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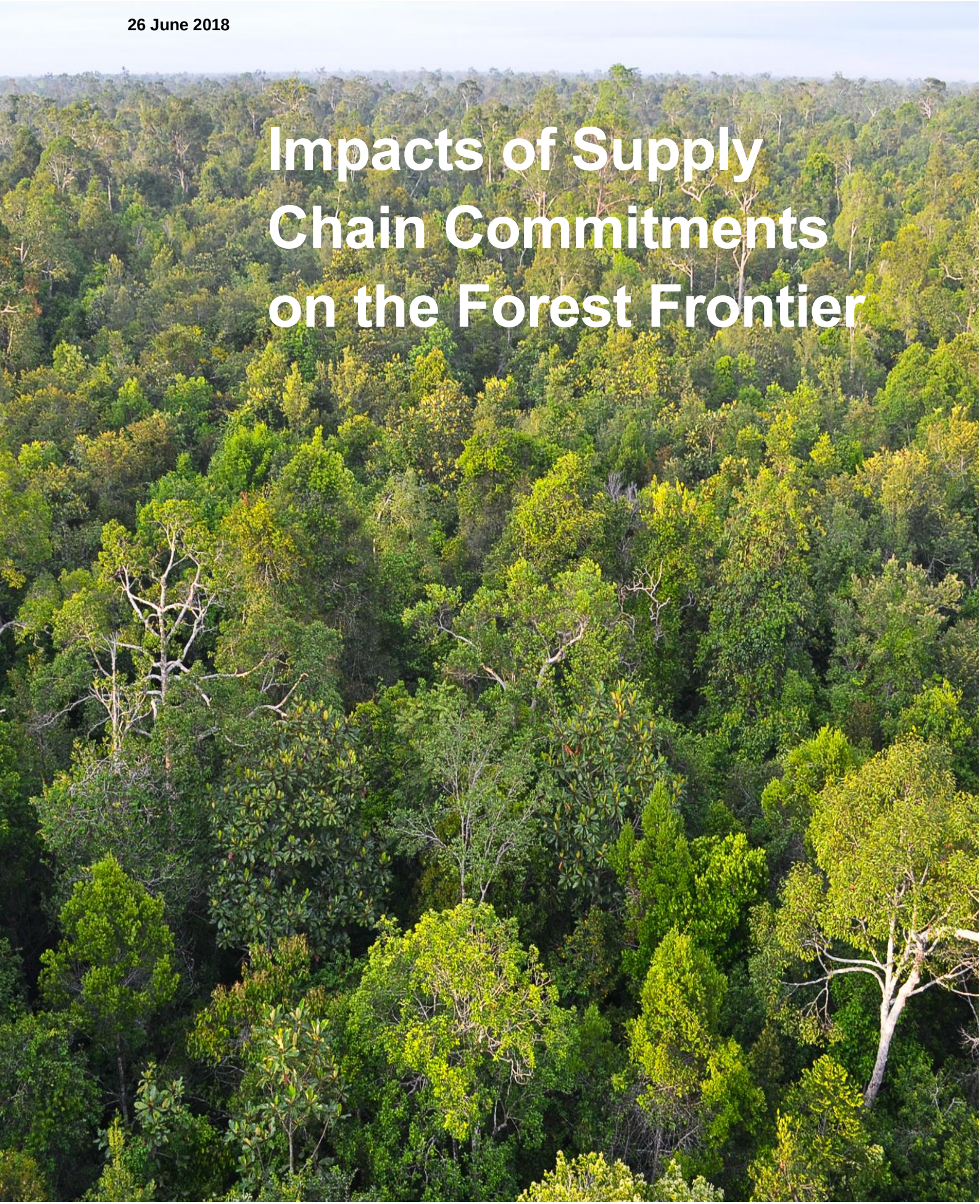
26 June 2018

Impacts of Supply Chain Commitments on the Forest Frontier



Impacts of Supply Chain
Commitments on the Forest Frontier

For Tropical Forest Alliance 2020

26 June 2018

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Executive Summary

Agriculture is the leading driver of tropical deforestation worldwide, and hundreds of private and public entities have attempted to slow deforestation by changing the way the world produces, procures, and distributes agricultural commodities. These efforts manifest themselves in company commitments, government pledges, voluntary market-exclusion agreements, and sustainable certification standards that affect different parts of agricultural commodity supply chains; but is this 'supply chain movement' having impacts on the ground? And if so, what are these impacts?

This study reviewed relevant literature and reached out to dozens of experts who are directly or indirectly involved in agricultural supply chains in key tropical forestry countries to explore, among other things, the environmental, economic, and political impacts of the supply chain movement. It also reviewed media reports on deforestation related to certain commodities from 2013 to 2017.

The findings are that supply chain movement is having an impact, largely through encouraging more transparency and accountability, especially among large trading groups in the middle of the supply chain. The movement has also led to better management of agricultural areas. For some initiatives (such as corporate pledges to comply with the Soy Moratorium in Brazil) there is also a clear correlation with reduced deforestation rates. But the supply chain movement has not been able to stop deforestation at the forest frontier and in forest areas not covered by a commitment or policy because of the often narrow scope of these interventions.

On the political front, experts generally agree that the supply chain movement has helped increase awareness of the links between commodities and deforestation, institutionalizing the debate around deforestation-free supply chains, and driving the adoption of new practices and technologies. Media attention to deforestation issues has roughly doubled since 2015, indicating that public perception of commodity-driven deforestation risks is on the rise, while several initiatives are working to map out supply chains and track progress toward fulfillment of company objectives.

Conversely, little evidence was found to show that consumer-facing companies were willing to share the costs that producers would need to incur in order to change production practices to meet market demand. Excluding suppliers that deforest from accessing sustainable markets will not be sufficient alone to tackle tropical deforestation. While external actors are stepping in to provide investment capital and agricultural extension services, especially to smallholder farmers, the level of support remains limited in scale and scope.

On the policy front, company pledges and commitments have reinforced national commitments, and governments and companies are gradually aligning these within the context of jurisdictional initiatives. Engagement and partnerships between public, private, and civil society actors hold promise of stopping commodity-driven deforestation. In addition, stakeholders interviewed stressed that without stable governance and institutional frameworks to support implementation, the positive impacts of the supply chain movement could be at risk. Risks include shifting deforestation to other areas and increased smuggling of commodities associated with deforestation into the market, both of which are exacerbated by a lack of capacity and political will to standardize deforestation tracking tools.

1. Introduction

Although forest-related supply chain commitments date back almost 10 years, it is difficult to establish direct quantifiable outcomes such as emission reductions or hectares of forest protected because of the commitments. This report seeks to explore the possible impacts of supply chain commitments on the broader political and socioeconomic efforts to reduce the deforestation associated with agricultural commodities in tropical forest countries.

Company pledges and commitments take different forms, including (1) aspirational, collective goals such as the New York Declaration on Forests; (2) concrete pledges made by individual companies; (3) company codes of conduct and policies explicitly setting operational requirements; and (4) sectoral standards or agreements such as moratoria or production standards (Table 1).

Table 1: Types of Supply Chain Commitments and Policies

Type of Commitment	Who Initiates?	Approach	Examples
Aspirational goals	Group of companies, government	Broad, ambitious, highly visible announcements	Consumer Goods Forum, New York Declaration on Forests (NYDF)
Company pledges	Individual companies	Establish and communicate a company commitment to reducing deforestation	Company commitments as listed by Supply Change, Forest 500, and assessed by the Carbon Disclosure Project (CDP)
Company policies	Individual companies	Companies translate goals and pledges into concrete policies and measures for their operations	Approved supplier lists; quality standards and sourcing criteria (including certification)
Sectoral standards and agreements	Groups of companies	Agreements to avoid commodities from certain areas, or produced in a particular manner (moratoria)	Soy Moratorium in the Brazilian Amazon
	Groups of companies	Agreement to promote certain production methods (roundtables, certification standards)	Roundtable for Sustainable Palm Oil

Source: Adapted from Lambin, E., Gibbs, H., Heilmayr, R., et al. (2018). The role of supply chain initiatives in reducing deforestation, *Nature Climate Change*, 8, 109-116

Drivers of deforestation are complex and the dynamics at the forest frontier are influenced by a multitude of local, national, and international developments. Even where actors in agricultural supply chains commit to reduce deforestation resulting from production of commodities, it takes time until a change in practice can be seen. Time scales influencing land use, including agricultural practices and forest management, span years to decades. Attributing an increase or decrease of deforestation to a particular set of actors, measures, or policies is rarely straightforward. Often the confluence of measures taken by different actors eventually leads to a reduction in deforestation.

1.1 Approach

In this study, the supply chain movement is defined as the entirety of private and public supply chain commitments, policies, and measures triggered by or in support of these commitments, public attention or media coverage in response to increased awareness, and nongovernmental organization's efforts to increase transparency around agricultural supply chains and support implementation.

The study team conducted a literature review, stakeholder interviews, and an international press and media analysis. This study was also informed by case studies on the impact of company policies and commitments on beef and soy production in Brazil, palm oil production in Malaysia and Indonesia, and on cocoa production in Ghana and Côte d'Ivoire, as well as insights on palm oil in Liberia. The broader conclusions draw on the findings from these countries.

In the absence of clear data points, this study is qualitative and largely relies on the perspective of experts who operate in supply chains, analyze deforestation dynamics, or observe changes in the underlying political and economic environment in tropical forest countries. In interviews, the study team asked about the environmental, economic, and political impacts of the supply chain movement.

1.2 Report Structure

Chapter 1 introduces the analysis. **Chapter 2** reviews existing literature on the impact of deforestation-related commitments, punctuated by key messages from the case studies. **Chapter 3** provides an analysis of the coverage of forests in the international press and media to see whether there have been any changes in the visibility and dialogue around commodity-driven deforestation. **Chapter 4** summarizes the case studies assessing the impact of the supply chain movement in key countries focusing on the production of beef, soy, palm oil, and cocoa. The full case studies are presented in the Appendix.

2. Impact of Deforestation-Related Commitments

The complex nature of the forest and land use sector makes it difficult to attribute direct impacts on the political economy at the forest frontier to company commitments.[1] No studies have been found that make a direct link between aspirational goals or individual company commitments and a reduction in deforestation.[2] Company policies help translate broader commitments into concrete actions and measures implemented either internally or by companies further up the supply chain. Company policies can also connect goals and commitments with standards or sectoral agreements that describe particular means to achieve goals. These include sourcing standards (e.g., certification or product or production requirements) or supplier audits. Company policies or codes of conduct are essential for a particular company to comply with its commitments. But they are not indicative of a broader environmental impact as a company can meet its commitment goals without actually engaging in improved production methods on the ground.

