited to the
386 plot/farm level. Focusing at the landscape level can allow for a more holistic analysis
387 of the challenges at the farm and wider territorial level, instead of focusing on
388 sectorial problems that impede the ability to address cross-boundary drivers of
389 deforestation, which are more cross-sectorial in nature (DeFries & Rosenzweig 2010,
390 Sayer et al. 2013). Recent studies have shown that landscape approaches have the
391 potential as a framework to bring together conservation and development goals,
392 helping address deforestation while ameliorating livelihoods, through improving
393 social capital and enhancing community income and employment (Reed et al. 2017,
394 Sayer et al. 2017). Nonetheless, there are still many barriers to successfully
395 implementing landscape initiatives such as defining its boundaries, being able to
396 reconcile conservation and development goals (Reed et al. 2017) and institutional and
397 governance shortfalls (Sayer et al. 2013). Thus, stakeholders should build more
398 alliances to build synergies and move together towards the same aim, avoiding
399 duplication of efforts.

400 *Supply Chain Approach*

401 Despite the unanimous call for integration at the landscape level, only a few
402 stakeholders mentioned the need to think along the entire supply chain from primary
403 production to end products (i.e., chocolate), with most of the emphasis on the
404 upstream part of the supply chain. This narrow approach is problematic for two main
405 reasons: first, research on life cycle assessment of chocolate has revealed that sugar,
406 packaging, transportation and especially milk powder contribute to significant
407 emissions (Büsser & Jungbluth 2009, Marton 2012, Humbert & Peano 2014). Thus,
408 focusing solely at the landscape level mostly requires only farmers to change
409 practices and address emissions, not the other stakeholders along the supply chain,
410 which raises the question of fairness. Second, because the drivers of deforestation
411 originate not only at the landscape level, they have more distant origins, mainly
412 related to the consumer markets. As the industry respondents mainly pointed out,
413 there is very little demand for sustainable/certified cocoa from consumers and
414 retailers; thus, indirectly it seems there is very little ‘demand’ for issues such as
415 deforestation to be addressed.

416 Interviewees acknowledged that there is still very little supply chain integration, with
417 many stakeholders such as retailers and consumers not well aware of the impact of
418 production and procurement systems on the ground, and therefore they often make
419 demands that are not necessarily the most important for the farmers. Thus, it is
420 paramount to think of supply chain interventions whereby all the different actors are
421 targeted with information that is understandable to them in order to encourage more
422 demand for sustainable products that address the needs of different actors in the
423 supply chain, especially the livelihoods of farmers who are the core stakeholders in
424 the chain.

425 **Conclusion**

426 Zero-deforestation commitments are seen as being an important step forward to help
427 promote forest conservation. Nonetheless, discourses have been rendering an analysis
428 of the problem that is too narrow, emphasizing deforestation and emissions at the
429 upstream/ground level when there are many other environmental and social
430 challenges that need addressing before cocoa and chocolate can be called sustainable.
431 For zero-deforestation commitments to effectively contribute to sustainable
432 development, a broader discussion and actions are needed in which the
433 interdependencies of stakeholders along the supply chain are acknowledged and the
434 deforestation issue is addressed concomitantly with other challenges, especially
435 livelihoods. Thus, stakeholders along the chain need to work together in a coordinated
436 fashion towards stimulating a market that rewards not only zero-deforestation cocoa,
437 but also sustainable chocolate production. Such a broadened approach will enhance
438 the likelihood of improving long-term forest conservation, and also help generate
439 more positive livelihood outcomes for the cocoa farmers involved, who are the heart
440 of the supply chain.

441 **Supplementary Material**

442 For supplementary material accompanying this paper, visit

443 <http://www.journals.combridge.org/ENC>

444 **Acknowledgements** <AQ4>

445 The authors would like to thank the interviewees that participated in this study,
446 Verina Ingram (Wageningen University) and Denis Sonwa (CIFOR) for their valuable
447 insights and the reviewers for their constructive comments.

448 **Financial Support**

449 This work was supported by the International Tropical Timber Organization (ITTO;
450 MCC, grant number 32/14A) and the Department for International Development

451 (DFID; MCC and IN, accountable grant component code 202834-101, purchase order
452 40054020).