Nevertheless, sectoral standards and agreements can have a positive environmental impact, particularly if they are implemented with cooperation between public and private sectors. For example, the Soy Moratorium in Brazil – a voluntary initiative in which soy traders agreed not to purchase soy from newly deforested areas of the Amazon – contributed to a sharp drop in deforestation in the Brazilian Amazon between 2007 and 2013 (see Chapter 4).[3] In 2014, almost no new deforestation occurred for soy production in the Amazon biome.[4] In Mato Grosso, a state in Brazil covered mostly with Amazon rainforest, the deforestation rate was more than five times higher before the Soy Moratorium compared to after.[5] Many companies with deforestation pledges also used the moratorium as a means to define their sourcing criteria. In the beef sector, after small and major meatpacking companies signed cattle agreements, such as the G4 Zero-Deforestation Agreement and the Terms of Adjustment of Conduct (see Appendix A), a rapid change in the behavior of meatpackers and ranchers was detected. Between 2009 and 2013, the suppliers of JBS – one of the largest meat processing companies in Brazil – showed decreases ranging from 50 percent to 75 percent in their deforestation rates.[6] Where land-use conflicts pose challenges, moratoria can also be useful to resolve conflicts and promote the clustering of smallholders and independent medium-size

[1] U.N. Food and Agriculture Organization (FAO). (2016). *Zero deforestation initiatives and their impacts on commodity supply chains.* Discussion paper prepared for the 57th Session of the FAO Advisory Committee on Sustainable Forest-based Industries.

[2] Potts, J., Voora, V., Lynch, M., et al. (2017). *Standards and biodiversity*. Winnipeg, Manitoba: International Institute for Sustainable Development. https://bit.ly/2FSz1zi; Milder, J. C., Arbuthnot, M., & Blackman, A., et al. (2015). An agenda for assessing and improving conservation impacts of sustainability standards in tropical agriculture. *Conservation Biology*, 29(2), 309–320; Anderson, Z. R., Kusters, K., & Obidzinski, K., et al. (2015). *Growing the economy: Oil palm and green growth in East Kalimantan, Indonesia.* Paper presented at the Land grabbing, conflict and agrarian-environmental transformation perspectives from East and Southeast Asia conference. (2015, June 5-6). Chiang Mai University; Sonenshine, J. (2013). Zero deforestation by 2020: The challenging road. *The Guardian.* https://bit.ly/2mHg0sK.

[3] Gibbs, H.K., Rausch, L., Munger, J., et al. (2015). Brazil's Soy Moratorium: Supply-chain governance is needed to avoid deforestation. *Science,* 347(6220), 377–378*;* Gibbs, H., Munger, J., L`Roe, J., et al. (2016). Did ranchers and slaughterhouses respond to zero-deforestation agreements in the Brazilian Amazon? *Conservation Letters* 9(1), 32–42.

[4] Gibbs, H.K, Rausch, L., Munger, J., et al. (2015). Brazil's Soy Moratorium. *Science*, *347*(6220), 377–378.

[5] Kastens, J. H., Brown, J.C., Coutinho, A.C., et al. (2017). Soy Moratorium impacts on soybean and deforestation dynamics in Mato Grosso, Brazil. *PloS one*, 12(4), e0176168.

[6] Gibbs, H., Munger, J., L`Roe, J., et al. (2016). Did ranchers and slaughterhouses respond to zero-deforestation agreements in the Brazilian Amazon? *Conservation Letters* 9(1), 32–42.

producers to link with corporate processing facilities with commitments.[7] This was the case in Peru, where the titling of indigenous lands resulted in a reduction of deforestation in previously contentious areas.[8]

Certification remains one of the most popular methods of implementing company commitments but is not always an effective tool to eliminate deforestation from commodity production. In 2015, more than two thirds of companies with supply chain commitments said certification was their preferred way to implement commitments.[9] Certification by an organization such as the Forest Stewardship Council, Roundtable for Sustainable Palm Oil (RSPO), or the Roundtable for Responsible Soy (RTRS) can help remove deforestation from commodity production, but often only in areas where forests are less threatened.[10] In the Indonesian palm oil industry, RSPO certification has led to reduced deforestation in developed palm oil plantation concessions, but the plantations that achieved certification were those with the least remaining forest area.[11] In addition, only half of RSPO-qualified palm oil sells at a premium, leaving farmers with little incentive to invest in certification. The weak demand for certified oil is partly because it is hard to trace the source of large volumes of segregated certified product, and because palm oil is a largely invisible ingredient in many consumer products.[12]

For soy – another invisible ingredient in many products – the portion of certified product remains very low, with only 2 percent of the market currently certified; for cattle products (which includes meat, leather, bones etc.) there are no data.[13] Demand for certified products also remains low in high-consuming, emerging economies such as China and India, leaving those markets wide open to noncertified farmers.

Transparency—and technologies to facilitate it—have advanced in line with the growth in company commitments. For companies to be able to confidently make— and meet—their commitments, they need information on how their product(s) are produced and from where they are sourced. Examples of increased transparency that help achieve sectoral standards and company commitments have emerged recently, although there remains a need for further and continued improvement. To name but a few examples: Greenpeace recently challenged companies and traders to publish their palm oil supplier and mills data, which led to a number doing so;[14] a supply chain platform called Trase was recently set up to provide data on trade flows of soy, beef, and palm oil from tropical countries,[15] and the New York Declaration on Forests publishes annual reports tracking progress toward 10 goals aimed at protecting and restoring forests.[16] Other initiatives to track and report on company commitments include the Supply Change and CDP (formerly the Carbon

[7] Hajek, F., Killeen, T.J., Regal, F., et al. (2015). *Toward zero-deforestation oil palm in Peru: Understanding actors, markets, and barriers.* United States Agency for International Development.

[8] Blackman, A., Corral, L., Lima, E.S., et al. (2017). Titling indigenous communities protects forests in the Peruvian Amazon. *Proceedings of the National Academy of Sciences,* 201603290.

[9] McCarthy, B. (2016). *Supply change: Tracking corporate commitments to deforestation-free supply chains, 2016.* Forest Trends' Ecosystem Marketplace.

[10] Cattau, M. E., Marlier, M.E., & DeFries, R. (2016). Effectiveness of Roundtable on Sustainable Palm Oil (RSPO) for reducing fires on oil palm concessions in Indonesia from 2012 to 2015. *Environmental Research Letters, 11*(10), 105007.

[11] Carlson, K. M., Heilmayr, R., Gibbs, H.K., et al. (2018). Effect of oil palm sustainability certification on deforestation and fire in Indonesia. *Proceedings of the National Academy of Sciences, 115*(1), 121–126.

[12] World Economic Forum. (2017). *Commodities and forest agenda 2020: Ten priorities to remove tropical deforestation from commodity supply chains*. https://bit.ly/2FwKsN.

[13] Climate Focus. (2016). *Progress on the New York Declaration on Forests: Eliminating Deforestation from the Production of Agriculture Commodities – Goal 2 Assessment Report*. Prepared by Climate Focus in cooperation with the NYDF Assessment Coalition with support from the Climate and Land Use Alliance and the Tropical Forest Alliance 2020.

[14] Greenpeace. (2018). Appendix 1: How companies perform on transparency *in Moment of truth*. https://bit.ly/2pziWs8

[15] Trase. https://trase.earth/?lang=en.

[16] New York Declaration on Forests. https://nydfglobalplatform.org.

Disclosure Project). Forest 500 lists the most influential companies in commodity supply chains. The digital revolution has also enabled greater granularity and shorter time lags in tracking forest status. Global Forest Watch, for example, publishes time-lapse data on forest change, land cover, and land use.

There is little evidence of company pledges producing the market signals needed to shift producer behavior. More needs to be done to engage smaller producers in sustainable practices. Where supply chains are disaggregated, smallholder farmers often lack the knowledge, tools, and financial resources needed to change practices. Companies looking to meet their commitments tend to target growers who are already not deforesting or using sustainable methods. This preferential treatment can have a negative effect on other farmers, especially smallholders on the forest frontier who have few incentives or resources to engage in sustainable production.[17, 18] Association representatives, traders, nongovernmental organization (NGO) leaders, academics, and other experts have noted that retailers are not yet creating the necessary incentives in the soy and beef supply chains in Brazil. In both Indonesia and Malaysia, interviewees agreed that smallholders should feature more prominently in pledges and commitments, especially given that they supply 40 percent of the palm oil processed by mills, much of which is associated with deforestation. Enabling smallholder farmers to shift to more sustainable agricultural practices remains key to tackling deforestation in the region.

Supply chain interventions, however, have led to an increase in external assistance programs for producers and farmers. A growing number of incentive programs are under development to facilitate the transformation of sustainable practices across the supply chain, although more are certainly needed. These initiatives are driven by governments, commodity roundtables, public-private partnerships, and NGO programs.[19] The Novo Campo project in Brazil, for example, is supported by Althelia, an impact investment fund.[20] The project mobilizes producers for sustainable ranching through partnerships with local governments and organizations and provides technical support, continued education and training, and incentives for farmers such as price premiums through special agreements with buyers. In Honduras, the Forest Stewardship Council partnered with the Rainforest Alliance to work with timber cooperatives to improve their forest management and business practices with remarkable results, including doubling the income of members and significant reduction in illegal activity.[21] These examples demonstrate that, while some companies report engaging with their suppliers on these matters, external actors fill an important gap in providing support for producers and farmers to obtain the financing and technical expertise needed to meet company sourcing requirements.

Supply chain commitments also play an important role in developing the narrative around and support for the zero-deforestation movement. Company pledges and commitments have reinforced existing national commitments, and these commitments are gradually being integrated into

[17] Durschinger, L., Hajek, F., Nelson, N., et al. (2015). *Incentivizing a transition to zero-deforestation commodities: Recommendations for Colombia, Democratic Republic of Congo, Liberia, and Peru.* Washington, DC: USAID -supported Forest Carbon, Markets and Communities Program.

[18] Latawiec A.E., Strassburg, B.B., Silva, D., et al. (2017). Improving land management in Brazil: A perspective from producers. *Agriculture, Ecosystems and Environment*, 240, 276–286.

[19] Carroll, T., Stern, A., Zook, D., et al. (2012). Catalyzing smallholder agricultural finance. *Dalberg Global Development Advisors*, 48; Levin, J. (2012). *Profitability and sustainability in palm oil production*. World Wildlife Fund Report; and Laven, A., & Boomsma, M. (2012). *Incentives for sustainable cocoa production in Ghana.* Amsterdam: Royal Tropical Institute.

[20] Savenije, H., Baltissen, G., van Ruijven, M., et al. (2017). Improving the positive impacts of investments on smallholder livelihoods and the landscapes they live in. Working paper 1.0. Tropenbos International, FMO – the Dutch Development Bank, KIT- The Royal Tropical Institute, and HIVOS International, the Netherlands; Instituto Centro de Vida. (2015). *Novo Campo program: A strategy* for *sustainable cattle ranching in the Amazon.*

[21] Fortin, R., Butterfield, R., & Hodgdon, B.D. (2010). *The impacts of training, technical assistance and new market access for community forest enterprises in the Rio Platano Biosphere Reserve, Honduras*. Rainforest Alliance.

government strategies and targets.[22] The most promising developments can be observed at the subnational levels in the context of jurisdictional, multistakeholder initiatives, but these face severe scaling challenges. In Indonesia and Malaysia, two high-profile efforts to provide province-wide sustainable palm oil certification – specifically, in Central Kalimantan, Indonesia[23] and Sabah, Malaysia – have garnered popular support but are struggling to finance the costs of certification. In Ghana and Côte d'Ivoire, individual companies like Mondelēz International have been working directly with governments through public-private partnerships,[24] leading to a massive new effort called the Cocoa and Forests Initiative (CFI), which has the backing of companies representing two thirds of the cocoa supply chain. In Brazil, several interviewees noted that the supply chain movement clearly increased the number of forums for dialogue and helped move the zero-deforestation discussions from theory to debate over the technical and economic possibilities for achieving it.

Regardless of how companies implement commitments, a lack of stable governance and institutional frameworks may neutralize or reduce any positive impact.[25] The impacts of commitments can be limited by laundering, in which commodities that have been produced by deforesting are smuggled into the market,[26] market segmentation,[27] and the absence of legal and legislative support to implement sustainable commodity production and sourcing.[28] Leakage—the shifting of deforestation from one area to another—also risks negating the benefits of any reduced deforestation.[29] In Brazil, while efforts such as the Soy Moratorium have contributed to the stark drop in deforestation for soy expansion in the Amazon, this does not mean that overall deforestation is under control. Despite commitments to zero-deforestation, large producers continue to accept legal deforestation from their suppliers in other regions like the Cerrado.[30] Lack of control over indirect suppliers of beef has also undoubtedly compromised the effectiveness of the 2009 Cattle Agreements, which seek to stop the purchase of cattle from farms that deforest.[31]

Unless consumer-facing companies in emerging markets demand sustainable practices, deforestation is likely to continue. Almost 90 percent of deforestation commitments come from

[22] Falconer, A., Dontenville, A., Parker, C., et al. (2017). *Landscape of REDD+ aligned finance in Côte d'Ivoire*. San Francisco, CA: Climate Policy Initiative; Austin, K.G., Lee, M.E., Clark, C., et al. (2017). An assessment of high carbon stock and high conservation value approaches to sustainable oil palm cultivation in Gabon. *Environmental Research Letters, 12*(1), 014005; Solidariedad. (2018). Colombian producers sign first national zero-deforestation agreement for palm oil. https://bit.ly/2I1Rco0; Fishman A. (2014). *Understanding "deforestation-free": The state of play and issues to consider during TFD's October 2014 dialogue*. New Haven, Connecticut, USA: The Forests Dialogue.

[23] Miller, D., Lujan, B., & Schaap, B. (2017). *Collaboration toward zero deforestation: Aligning corporate and national commitments in Brazil and Indonesia*. Washington DC: Environmental Defense Fund.

[24] Mondelēz International. (2017). *Mondelēz International advances forest-protection efforts in West Africa*. https://bit.ly/2I3tDeJ.

[25] Climate Focus. (2016). *Progress on the New York Declaration on Forests: Eliminating deforestation from the production of agriculture commodities – Goal 2 assessment report.* Prepared by Climate Focus in cooperation with the NYDF Assessment Coalition with support from the Climate and Land Use Alliance and the Tropical Forest Alliance 2020.

[26] Gibbs, H., Munger, J., L`Roe, J., et al. (2016). Did ranchers and slaughterhouses respond to zero-deforestation agreements in the Brazilian Amazon? *Conservation Letters* 9(1), 32–42.

[27] Heilmayr, R., & Lambin, E.F. (2016). Impacts of nonstate, market-driven governance on Chilean forests. *Proceeding of the National Academy of Science,* 113.

[28] Streck. C., & Lee, D. (2016). *Partnering for results: Public-private collaboration on deforestation-free supply chains*. Washington DC: U.S. Department of State.

[29] Arima, E.Y., Richards, P., Walker, R., et al. (2011). Statistical confirmation of indirect land use change in the Brazilian Amazon. *Environmental Research Letters, 6*(2); Austin, K.G., Lee, M.E., Clark, C., et al. (2017). An assessment of high carbon stock and high conservation value approaches to sustainable oil palm cultivation in Gabon. *Environmental Research Letters, 12*(1), 014005; Alix-Garcia, J., & Gibbs, H. (2017). Forest conservation effects of Brazil's zero deforestation cattle agreements undermined by leakage. *Global Environmental Change,* 47, 201–217.

[30] Drost, S., de Wilde, J., & Drennen, Z. (2017). Bunge: Key position in cerrado puts zero-deforestation commitments at risk. *Chain Reaction Research*; Campos Mello, P., & Prado, A. (2018). *Comunidades tradicionais e produtores disputam reservas ambientais na Bahia.* http://bit.ly/2KPLvup.

[31] See Gibbs, H., Munger, J., L`Roe, J., et al. (2016). Did ranchers and slaughterhouses respond to zero-deforestation agreements in the Brazilian Amazon? *Conservation Letters* 9(1), 32–42; Barreto, P., Ritaumaria, P., Brandao Jr. A., et al. (2017). Will meatpacking plants help halt deforestation in the Amazon? Belém, PA: Imazon.

companies based in North America, Europe, and Australia.[32] Although these companies account for a significant portion of demand for commodities produced from high-risk forests, engaging companies in emerging markets is vital. China is the world's largest importer of soy and pulp and paper products, the third largest importer of palm oil, and is projected to become the second largest importer of beef within the next five years.[33] India is the world's largest importer of palm oil.[34] These factors leave a viable market open to producers that continue to deforest.

[32] Climate Focus. (2016). *Progress on the New York Declaration on Forests: Eliminating deforestation from the production of agriculture commodities – Goal 2 assessment report*. Prepared by Climate Focus in cooperation with the NYDF Assessment Coalition with support from the Climate and Land Use Alliance and the Tropical Forest Alliance 2020.

[33] World Economic Forum. (2017). *Commodities and forest agenda 2020: Ten priorities to remove tropical deforestation from commodity supply chains*. https://bit.ly/2FwKsNz.

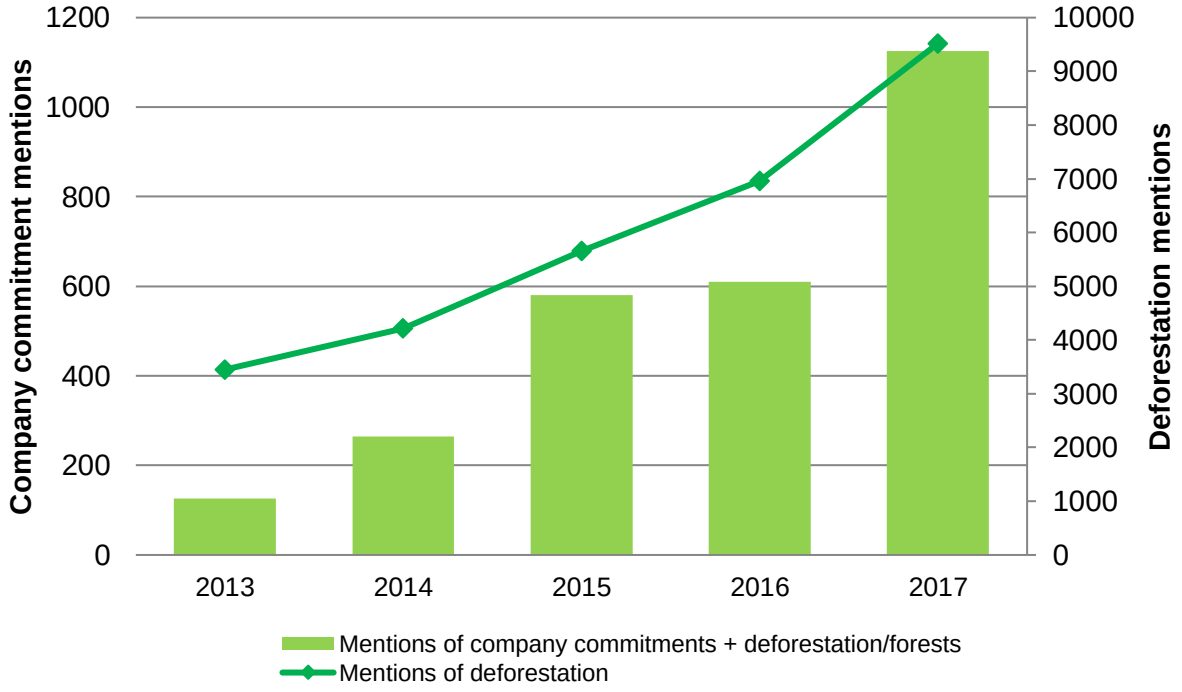
[34] Statista, Palm oil consumption in India from 2011/2012 to 2016/2017 [Bar chart]. https://bit.ly/2I20gtk; Potts, J., Lynch, M., Wilkings, A., et al. (2014). The state of sustainability initiatives review 2014: Standards and the green economy. Chapter 11 in *Palm oil market.* London: IIED; Roundtable on Sustainable Palm Oil (RSPO). (2017). *Palm oil in India: Analysis of supply chains and sustainability*. https://bit.ly/2KO32mC.

3. Media Coverage of Deforestation in Supply Chains

To assess changes in the visibility of commodity-driven deforestation, the study team conducted a search of key terms related to deforestation in global and regional media outlets over the last five years. Details of the methodology of the media review are in Appendix D.

Media attention to – and associated public awareness of – deforestation issues has grown since 2013, nearly doubling between 2015 and 2017 (Figure 1). Mentions of company commitments and deforestation or forests jumped in 2015, around the time many international declarations such as the New York Declaration on Forests and the Amsterdam Declarations were coming to fruition. Media attention continued to rise in 2017, possibly indicating that the discussion is gaining momentum as 2020 targets for climate action goals approach. This growing dialogue around deforestation is projected to continue: as of mid-March 2018 – roughly a fifth of the way into the year – media mentions of deforestation had reached almost 40 percent of total mentions in 2017. Assuming the discussion continues at the same pace, 2018 media mentions are expected to double over the previous year.