453 **Conflict of Interest**

454 None.

455 **Ethical Standards**

456 None.

457 **References**

458 Afoakwa, E.O. (2014) *Cocoa Production and Processing Technology*. CRC
459 Press. <AQ5>

460 Borel-Saladin, J.M. & Turok, I.N. (2013) The green economy: incremental change or
461 transformation? *Environmental Policy and Governance* **23**(4): 209–220.

462 Brickell, E. & Elias, P. (2013) Great expectations: realising social and environmental
463 benefits from public-private partnerships in agricultural supply chains. URL
464 <http://theredddesk.org/sites/default/files/resources/pdf/2013/8500.pdf>

465 Brundtland, G.H. (1987) *Report of the World Commission on Environment and*
466 *Development: 'Our Common Future'*. New York, NY: United Nations.

467 Büsser, S. & Jungbluth, N. (2009) LCA of chocolate packed in aluminium foil based
468 packaging. ESU-Services Ltd., Uster (CH). URL [http://packaging.world-](http://packaging.world-aluminium.org/fileadmin/_migrated/content_uploads/ESU-Chocolate_2009_-Exec_Sum_03.pdf)
469 [aluminium.org/fileadmin/_migrated/content_uploads/ESU-Chocolate_2009_-](http://packaging.world-aluminium.org/fileadmin/_migrated/content_uploads/ESU-Chocolate_2009_-Exec_Sum_03.pdf)
470 [Exec_Sum_03.pdf](http://packaging.world-aluminium.org/fileadmin/_migrated/content_uploads/ESU-Chocolate_2009_-Exec_Sum_03.pdf)

- 471 Camargo, M. & Nhamtumbo, I. (2016) *Towards Sustainable Chocolate: Greening the*
472 *Cocoa Supply Chain*. London, UK: IIED.
- 473 Clough, Y., Faust, H. & Tschardtke, T. (2009) Cacao boom and bust: sustainability of
474 agroforests and opportunities for biodiversity conservation. *Conservation Letters* **2**(5):
475 197–205.
- 476 Coulibaly, S.K., Terence, M.M., Erbao, C. & Bin, Z.Y. (2017) Climate change effects
477 on cocoa export: case study of Cote d’Ivoire. In: *Allied Social Science Association*
478 *(ASSA)/American Economic Association (AEA) – African Finance and Economic*
479 *Association (AFEA) Jan 8 Session*. Chicago, IL. <AQ6>
- 480 DeFries, R. & Rosenzweig, C. (2010) Toward a whole-landscape approach for
481 sustainable land use in the tropics. *Proceedings of the National Academy of Sciences*
482 **107**(46): 19627–19632.
- 483 FAO (2014) FAOSTAT online database. URL <http://faostat.fao.org>
- 484 Fay, M. (2012) *Inclusive Green Growth: The Pathway to Sustainable Development*.
485 Washington, DC: World Bank.
- 486 French, J.R., Raven, B. & Cartwright, D. (1959) The bases of social power. *Classics*
487 *of Organization Theory* **7**. <AQ7>

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

491 Green, W. (2015) G7 leaders pledge to 'promote safe and sustainable supply chains'.
492 URL [http://www.supplymanagement.com/news/2015/g7-leaders-pledge-to-](http://www.supplymanagement.com/news/2015/g7-leaders-pledge-to-promote-safe-and-sustainable-supply-chains)
493 [promote-safe-and-sustainable-supply-chains](http://www.supplymanagement.com/news/2015/g7-leaders-pledge-to-promote-safe-and-sustainable-supply-chains) - sthash.fKcthBTr.dpuf

494 Gunningham, N. & Young, M.D. (1997) Toward optimal environmental policy: the
495 case of biodiversity conservation. *Ecology Law Quarterly* **24**: 243–298.

496 Hahn, T., Pinkse, J., Preuss, L. & Figge, F. (2015) Tensions in corporate
497 sustainability: towards an integrative framework. *Journal of Business Ethics* **127**(2):
498 297–316.

499 Henders, S., Persson, U.M. & Kastner, T. (2015) Trading forests: land-use change and
500 carbon emissions embodied in production and exports of forest-risk commodities.
501 *Environmental Research Letters* **10**(12): 125012.

502 Hosonuma, N., Herold, M., De Sy, V., De Fries, R.S., Brockhaus, M., Verchot, L.,
503 Angelsen, A. & Romijn, E. (2012) An assessment of deforestation and forest
504 degradation drivers in developing countries. *Environmental Research Letters* **7**(4):
505 4009.