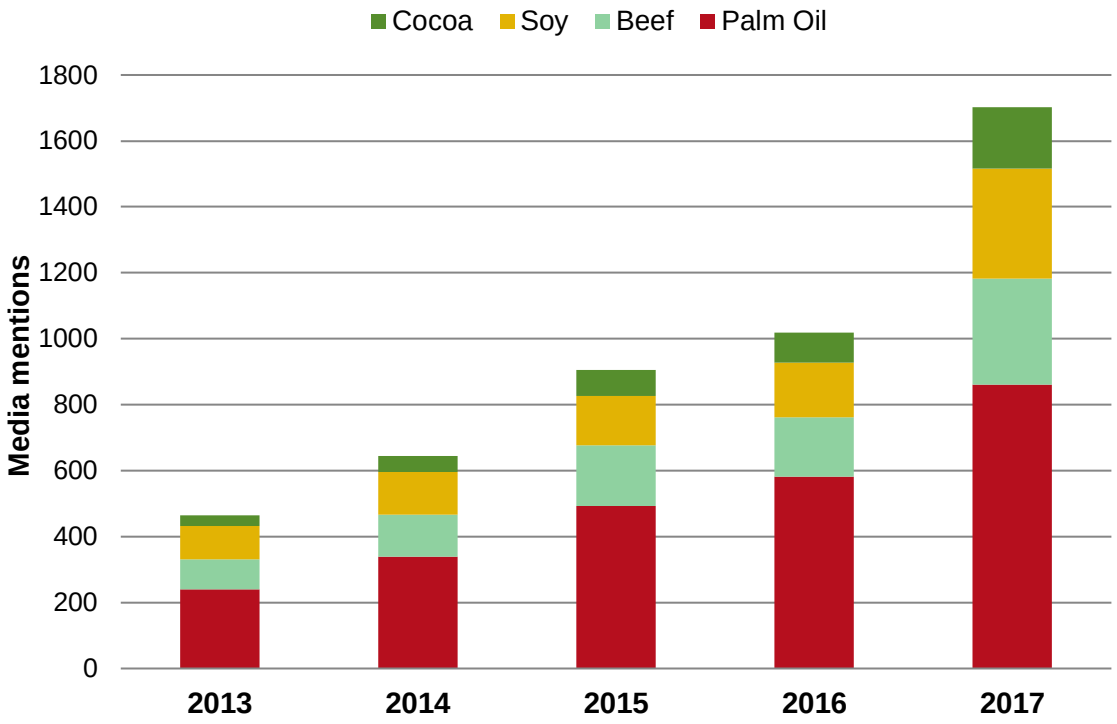
Figure 1: Media Mentions of Deforestation and Supply Chain Company Commitments in Media Outlets Reviewed, 2013-17



Source: Authors. See Appendix E.

Globally, palm oil dominates media attention as a commodity that drives deforestation (Figure 2). Regionally, increasing mentions of commodities point to growing interest in the local drivers of deforestation. In Indonesia and Malaysia, across all media outlets assessed, the link between palm oil and deforestation is increasingly discussed. Cocoa as a deforestation driver remains largely undiscussed, although 2017 did see a slight rise in media coverage, which may be partially attributed to the development of the Cocoa and Forests Initiative, a pledge by companies and governments to work together to end deforestation and forest degradation in the global coca supply chain, initially focused on Côte d'Ivoire and Ghana.[35]

Figure 2: Media Mentions of Commodity-Driven Deforestation in Media Outlets Reviewed, 2013-17



Source: Authors. See Appendix E.

[35] World Cocoa Foundation. *Coca and Forest Initiative: An introduction*. https://bit.ly/2I0Jlae.

4. Case Study Summaries

Recognizing the complexities of the supply chain movement and significant differences across countries and governance structures, this chapter summarizes several case studies to provide a qualitative impression of the impact of efforts to eliminate deforestation from agricultural supply chains. The case studies focus on the following country and commodity combinations:

- Beef and soy in Brazil
- Palm oil in Indonesia and Malaysia
- Cocoa in Ghana and Côte d'Ivoire

The impact of the palm oil supply chain movement in Liberia is briefly examined in Box 1.

The case studies were researched by reviewing the literature and interviewing experts, companies, civil society representatives, and governments on the topics of forests and agriculture. Interviewees ranged from actors who are deeply engaged with supply chain efforts to eliminate deforestation, to individuals who work on supply chains, but also those who are able to provide an outsider perspective. Over fifty interviews were held during March and April 2018.

These Interviews indicated that the supply chain movement is having an impact on the forest frontier, but there are challenges and risks. While it is difficult to attribute reduced deforestation to supply chain interventions, clear positive effects can be observed across the categories surveyed: environmental, economic, political, and policy impacts, stakeholder perceptions and participation, and capacity needs.

Each case study is summarized here and the complete case studies are in Appendixes A-C.

Box 1: Palm Oil in Liberia: The Big Test to Come

Liberia has a less developed economy than the other countries explored in this study, largely because of its 14-year civil war that ended in 2003 and the 2014 Ebola outbreak, which stifled the country's nascent recovery.

The lack of economic development means its forests have not been exploited and are largely intact. For this reason, Liberia is a country that many, particularly the Roundtable for Sustainable Palm Oil (RSPO), see as the proving ground for supply chain initiatives.

Liberia's primary exports are iron ore, timber, and rubber, but it produces cocoa as well, and the government has identified palm oil as a growth commodity. The new Liberian government has set a priority to develop the agricultural sector,[36] especially palm oil, which accounts for 10 percent of agricultural employment[37] and is mostly produced by smallholders.[38]

In 2014, Liberia became a founding member of the Africa Palm Oil Initiative (APOI), and in 2016 it pledged to implement sustainable development principles under the 2016 Marrakesh Declaration.

[36] The Star Online. (2018, January 3). *Liberia´s new president plans agriculture push, Sime major investor.* https://bit.ly/2DZcFMc.

[37] Liberia Institute of Statistics and GeoInformation Services (LISGIS). Statistics for 2010-2011.

[38] International Trade Center and the Republic of Liberia. (2014). *The Republic of Liberia, National Export Strategy, Oil Palm Export Strategy 2014–2018*. https://bit.ly/2JUZnmL.

Prior to this, in 2008, the government started granting massive concessions to four palm oil companies: the British group Equatorial Palm Oil (EPO),[39] the Malaysian group Sime Darby,[40] the Indonesian group Golden Veroleum Liberia (GVL),[41] and the West African group SIFCA, the latter on land previously managed by Maryland Oil Palm Plantation.[42]

These four companies are members of RSPO, and had promised to develop their Liberian plantations according to RSPO principles in the hope of earning certification of the new plantations. Sime Darby has committed to a no-deforestation objective and to protect and enhance forests under its new Responsible Agriculture Charter.[43] EPO, and GVL have also committed to no deforestation,[44,45] and SIFCA has a high rating from Forest500 for its overall forest policy.[46]

The impacts of these supply chain efforts, as well as the wider supply chain movement in Liberia, include environmental, economic, policy, stakeholder, and capacity aspects, as described below.

Environmental impacts. As a result of their supply chain commitments, three of the four companies reduced their cultivated area and corresponding impact on forests. Specifically, in accordance with RSPO guidelines, all four delineated high-conservation-value (HCV) forest areas within their concessions and demonstrated that they had avoided developing them. As a result of the civil crisis, the region had experienced an influx of displaced people who had settled in the concession area, and three of the four were forced to renegotiate their concessions with local communities who filed complaints with the RSPO, with support from environmental nongovernmental organizations (NGOs). Furthermore, Sime Darby and GVL are now experimenting with produce-and-protect mechanisms to protect nearby forest. Both companies have renegotiated their concessions to include independent farmers who receive land at the edge of the plantation as well as inputs and support from the companies in an effort to emulate the "plasma" model pioneered in Malaysia and Indonesia (see Historical Context in Appendix B: Palm Oil in Indonesia and Malaysia).

Ultimately, Sime Darby developed just 10 percent of its concession, and more than 150,000 hectares were set aside for protection. GVL protected 70,000 hectares of forest and gave 8,000 hectares to outgrowers. Interviewees say this would not have happened without RSPO membership.

Economic Impacts. Interviewees were divided over the economic impact of the supply chain movement in Liberia to date. The country is in need of economic development, and it is not clear whether the outrgower program can achieve the scale needed to improve livelihoods.

The Norwegian government is supporting the Sime Darby and GVL produce-and-protect programs with risk-mitigation finance funneled through the Sustainable Trade Initiative (IDH), while the Liberian government is working with both Norway and IDH to pursue impact investments for the outgrower portion. To do so, they created a joint financing company called Liberia Oil Palm Management Company. IDH and the Government of Liberia jointly presented the proposal to investors last year, but negotiations were put on hold by the recent elections. The pilot project would employ 1,300 people, and developers estimate it will improve the lives of 7,000 dependents.

[39] Roundtable for Sustainable Palm Oil (RSPO). Case Tracker. Equatorial Palm Oil PLC. https://rspo.org/members/complaints/status-of-complaints/view/44.

[40] Roundtable for Sustainable Palm Oil (RSPO). Case Tracker. Sime Darby (Liberia) Plantation INC. https://bit.ly/2jAjWtx.

[41] Roundtable for Sustainable Palm Oil (RSPO). Case Tracker. Golden Veroleum Liberia. https://rspo.org/members/complaints/status-of-complaints/view/24.

[42] Polack, E., Cotula, L., & Côte, M. (2013). *Accountability in Africa´s land rush: What role for legal empowerment?* London/Ottowa: International Institute for Environment and Development (IIED) and International Development Research Centre (IDRC). https://bit.ly/2wPTQfz.

[43] Sime Darby. (2016). Sime Darby agriculture charter. https://bit.ly/2E2sDWP.

[44] Equatorial Palm Oil. (2017). Sustainability report 2016. https://bit.ly/2KHzt73.

[45] Golden Veroleum Liberia. (2015). Forest conservation policy. https://bit.ly/2rrEWHh.

[46] Forest500. SIFCA Group. https://forest500.org/rankings/companies/sifca-group.

News media portrayed the granting of concessions as a "land-grab" thwarted by local communities, while most interviewees stressed that companies adapted their development plans. Several interviewees feared that supply chain concerns could frighten sustainability-oriented companies away from Liberia, opening the door to companies less inclined to recognize community rights and environmental impact. President George Weah has vowed to re-evaluate all concessions granted in all commodities, and financing negotiations are currently on hold until a clear policy is announced.

Stakeholder perception and participation. Most interviewees said that smallholder farmers enjoy a better livelihood than do plantation workers, but others countered that the long-term employment prospects of sustainability-managed plantations had been underestimated. One study showed that palm oil plantation workers earn significantly more than workers in competing sectors like rice farms,[47] while another study argued that plantation work distorts rather than improves the local economy.[48]

The supply chain movement has given local NGOs the leverage needed to challenge the government-awarded concessions for palm oil development. Specifically, the "free, prior and informed consent" provisions of RSPO clearly forced companies to engage the local population more than they probably would have in the past.

Capacity needs. Interviewees agreed that the government, in the wake of the civil conflict, lacked the resources needed to carry out proper land-use planning, but most perceived a dramatic improvement after the country began developing a REDD+ strategy in 2012 and then joined the APOI in 2014.

Farmers lack the training and inputs needed to adopt sustainable production practices and also need agricultural support services. Concentrated outgrower programs could help address this gap by aligning corporate goals with smallholder goals and enabling companies to achieve economies of scale. GVL recently opened a new processing mill, indicating a willingness to invest in the viability of smallholder farms.[49]

4.1 Beef and Soy in Brazil

Beef sector

Brazil is one of the largest producers of beef and soy in the world. Livestock farming generates 7 percent of Brazil's GDP,[50] and in the Amazon alone the cattle industry provides income to over half a million smallholders. Beef plays a central role in Brazilians' daily diets with nearly 80 percent of the meat produced consumed domestically.[51] Yet Brazil remains a major exporter of beef with international demand projected to rise by 3 percent annually. In the next 10 years, Brazil is expected to become the world's top exporter of beef.[52]

Since the 1990s, the animal slaughtering and meat processing market in Brazil has undergone gradual consolidation.[53] Between 2009 and 2011, the three largest slaughterhouses (JBS, Marfrig

[47] Savoure, T. (2015). *Community oil palm smallholder programs: A Liberian case study.* The Sustainable Trade Initiative (IDH).

[48] Global Witness. (2016). *Will big plantations help Liberians? New economic study shows costs outweigh benefits*. https://bit.ly/2tt0Qta.

[49] Golden Veroleum Liberia. (2016, April 21). *GVL Dedicates Mini Mill in Sinoe*. https://bit.ly/2k8jLGc.

[50] Associação Brasileira das Indústrias Exportadoras De Carnes (ABIEC), Brazilian Beef, & ApexBrasil. (2017). *2017: Brazilian livestock profile*. Annual Report. https://bit.ly/2I2T2Fu.

[51] Associação Brasileira das Indústrias Exportadoras De Carnes (ABIEC), Brazilian Beef, & ApexBrasil. (2017). *2017: Brazilian livestock profile*. Annual Report. https://bit.ly/2I2T2Fu.

[52] Ministério da Agricultura, Pecuária e Abastecimento. (2017). *Projeções do Agronegócio: Brasil 2016/17 a 2026/2027 – Projeções de Longo Prazo*. https://bit.ly/2jASiwo.

[53] Carvalho, T. (2016). *Estratégias de crescimento e restruturação da indústria de carne bovina no Brasil: O papel de políticas públicas discricionárias.* Doctoral dissertation, Universidade de São Paulo.

Group, and Minerva Foods) dominated about 30 – 35 percent of animal slaughtering in the country.[54] However, concentration at the level of slaughterhouses varies considerably from state to state.[55] Public finance from the Brazilian National Development Bank (BDNES) from 2005 to 2015, estimated at around R$ 14 billion (US$ 5 billion), contributed to the concentration of the market and globalization of the companies.[56]

Transparency around indirect cattle supply remains a challenge. The beef production process includes the stages of breeding, raising and fattening, processing, trading, and marketing/consumption. Many dispersed formal and informal farms operate autonomously in the early breeding stages of juvenile animals, creating challenges in sourcing at this stage of the supply chain, which is closest to forests. Most beef production is extensive with low productivity per hectare.[57]

There are efforts to remove deforestation from the cattle supply chain, although more are certainly needed. Efforts include establishment of the Cattle Agreements in 2009, agreements between the four major slaughterhouses and Greenpeace to cease purchase of cattle from farms with deforestation after 2009 and the "current practice adjustment agreements," known as the TAC Agreements, which focus on curbing illegal deforestation by ranchers and the purchase of cattle with irregularities by meatpackers. Also in 2009 the then four largest meatpackers signed the G4 Zero-Deforestation Agreement with Greenpeace.[58] The Brazilian Roundtable on Sustainable Livestock, established in 2007, aims to improve the sustainability of the beef value chain. The Rainforest Alliance, together with U.S. Agency for International Development (USAID), launched a certification scheme for sustainable beef in 2010.

A recent assessment of corporate commitments found that of 22 companies in Latin America, 18 have forest commitments in Brazil.[59] These commitments differ significantly in scope. Some companies state specific sectors or specific targets for their objective to end deforestation, e.g., including forest degradation, whereas others state the general goal of zero-deforestation. Some refer only to general sustainability goals without mentioning deforestation.

Soy sector

Brazil is also one of the world's largest producers of soy.[60] The sector employed over 3.7 million people in 2014 and in 2017 it generated around 2 percent of national GDP.[61] Soy production has grown rapidly at about 13 percent per year over the past 20 years.[62] Only about 40 percent of the soy

[54] do Amaral Rocha, A. (2011). *Frigoríficos 'Abertos' Detêm 35% Dos Abates*. Sindicarne. https://bit.ly/2I2gFxP; Beefpoint. (2011). *Concentração no mercado de frigoríficos é contestada por representantes do setor de carne.* https://bit.ly/2KHCSCR; Carvalho, T. (2016). *Estratégias de crescimento e restruturação da indústria de carne bovina no Brasil: O papel de políticas públicas discricionárias*. Doctoral dissertation, Universidade de São Paulo.

[55] Da Silva, F.L.M., & Gameiro, A.H. (2012). *Análise da concentração na indústria frigorífica brasileira.* VI Simpósio de Pós-Graduação e Pesquisa em Nutrição e Produção Animal, conducted by Departamento de Nutrição e Produção Animal & Zootecnia da Universidade de São Paulo. https://bit.ly/2FRaTgv.

[56] Folha Politica. (2017). *BNDES articulou monopolização do mercado da carne, com política de 'Campeãs Nacionais'.* https://bit.ly/2KHd9dX.

[57] Strassburg, B.B., Latawiec, A.E., Barioni, L.G., et al. (2014). When enough should be enough: Improving the use of current agricultural lands could meet production demands and spare natural habitats in Brazil. *Global Environmental Change,* 28, 84–97; Instituto Centro de Vida (ICV). *Beef impact analysis for Brazil.* ICV report, see feasibility study in Colombia.

[58] Gibbs, H., Munger, J., L`Roe, J., et al. (2016). Did ranchers and slaughterhouses respond to zero-deforestation agreements in the Brazilian Amazon? *Conservation Letters* 9(1), 32–42.

[59] Climate Focus. (forthcoming 2018). *Drivers of change: How effective are corporate supply-chain commitments?* Prepared by Climate Focus in collaboration with Imaflora with support from the Gordon and Betty Moore Foundation.

[60] Filho, A.C., & Costa, K. (2016). The expansion of soybean production in the Cerrado: Paths to sustainable territorial occupation, land use and production. *Agroicone: INPUT*. https://bit.ly/2t7XDgZ.

[61] Cepea. PIB de Cadeias Agropecuarias. http://bit.ly/2KSD69t.

[62] Embrapa. (2017). *Análise da área, produção e produtividade da soja no Brasil em duas décadas (1997–2016).*

produced is consumed domestically (either by humans or animals) with the rest exported.[63] China is by far Brazil's biggest customer, buying around 74 percent of the soybeans produced in 2016.[64]

The soy supply chain in Brazil is largely aggregated. There are, however, clear variations in the structure of supply chains in different regions. The basic soy supply chain includes production, storage, processing, trade, and consumption. Growing demand for soy has led to the expansion of soy cultivation into new areas, including land that was previously tropical forest. Crop storage mostly takes place on the farm, while processing is concentrated in a few large corporations, such as Cargill, Bunge, and ADM. After processing, soybeans are either stored in silos or processed further.[65] Market activity is also dominated by a few large corporations that move the commodity toward distribution and finally to be used for livestock feed, biodiesel, cooking oil, or food ingredients. Other actors may provide inputs across the supply chain, supplying seeds or chemicals to the farmers, lending finance from federal or private banks or credit unions, or cooperating with the farmers in purchasing and marketing.[66]

There are a number of ongoing initiatives to eliminate deforestation from the soy supply chain. The most prominent initiatives include Brazil's Soy Moratorium brokered by NGOs and signed by major traders in 2006. In this voluntary agreement, signatories pledged to refrain from purchasing soy from farmers that had cleared forested land for soy cultivation in the Amazon after July 2006 (later adjusted to July 2008).[67] Many signatories have also made commitments to eliminate deforestation from their supply chains. Forty-four companies that source soy from Brazil have made commitments to tackle deforestation in their supply chains. Companies either emphasize the sourcing of certified soy (almost 40 percent) or compliance with the moratorium and Brazil's Forest Code, which set limitations on forest clearance. For companies that rely on certification to meet their commitments, the Roundtable on Responsible Soy is the most often referenced mechanism.[68]

Supply chain interventions have contributed to reducing deforestation rates in the Amazon. The Soy Moratorium, in particular, was frequently praised for clearly contributing to the substantial decline in deforestation in the region between 2005 and 2012.[69] It is also clear that awareness by companies and producers over the need to discuss possible pathways to zero-deforestation is now consolidated in the country. The supply chain movement has provided an opportunity for high-profile international commitments, creating domestic momentum and maintaining deforestation at the top of the agenda. Despite this progress, existing initiatives still lack scale and a national consensus on how to deal with deforestation in the Cerrado biome is yet to be achieved.

[63] Abiove. *Soybean complex statistics. Projection for 2018*. https://bit.ly/2jFvtbf.

[64] Cattelan, A. J., & Dall'Agnol, A. (2018). *The rapid soybean growth in Brazil.* Oilseeds & fats Crops and Lipids (OCL).

[65] Garrett, R. D., & Rausch, L. L. (2016). Green for gold: Social and ecological tradeoffs influencing the sustainability of the Brazilian soy industry. *The Journal of Peasant Studies*, *43*(2), 461–493.

[66] Garrett, R. D., & Rausch, L. L. (2016). Green for gold: social and ecological tradeoffs influencing the sustainability of the Brazilian soy industry. *The Journal of Peasant Studies*, 43(2), 461–493.

[67] Piatto, M., & de Souza, I. (2016). *10-years of soy moratorium in the Amazon: History, impacts and expansion into Cerrado areas.* Piracicaba, SP: Imaflora; Boucher, D. (2014). How Brazil has dramatically reduced tropical deforestation. *Solutions Journal*, 5(2), 66–75; Gibbs, H.K., Rausch, L., Munger, J., et al. (2015). Brazil's Soy Moratorium: Supply-chain governance is needed to avoid deforestation. *Science,* 347(6220), 377–378.

[68] Round Table on Responsible Soy (RTRS). *Standard for Responsible Soy Production* Version 3.1. https://bit.ly/2JWrNwQ.

[69] See, for instance, Gibbs, H.K., Rausch, L., Munger, J., et al. (2015). Brazil's Soy Moratorium: Supply-chain governance is needed to avoid deforestation, *Science,* 347(6220), 377–378; and Gibbs, H., Munger, J., L`Roe, J., et al. (2016). Did ranchers and slaughterhouses respond to zero-deforestation agreements in the Brazilian Amazon? *Conservation Letters*, 9(1), 32–42.