506 Hower, M. (2014) APP, Cargill plant U.N. deforestation pledge for 2030. URL
507 <https://www.greenbiz.com/blog/2014/09/26/app-cargill-un-deforestation->
508 [pledge](https://www.greenbiz.com/blog/2014/09/26/app-cargill-un-deforestation-)

509 Humbert, S. & Peano, L. (2014) Developing inventory data for chocolate: importance
510 to consider impacts of potential deforestation in a consistent way among ingredients
511 (cocoa, sugar and milk). Presented at: *9th International Conference on Life Cycle*
512 *Assessment in the Agri-Food Sector*, San Francisco, CA. <AQ8>

513 Kopnina, H. (2017) Commodification of natural resources and forest ecosystem
514 services: examining implications for forest protection. *Environmental Conservation*
515 **44**(1): 24–33.

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

519 Lambin, E.F., Gibbs, H.K., Heilmayr, R., Carlson, K.M., Fleck, L.C., Garrett, R.D.,
520 de Waroux, Y.I.P., McDermott, C.L., McLaughlin, D. & Newton, P. (2018) The role
521 of supply-chain initiatives in reducing deforestation. *Nature Climate Change* **8**: 109–
522 116.

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

- 525 Marton, S. (2012) Bittersweet comparability of carbon footprints. In: *8th*
526 *International Conference on Life Cycle Assessment in the Agri-Food Sector (LCA*
527 *Food 2012)*, pp. 767–768. Saint Malo, France: INRA.
- 528 Newton, P., Agrawal, A. & Wollenberg, L. (2013) Enhancing the sustainability of
529 commodity supply chains in tropical forest and agricultural landscapes. *Global*
530 *Environmental Change* **23**(6): 1761–1772.
- 531 Nikolakis, W. & Innes, J.L. (2017) Evaluating incentive-based programs to support
532 forest ecosystem services. *Environmental Conservation* **44**(1): 1–4.
- 533 Park, K.O., Chang, H. & Jung, D.H. (2017) How do power type and partnership
534 quality affect supply chain management performance? *Sustainability* **9**(1): 127.
- 535 Rautner, M., Leggett, M. & Davis, F. (2013) *The Little Book of Big Deforestation*
536 *Drivers*. Oxford, UK: Global Canopy Programme.
- 537 Reed, J., van Vianen, J., Barlow, J. & Sunderland, T. (2017) Have integrated
538 landscape approaches reconciled societal and environmental issues in the tropics?
539 *Land Use Policy* **63**: 481–492.
- 540 Rubin, H.J. & Rubin, I.S. (2011) *Qualitative Interviewing: The Art of Hearing Data*.
541 Sage. <AQ9>
- 542 Sayer, J., Sunderland, T., Ghazoul, J., Pfund, J.-L., Sheil, D., Meijaard, E., Venter,
543 M., Boedhihartono, A.K., Day, M. & Garcia, C. (2013) Ten principles for a landscape

544 approach to reconciling agriculture, conservation, and other competing land uses.
545 *Proceedings of the National Academy of Sciences* **110**(21): 8349–8356.

546 Sayer, J.A., Margules, C., Boedhihartono, A.K., Sunderland, T., Langston, J.D., Reed,
547 J., Riggs, R., Buck, L.E., Campbell, B.M. & Kusters, K. (2017) Measuring the
548 effectiveness of landscape approaches to conservation and development.
549 *Sustainability Science* **12**(3): 465–476.

550 Schroth, G., Läderach, P., Martinez-Valle, A.I., Bunn, C. & Jassogne, L. (2016)
551 Vulnerability to climate change of cocoa in West Africa: patterns, opportunities and
552 limits to adaptation. *Science of the Total Environment* **556**: 231–241.

553 Strauss, A. & Corbin, J. (1990) *Basics of Qualitative Research*. Newbury Park, CA:
554 Sage.

555 Ulstrup Hoejmoser, S., Grosvold, J. & Millington, A. (2013) Socially responsible
556 supply chains: power asymmetries and joint dependence. *Supply Chain Management:
557 An International Journal* **18**(3): 277–291.