Table 2: Summary of Impacts of the Supply Chain Movement in Brazil

IMPACT AREA	POSITIVE AND NEGATIVE IMPACTS OF SUPPLY CHAIN MOVEMENT
Environmental	+ Contributed to the reduction in deforestation rates between 2005 and 2012. ± Reduced soy-related deforestation in the Amazon due to the voluntary 2006 Soy Moratorium, but increased soy expansion to previously intact forest areas in the Cerrado. ± Decreased deforestation in the state of Pará due to cattle agreements, but had little net impact due to laundering and leakage. - Limited success in using standards/certifications to eliminate deforestation from supply chains. In the beef sector, few standards exist and these have been slow to develop. In the soy sector, certification is limited by high implementation costs and difficulty in applying certification at scale.
Economic	+ Some support for smallholders is evident (e.g., Novo Campo Program, Embrapa's Good Agricultural Practices, Amazon Eyes of Water, Low-Carbon Agriculture Plan of Brazil). - There is little evidence of market premiums being paid for sustainably produced products. - Smaller producers depend on extension services and economic incentives to engage with the supply chain movement. - Financing has been slow to reach actors at the forest frontier (e.g., Amazon Fund). Only isolated examples of successful business models were found.
Political	+ Increased number of forums for dialogue about forests. + Increased visibility and political debate around commodity-driven deforestation. + Improved cooperation between public and private sector efforts to tackle deforestation.
Policy	+ Policies and legal instruments such as the Brazilian Forest Code and Rural Environmental Registry (CAR) have evolved in parallel to the supply chain movement and company commitments help push for adhesion of farmers to the CAR. - But companies and traders find it difficult to implement their commitments without supportive policies and institutions.
Stakeholders perception and engagement	+ Increased public awareness and corporate action around deforestation within the beef and soy supply chains. + Civil society was instrumental in motivating and holding companies accountable to their deforestation commitments. ± Discussions on zero deforestation are being brought to the fore, but there remains substantial divergence among stakeholders.
Capacity needs	+ The number of tools leading to improved transparency and access to information in the beef and soy supply chains have clearly increased. + Experts agreed that the supply chain movement has leveraged further innovation in these supply chains. - But scalability of efforts remains a challenge.

Overall, there is a growing acceptance that economic growth can be decoupled from the clearing of land. A number of initiatives are linked to supply chain efforts devoted to enhancing the capacity of farmers by offering training to increase productivity without further expansion into new areas. In addition, the supply chain movement was often referred by interviewees as a lever for

innovation and further transparency in the Brazilian beef and soy value chains. Scalability, however, remains a challenge for most of these initiatives.

From an economic standpoint, actions remain fairly limited. With a few notable exceptions, there is little evidence of premiums being paid in exchange for sustainably certified commodities. Companies have engaged with the supply chain movement mostly as a risk-mitigation strategy and have yet to take the lead in providing or transmitting the necessary market signals to catalyze action. A number of interviewees argued that positive incentives, such as Reduce Emissions from Deforestation and Degradation (REDD+) and payment for ecosystem services, are still needed and must be implemented in parallel (both at landscape and project scales).

4.2 Palm Oil in Indonesia and Malaysia

More than 80 percent of the world's palm oil comes from just two countries: Indonesia and Malaysia. Since 2000, Malaysia's palm oil output has increased steadily, while Indonesia's has more than quadrupled. In both countries, this has led to rapid increases in deforestation, although some of the new plantations were developed on land converted from other agricultural uses.

Most companies with deforestation commitments have turned to sustainability standards that either predate or were created in parallel with zero-deforestation commitments. The most common standard is the Roundtable for Sustainable Palm Oil (RSPO), but both countries also have national standards: Indonesian Sustainable Palm Oil (ISPO) and Malaysian Sustainable Palm Oil (MSPO). Export-oriented plantation owners have rallied around the RSPO, while smaller companies favor the national standards. Roughly 19 percent of all palm oil is RSPO certified, with most of it being shipped to Europe and the United States.[70]

A handful of large trading and plantation groups control more than 60 percent of exports from Indonesia and Malaysia; these large exporters source 60 – 80 percent of their palm oil from hundreds of smaller traders and plantations, who in turn source from millions of independent farmers, often through several intermediaries. Most of these smallholders operate independently, and with low productivity, but some are contractually attached to larger plantations.

Smaller companies are driving deforestation at the frontiers, but many of these companies are owned by larger companies. This is seen as an area where the supply chain movement can exert more influence. Many observers see increased productivity among smallholders as key to increasing production without deforesting.

Over the past five years, the strength of supply chain commitments has improved. At least 285 companies have made commitments in the palm oil sector, with 267 of them aiming to achieve their goals in whole or in part by purchasing palm oil that has been certified as sustainable,[71] usually by the RSPO. Exporting companies with commitments have shifted from zero-deforestation commitments to more specific and detailed no-deforestation, no-peat, no-exploitation (NDPE) commitments developed in cooperation with NGOs.[72] Unlike most of the high-profile commitments that spawned them, NDPE commitments tend to be concrete, viable, and verifiable, with detailed descriptions of exactly which high-carbon-stock forests and which high-conservation-value areas will be avoided, as well as firm commitments to avoid all development on peatlands. They also include commitments to restore previously disrupted forests and peatlands, and to embrace fair labor practices. Most importantly, these pledges go beyond the activities of individual plantations and extend to all facilities that

[70] Roundtable on Sustainable Palm Oil (RSPO). (2018, March). *RSPO in numbers*. https://rspo.org/about/impacts.

[71] Supply Change. *Palm*. http://www.supply-change.org/commodity/palm.

[72] Wilmar. (2013). *No deforestation, no peat, no exploitation policy*. https://bit.ly/1hDCOBB.

companies either operate or invest in – as well as to third-party suppliers, many of whom have balked at complying in the past. Most of the refining capacity (74 percent) in both countries is controlled by companies with NDPE commitments.[73]

Governments in both Indonesia and Malaysia are exploring jurisdictional approaches to secure sustainable palm oil supply from an entire landscape. The Malaysian state of Sabah is seeking to create an entire RSPO-certified jurisdiction, while the Sustainable Trade Initiative (IDH) is spearheading initiatives in West Kalimantan,[74] South Sumatra,[75] Aceh,[76] and Jambi.[77]

The support for and momentum around jurisdictional efforts in Malaysia and Indonesia holds significant promise for moving supply chain commitments forward (Table 3). Jurisdictional approaches can help companies save money in implementation costs and increase the effectiveness of RSPO, but these efforts are also having trouble getting to scale.

Table 3: Summary of Impacts of the Supply Chain Movement in Indonesia and Malaysia

IMPACT AREA	POSITIVE AND NEGATIVE IMPACTS OF THE SUPPLY CHAIN MOVEMENT
Environmental	+ Incentivized sustainable practices in existing plantations + Provided a lever for enforcement and discovery + Sparked deeper and broader commitments under the "no-deforestation, no-peat, no-exploitation" movement. ± Catalyzed a bifurcation of the palm oil sector into committed and noncommitted entities, which - Enabled some companies to hide deforestation - Failed to slow deforestation at the forest frontier
Economic	+ Helped some smallholders increase yields and earnings ± May be sparking a vertical integration among companies ± Sparked renewed interest in project-based REDD - Imposed costs on some companies that fail to meet their commitments
Political	+ Sparked the creation of smaller, informal cooperative efforts ± Has a mixed reception domestically - Has encountered organized backlash
Policy	+ Sparked emergence of jurisdictional certification programs + Dovetails with anticorruption efforts and moratoria + Gained legitimacy in Supreme Court

[73] Steinweg, T., Drennen, Z., & Rijk, G. (2017). Unsustainable palm oil faces increasing market access risks. *Chain Reaction Research.* https://bit.ly/2JUpCcQ.

[74] The sustainable trade initiative (IDH). West Kalimantan, Indonesia. https://bit.ly/2K17Ep5.

[75] The sustainable trade initiative (IDH). South Sumatra, Indonesia. https://bit.ly/2JX83sM.

[76] The sustainable trade initiative (IDH). Aceh, Indonesia. https://bit.ly/2IS65x1.

[77] The sustainable trade initiative (IDH). Jambi, Indonesia. https://bit.ly/2k5MbAx .

Stakeholder perception and engagement	+ Created near-universal awareness among relevant NGOs + Created understanding among companies ± Variable understanding among smallholders - Is not embraced by all companies
Capacity needs	+ Has helped some smallholders improve practices + Forged some agreement over forest definition + Provided impetus for improved standards

However, supply chain commitments will not be effective unless commitments spread to other major buying countries, especially India and China. Several interviewees spoke of the need to acknowledge the bifurcation of the supply chain that has been caused by (largely) Western markets seeking deforestation-free palm oil, while other markets are unconcerned with how palm oil is produced. Some interviewees were encouraged by the high number of Chinese processors making NDPE commitments: 86 percent of China's refining capacity is now covered by NDPE commitments, and some Chinese companies such as Cofco have embraced supply chain commitments. However, India, which is the world's largest importer of palm oil and buys 15 percent of Indonesia's product, remains largely out of the picture.[78]

4.3 Cocoa in Ghana and Côte d'Ivoire

Ghana and Côte d'Ivoire produce more than 60 percent of the world's cocoa. [79] Millions of people in both countries earn their living producing or processing cocoa. In Côte d'Ivoire, cocoa generates more than 40 percent of export revenues[80] and 30 percent of the country's GDP; [81] while in Ghana, cocoa generates roughly 20-25 percent of export revenues and 7 percent of GDP. [82]

While cocoa production is disaggregated, cocoa trade and processing is dominated by a handful of companies. Farmers usually ferment and dry the beans themselves, either individually or in cooperatives, before selling to traders. From here, they go to grinder/traders, most of which are global companies that process the beans into a commoditized product, then liquefy the product and either create a finished product themselves or sell to chocolate companies or both. In 2016, six traders/grinders traded and processed 89 percent of the world's cocoa,[83] and three of them – Barry Callebaut, Cargill, and Olam – controlled 60 percent of the market.[84]

[78] Statista. Palm oil consumption in India from 2011/2012 to 2016/2017. Bar chart. https://bit.ly/2I20qtk; Potts, J. Lynch, M., & Wilkings, A. (2014). *Palm oil market*; Roundtable on Sustainable Palm Oil (RSPO). *Palm oil in India: Analysis of supply chains and sustainability*; Tropical Forest Alliance (TFA). (2017). *Commodities and forests agenda 2020: Ten priorities to remove tropical deforestation from commodity supply chains.* https://bit.ly/2FwKsNz.

[79] Geiger, M., Kwabena, G.K., Tchale, H., et al. (2018). *3rd Ghana Economic Update. Agriculture as an engine of growth and jobs creation.* Washington DC: World Bank Group. https://bit.ly/2s2M9Ni.

[80] Observatory of Economic Complexity (OEC). (2016). Cote d´Ivoire. https://bit.ly/2s4nIzl.

[81] Export.gov. (2015). *Cote d´Ivoire – Market Overview*. https://bit.ly/2FKFs7m .

[82] Geiger, M., Kwabena, G.K., Tchale, H., et al. (2018). *3rd Ghana Economic Update. Agriculture as an engine of growth and jobs creation.* Washington DC: World Bank Group. https://bit.ly/2s2M9Ni .

[83] Kroeger, A. (2017). *Eliminating deforestation from the cocoa supply chain.* Washington, DC: World Bank. https://openknowledge.worldbank.org/handle/10986/26549.