558 United Nations (2014) 2014 Climate Change Summit – Chair’s Summary. URL
559 [http://www.un.org/climatechange/summit/wp-](http://www.un.org/climatechange/summit/wp-content/uploads/sites/2/2014/05/Climate-Summit-Chairs-Summary_26September2014CLEAN.pdf)
560 [content/uploads/sites/2/2014/05/Climate-Summit-Chairs-](http://www.un.org/climatechange/summit/wp-content/uploads/sites/2/2014/05/Climate-Summit-Chairs-Summary_26September2014CLEAN.pdf)
561 [Summary_26September2014CLEAN.pdf](http://www.un.org/climatechange/summit/wp-content/uploads/sites/2/2014/05/Climate-Summit-Chairs-Summary_26September2014CLEAN.pdf)

562 Van der Byl, C.A. & Slawinski, N. (2015) Embracing tensions in corporate
 563 sustainability: a review of research from win–wins and trade-offs to paradoxes and
 564 beyond. *Organization & Environment* **28**(1): 54–79.

565 World Cocoa Foundation (2017) Collective Statement of Intent: The Cocoa and
 566 Forests Initiative. URL [http://www.worldcocoafoundation.org/cocoa-forests-
 568 initiative-statement-of-intent](http://www.worldcocoafoundation.org/cocoa-forests-

 567 initiative-statement-of-intent)

569 **Fig. 1.** Policy mix: examples of what different stakeholders can do in a synergistic
 570 manner. NGO = non-governmental organization; TA = technical
 571 assistance. <AQ10><TS: Set this figure to 2-column width.>

573 **Table 1.** Number of interviews per stakeholder group per sample country. NGO = non-
 574 governmental organization

| Stakeholder groups | Cocoa-producer countries | | | Cocoa-importing/processing/consumer countries | | | Subtotal | Total |
|----------------------------|--------------------------|-----------|-----------|---|---------------------|-----------------|-----------|-----------|
| | Ghana | Brazil | Subtotal | USA | Belgium and Denmark | The Netherlands | | |
| Research | 2 | 2 | 4 | 0 | 0 | 0 | 0 | 4 |
| NGOs | 3 | 3 | 6 | 4 | 1 | 1 | 6 | 12 |
| International institutions | 3 | 0 | 3 | 3 | 0 | 2 | 5 | 8 |
| Farmers | 4 | 2 | 4 | 0 | 0 | 0 | 0 | 6 |
| Government – consuming | 0 | 0 | 0 | 2 | 4 | 0 | 6 | 6 |
| Government – producing | 4 | 0 | 4 | 0 | 0 | 0 | 0 | 4 |
| Technical assistance | 1 | 1 | 2 | 1 | 0 | 3 | 4 | 6 |
| Industry | 4 | 2 | 6 | 1 | 3 | 1 | 5 | 11 |
| Investors | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 2 |
| Total | 21 | 10 | 31 | 12 | 8 | 8 | 28 | 59 |

575
 576
 577 **Table 2.** Stakeholder group descriptions. NGO = non-governmental organization

| Stakeholder group | Description |
|----------------------------|--|
| Research | Universities and organizations |
| NGOs | Several types of organization (e.g., working on campaigns, legal matters, third-party certification entities) |
| International institutions | Organizations that work on issues globally, often with multi-stakeholder membership |
| Farmers | Both cocoa farmers and cocoa farmers' associations |
| Government – consuming | Government officials working on agriculture, commodities or climate change issues in different government departments |
| Government – producing | Stakeholders working in cocoa and forest sector government departments focusing on extension service, research, monitoring and evaluation and climate change |
| Technical assistance | Private companies that provide technical assistance |
| Industry | Cocoa traders, processors, manufacturers and industry foundations and associations representing the sector |
| Investors | International institutions providing funding to different actors along supply chains |

578

579

580 **Table 3.** Example of stakeholder concerns and solutions. NGO = non-governmental
581 organization

| Stakeholder group | Concerns and solutions |
|-------------------|---|
| Private sector | <p>Prefers positive incentive measures for producers to adopt more sustainable practices</p> <p>Often emphasize demand-side measures to encourage the uptake of more sustainable production of cocoa</p> <p>Not supportive of certification</p> |
| NGOs | <p>In favour of actions based on depicting the risks that the industry can incur due to negative environmental impacts</p> <p>Do not emphasize the role of consumer markets and express positive views on certification</p> |
| Farmers | <p>Focus mostly on technical assistance and actions that could empower their position in the supply chain</p> <p>Keen on practices like certification that improve yield while addressing other associated challenges</p> <p>Favour demand-side measures that reward sustainable production</p> |

582