[84] Terazono, E. (2014, December 18). Welcome to the world of big chocolate: Three companies will dominate the processing sector. *Financial Times*. https://on.ft.com/2rPYqoc.

Productivity in the region is less than half of other regions.[85] In Ghana and Côte d'Ivoire, cocoa is often planted without shade or intermingling with other crops. As a result, farms quickly deplete the soil, forcing farmers into forested areas and accelerating deforestation.[86] Poorly planned and aged cocoa farms could be replaced with modern agroforestry initiatives that intermingle shade trees among newly planted cocoa trees. However, most farmers are tenants on land owned by hereditary chiefs and until recently had no rights to income derived from non-cocoa trees on their farm. This meant that they had little incentive to plant crops that would provide shade to cocoa and increase yields. Tenure laws in Ghana have recently been changed and today farmers have shared rights to income from the trees they nurture, but most farmers are not aware of the changes.[87]

Cocoa companies are aware of the challenges facing smallholder farmers, and many have individually launched programs to help address them, often through training programs that help farmers become certified under one of four widely recognized standards: the UTZ sustainable farming initiative, Rainforest Alliance/Sustainable Agriculture Network (RA/SAN), Fairtrade International, and Organic. Companies' main motivation for engagement has been to ensure future supplies of cocoa.

A survey of 19 companies involved in the cocoa and chocolate trade found that more than 60 percent of them had made cocoa-related deforestation commitments, but none were yet reporting progress.[88] Included in the survey were six trader/grinder companies who traded and processed almost 90 percent of annual global cocoa production in 2016. Of these, four companies responsible for more than 70 percent of global processing had made deforestation commitments, with one of them – which is responsible for almost a quarter of global processing – committing to 100 percent sustainable sourcing by 2020.

The supply chain movement has been successful at capturing a cocoa industry that is both dominated by a small number of companies and geographically concentrated (Table 4). However, to advance progress to impact the forest frontier, significant financial commitments will be needed. By one estimate, it will cost US$150 million to conduct restoration and replanting on 200,000 hectares across both countries.[89] Companies may view this as an investment in their future prosperity. Deforestation-related commitments have largely been made in response to signals from consumer-facing companies, and a number of interviewees said that it is now up to these companies to keep their end of the bargain.

Table 4: Summary of Impacts of the Supply Chain Movement in Ghana and Côte d'Ivoire

IMPACT AREA	POSITIVE AND NEGATIVE IMPACTS OF THE SUPPLY CHAIN MOVEMENT
Environmental	+ The majority of the cocoa sector has committed to increased forest protection in both Ghana and Côte d'Ivoire + Catalyzed two large private sector programs aligned with Ghana's REDD+ efforts + Was designed with the benefit of hindsight

[85] Wessel, M., & Quist-Wessel, P. F. (2015). Cocoa production in West Africa: A review and analysis of recent developments. *NJAS-Wageningen Journal of Life Sciences*, 74, 1-7.

[86] Ruf, F., & Zadi, H. (1998). *Cocoa: From deforestation to reforestation*. Centre de cooperation internationale en recherche agronomique pour le développement (CIRAD). https://s.si.edu/2IlRhq5.

[87] *Tenure laws in Ghana now give farmers shared rights to income from the trees they nurture and support, but most farmers are not aware of the changes*. https://bit.ly/2rnNiQk.

[88] Kroeger, A. (2017). *Eliminating deforestation from the cocoa supply chain.* Washington, DC: World Bank. https://openknowledge.worldbank.org/handle/10986/26549.

[89] Kroeger, A. (2017). *Forest- and climate-smart cocoa in Côte d'Ivoire and Ghana: Aligning stakeholders to support smallholders in deforestation-free cocoa.* Washington, DC: World Bank. https://bit.ly/2rqVpvo.

Economic	+ Could unlock as much as US$50 million in performance-based REDD finance. + The greater benefit will be increased income from increased yield and crop diversification
Political	+ Has catalyzed cooperation and organization among farmers, often in cooperation with NGOs + Has catalyzed cooperation among governing bodies and private sector toward shared goals on forests, production, and livelihoods
Policy	+ Supply chain initiatives have broad buy-in from both governments + The F4A include verifiable commitments and actions from governments to enact new policies in support of the Cocoa and Forests Initiative (CFI)
Stakeholder perception and engagement	+ Enjoys near universal awareness among relevant NGOs - Has not helped the general public understand the link between cocoa production and deforestation - Has not been fully integrated into planning among chocolate companies
Capacity needs	± Has had isolated success in helping farmers develop their technical capacities - Does not yet adequately address the costs to farmers of transitioning to more sustainable cocoa production

Consumer-facing companies like Hershey's and Mars have vowed to ramp up their engagement in the supply chain movement, often with projects like Hershey's planned efforts to help small farmers diversify away from cocoa,[90] or Mars' Sustainable Cocoa Initiative, which aims for all of its farmers to be certified under one or more standards by 2020.[91] These projects have the potential not only to help companies meet their supply chain commitments, but also to ensure that consumers understand the impacts their purchases can have on people at the opposite end of the supply chain.

Both Ghana and Côte d'Ivoire have outlined detailed frameworks for action with clear benchmarks for success under the Cocoa and Forests Initiative, and companies and NGOs are stepping up to implement them. The CFI was launched to end deforestation and forest degradation in the cocoa supply chain, with an initial focus on Ghana and Côte d'Ivoire.[92] It is spearheaded by the World Cocoa Foundation, which is a nonprofit membership organization representing more than 80 percent of the global cocoa market, with support from the Sustainable Trade Initiative (IDH) and the Prince's International Sustainability Unit (ISU). A detailed action plan is set to be published in June 2018 including government plans for resettling farmers from forested areas and corporate plans for providing traceability and accountability across their supply chains. Interviewees said that the timelines were realistic and achievable, and stressed the importance of ensuring that progress is clearly reported.

[90] USAID.Gov. *A financial model for cocoa and farm rehabilitation and income diversification.* https://bit.ly/2I3HD80 .

[91] Mars. Cocoa. *Caring for the future of cocoa*. https://bit.ly/2zMxXvd.

[92] The Cocoa and Forests Initiative. *Collective statement of intent*. https://bit.ly/2wkBSS8.

Appendix

A. Beef and Soy Production in Brazil

A. 1. Sector Background

A. 1. 1. Beef supply chain

Brazil is one of the largest producers of beef in the world. In 2016, livestock farming generated 7 percent of Brazil's GDP (US$130 billion),[93] and in the Amazon alone the cattle industry provided income to over half a million smallholders.[94] Brazilians love beef, and consume nearly 80 percent of the beef produced domestically.[95] Brazil is also a major exporter of beef and in the next 10 years is expected to become the world's top beef exporter.[96] International demand is projected to rise by 3 percent annually.

Most beef production is extensive with low productivity per hectare.[97] Ranching occupies almost one fifth (183 million hectares) of Brazil's land area.[98] Over the past 10 years, the number of cattle has remained constant at around 219 million animals,[99] with beef production also remaining steady.[100] Beef production includes breeding, raising and fattening, processing, trading, and marketing.

Although there are clearly considerable efficiency gains to be made in how cattle are farmed, 85 percent of farmers still rely on extensive pasture grazing[101] where land is often poorly managed and roughly two thirds of pastures are degraded.[102] Farmers commonly clear forest to make way for new

[93] The currency quotation of the European Central Bank was used to convert BRL into US$ (2016); Associação Brasileira das Indústrias Exportadoras de Carnes (ABIEC), Brazilian Beef, & ApexBrasil. (2017). *2017: Brazilian livestock profile.* Annual Report. https://bit.ly/2I2T2Fu; de Carvalho, T., & De Zen, S. (2017). A cadeia de Pecuária de Corte no Brasil: Evolução e tendências. *Revista iPecege* 3(1), 85-99.

[94] Instituto Brasileiro de Geografia e Estatística (IBGE). (2009). *Censo Agropecuário 2006. Brasil, Grandes Regiões e unidades da Federação*. https://bit.ly/2ljuuLM .

[95] Associação Brasileira das Indústrias Exportadoras de Carnes (ABIEC), Brazilian Beef, & ApexBrasil. (2017). *2017: Brazilian livestock profile*. Annual Report. https://bit.ly/2I2T2Fu .

[96] Ministério da Agricultura, Pecuária e Abastecimento. (2017). *Projeções do Agronegócio: Brasil 2016/17 a 2026/2027 – Projeções de longo prazo.* http://bit.ly/2LoO3kb.

[97] Strassburg, B.B., Latawiec, A.E., Barioni, L.G., et al. (2014). When enough should be enough: Improving the use of current agricultural lands could meet production demands and spare natural habitats in Brazil. *Global Environmental Change,* 28, 84–97.

[98] Climate Focus calculations based on Federação das Indústrias do Estado de São Paulo (FIESP), 2016.

[99] Associação Brasileira das Indústrias Exportadoras de Carnes (ABIEC), Brazilian Beef, & ApexBrasil. (2017). *2017: Brazilian livestock profile*. Annual Report. https://bit.ly/2I2T2Fu; de Carvalho, T., & De Zen, S. (2017). A cadeia de Pecuária de Corte no Brasil: Evolução e tendências. *Revista iPecege* 3(1), 85-99.

[100] Associação Brasileira das Indústrias Exportadoras de Carnes (ABIEC), Brazilian Beef, & ApexBrasil. (2017). *2017: Brazilian livestock profile*. Annual Report. https://bit.ly/2I2T2Fu; de Carvalho, T., & De Zen, S. (2017). A cadeia de Pecuária de Corte no Brasil: Evolução e tendências. *Revista iPecege,* 3(1), 85-99.

[101] Strassburg, B.B., Latawiec, A.E., Barioni, L.G., et al. (2014). When enough should be enough: Improving the use of current agricultural lands could meet production demands and spare natural habitats in Brazil. *Global Environmental Change,* 28, 84–97.

[102] Strassburg, B.B., Latawiec, A.E., Barioni, L.G., et al. (2014). When enough should be enough: Improving the use of current agricultural lands could meet production demands and spare natural habitats in Brazil. *Global Environmental Change,* 28, 84-97.

pastures, and in 2011 cattle ranching was responsible for around three quarters of Brazil's deforestation.[103] In the Amazon region, pastures accounted for nearly 80 percent of deforested land from 1996 to 2006.[104]

Calves are bred on many formal and informal dispersed farms operating autonomously and creating challenges in identifying and tracking animals through the stages of the supply chain that is closest to forests.

Since the 1990s, the animal slaughtering and meat processing market in Brazil has been undergoing gradual consolidation following increasing internationalization and the need for efficiency gains.[105] Between 2009 and 2011, the three largest slaughterhouses (JBS, Marfrig Group, and Minerva Foods) dominated 30–35 percent of animal slaughtering in the country.[106] However, slaughterhouse concentration varies from state to state.[107] Public finance of about US$ 5 billion by the Brazilian National Development Bank (BDNES) from 2005 to 2015 contributed to the concentration of the market and globalization of the companies.[108]

A. 1. 2. Soy supply chain

Brazil is one of the world's largest producers of soy.[109] This sector provided employment for over 3.7 million people in 2014 and in 2017 it generated around 2 percent of national GDP.[110]. Soy production has grown rapidly at about 13 percent per year over the past 20 years.[111] Only about 40 percent of soy produced is consumed domestically (either by humans or animals) with the rest exported.[112] China is by far Brazil's biggest customer, buying 74 percent of the soybeans produced in 2016.[113] Around 33 million hectares of land were used to produce roughly 96 million tons of soy in the same year.[114]

The soy supply chain in Brazil is largely aggregated. However, there are clear variations in the structure of supply chains in different regions. The basic soy supply chain includes production, storage, processing, and trade. Production differs based on the characteristics of the farm. Farm sizes range from 70 hectares to tens of thousands of hectares. Farm owners may be part of a grower

[103] Walker, N.F., Patel, S.A., & Kalif, K.A. et al. (2013). From Amazon pasture to the high street: Deforestation and the Brazilian cattle product supply chain. *Tropical Conservation Science*, 6(3), 446–467.

[104] Greenpeace. (2009). *Amazon cattle footprint: Mato Grosso: State of destruction*. https://bit.ly/2rqG5Op.

[105] Carvalho, T. (2016). *Estratégias de crescimento e restruturação da indústria de carne bovina no Brasil: O papel de políticas públicas discricionárias.* Doctoral Dissertation, Universidade de São Paulo.

[106] do Amaral Rocha, A. (2011). *Frigoríficos 'Abertos' Detêm 35% Dos Abates*. Sindicarne. https://bit.ly/2I2qFxP; Beefpoint. (2011). *Concentração no mercado de frigoríficos é contestada por representantes do setor de carne*. https://bit.ly/2KHCSCR ; Carvalho, T. (2016). *Estratégias de crescimento e restruturação da indústria de carne bovina no Brasil: O papel de políticas públicas discricionárias.* Doctoral Dissertation, Universidade de São Paulo.

[107] Da Silva, F.L.M., & Gameiro, A.H. (2012). *Análise da concentração na indústria frigorífica brasileira.* VI Simpósio de Pós-Graduação e Pesquisa em Nutrição e Produção Animal, conducted by Departamento de Nutrição e Produção Animal & Zootecnia da Universidade de São Paulo. https://bit.ly/2FRaTgv.

[108] The currency quotation of the European Central Bank was used to convert BRL into US$, 2018; Folha Politica. (2017). *BNDES articulou monopolização do mercado da carne, com política de 'Campeãs Nacionais'*. https://bit.ly/2KHd9dX.

[109] Filho, A.C., & Costa, K. (2016). The expansion of soybean production in the Cerrado: Paths to sustainable territorial occupation, land use, and production. *Agroicone: INPUT*. https://bit.ly/2t7XDgZ.

[110] Cepea. *PIB de Cadeias Agropecuarias*. http://bit.ly/2KSD69t.

[111] Embrapa. (2017). *Análise da área, produção e produtividade da soja no Brasil em duas décadas (1997-2016)*.

[112] Abiove. *Soybean complex statistics: Projection for 2018*. https://bit.ly/2jFvtbf.

[113] Cattelan, A. J., & Dall'Agnol, A. (2018) . *The rapid soybean growth in Brazil. Oilseeds & fats; Crops and Lipids (OCL)*.

[114] Montoya, M., Bertussi, L.A.S., & Lopez, L.A. (2017). *A cadeia da soja no Brasil: Uma abordagem insumo-produto do PIB, emprego, consumo de energia e emissões de CO_2 no período de 2000 a 2014.* The University of São Paulo. Regional and Urban Economics Lab.

association or union, which can increase their market access and bargaining power.[115] Crops are usually stored on the farm, while processing is carried out by a few large corporations, such as Cargill, Bunge, and ADM. After processing, soybeans are either stored in silos or processed/ground to be used for livestock feed, biodiesel, cooking oil, or food ingredients.[116]

Market activity is also dominated by a few large corporations, which move the commodity toward distribution and finally consumption. Other actors may provide inputs across the supply chain, supplying seeds or chemicals to the farmers, lending finance from federal/private banks or credit unions, or cooperating with the farmers in purchasing and marketing.[117]

A. 2. Impacts of the Supply Chain Movement

This section describes the type of supply chain commitments made in the Brazilian beef and soy sectors and their environmental, economic, and policy impacts, as well as stakeholder perceptions and participation and capacity needs.

A. 2. 1. Supply chain commitments

Beef sector. A recent assessment of corporate commitments in Brazil's beef sector found that of 22 companies,18 have made some type of supply chain commitment.[118] These commitments differ significantly in scope. While some companies state specific sectors or specific targets for their objective to end deforestation (e.g., including forest degradation); other companies state the general goal of zero deforestation. Some refer only to general sustainability goals without mentioning deforestation.

There is public and civil society sector support for removing deforestation from commodity supply chains. The efforts of federal public prosecutors in the state of Pará, along with a prominent Greenpeace campaign in 2009, motivated food companies and retailers to suspend meat purchases from slaughterhouses being investigated for illegal deforestation. In response, several slaughterhouses signed "current practice adjustment agreements" (known as TACs) with the federal prosecutor's office in which direct suppliers of cattle are required to meet certain socioenvironmental criteria and cease illegal deforestation.[119] The TACs also specify penalties for any hectares illegally deforested. In addition, the four largest meatpackers signed the G4 Zero-Deforestation Agreement with Greenpeace, which goes a step further to prohibit forest clearing – even within legal limits – and includes commitments to set up monitoring systems to manage deforestation risks.[120]

Soy sector. In the soy sector, a Soy Moratorium was brokered by NGOs and signed by major traders in 2006. In this voluntary agreement, signatories pledged to refrain from purchasing soy from farmers that had cleared forested land for soy cultivation after July 2006 (later adjusted to July 2008).[121] Many

[115] Brack, D., Wellesley L., & Glover, A. (2016). *Agricultural commodity supply chains: Trade, consumption and deforestation*. Chatham House for the Royal Institute of International Affairs.

[116] Garrett, R. D., & Rausch, L. L. (2016). Green for gold: Social and ecological tradeoffs influencing the sustainability of the Brazilian soy industry. *The Journal of Peasant Studies*, 43(2), 461–493.

[117] Garrett, R. D., & Rausch, L. L. (2016). Green for gold: Social and ecological tradeoffs influencing the sustainability of the Brazilian soy industry. *The Journal of Peasant Studies*, 43(2), 461–493.

[118] Climate Focus. (forthcoming 2018). *Drivers of change: How effective are corporate supply-chain commitments?* Prepared by Climate Focus in collaboration with Imaflora with support from the Gordon and Betty Moore Foundation.

[119] Barreto, P., & Gibbs, H. (2015). *Como melhorar a eficácia dos acordos contra o desmatamento associado à pecuária na Amazônia?* University of Wisconsin-Madison, Belém, Imazon.

[120] Gibbs, H. K., Munger, J., L´Roe, J., et al. (2016). Did ranchers and slaughterhouses respond to zero-deforestation agreements in the Brazilian Amazon? *Conservation Letters* 9 (1), 32–42.

[121] Piatto, M., & de Souza, I. (2016). *10 years of soy moratorium in the Amazon: History, impacts and expansion into Cerrado areas*. Piracicaba, SP: Imaflora; Boucher, D. (2014). How Brazil has dramatically reduced tropical deforestation. *Solutions Journal*, 5(2), 66–75; Gibbs, H. K., Rausch, L., Munger J., et al. (2015). Brazil's soy moratorium. *Science*, 347(6220), 377–378.

signatories also made commitments to eliminate deforestation from their supply chains. In total, 44 companies that source soy from Brazil have made commitments to tackle deforestation in their supply chains. Companies either emphasize the sourcing of certified soy (almost 40 percent of the companies) or compliance with the moratorium and the Brazilian Forest Code, which set limitations on forest clearance. For companies that choose to rely on certification to meet their commitments, the Roundtable on Responsible Soy is the certification organization most often referenced.[122]

Table A1 summarizes the impacts of the supply chain movement in Brazil's beef and soy sectors.

Table A1: Summary of Impacts of the Supply Chain Movement in Brazil

IMPACT AREA	POSITIVE AND NEGATIVE IMPACTS OF SUPPLY CHAIN MOVEMENT
Environmental	+ Contributed to the reduction in deforestation rates between 2005 and 2012 ± Reduced soy-related deforestation in the Amazon due to the voluntary 2006 Soy Moratorium, but increased soy expansion to previously intact forest areas in the Cerrado ± Decreased deforestation in the state of Pará due to cattle agreements, but had little net impact due to laundering and leakage - Limited success in using standards/certifications to eliminate deforestation from supply chains. In the beef sector, few standards exist and these have been slow to develop. In the soy sector, certification is limited by high implementation costs and difficulty in applying certification at scale.
Economic	+ Some support for smallholders is evident (e.g. Novo Campo Program, Embrapa's Good Agricultural Practices, Amazon Eyes of Water, Low-Carbon Agriculture Plan of Brazil) - There is little evidence of market premiums being paid for sustainably produced products - Smaller producers depend on extension services and economic incentives to engage with the supply chain movement. - Financing has been slow to reach actors at the forest frontier (e.g., Amazon Fund). Only isolated examples of successful business models were found
Political	+ Increased number of forums for dialogue about forests + Increased visibility and political debate around commodity-driven deforestation + Improved cooperation between public and private sector efforts to tackle deforestation
Policy	+ Policies and legal instruments such as the Brazilian Forest Code and Rural Environmental Registry (CAR) have evolved in parallel to the supply chain movement and company commitments help push for adhesion of farmers to the CAR - But companies and traders find it difficult to implement their commitments without supportive policies and institutions
Stakeholders perception and engagement	+ Increased public awareness and corporate action around deforestation within the beef and soy supply chains + Civil society was instrumental in motivating and holding companies accountable to their deforestation commitments ± Discussions on zero deforestation are being brought to the fore, but there remains substantial divergence among stakeholders

[122] Round Table on Responsible Soy (RTRS). *Standard for Responsible Soy Production* Version 3.1. https://bit.ly/2JWrNwQ.

Capacity needs	+ The number of tools leading to improved transparency and access to information in the beef and soy supply chains have clearly increased + Experts agreed that the supply chain movement has worked as a lever for further innovation in these supply chains - But scalability of efforts remains a challenge

A. 2. 2. Environmental impacts

Supply chain interventions have positively contributed to the significant reduction in deforestation witnessed in Brazil between 2005 and 2012.[123] Brazil's success in reducing deforestation rates in the Amazon during this period is generally attributed to a confluence of many factors, including the expansion of conservation areas, the introduction of the Real Time System for Detection of Deforestation (DETER), stronger command and control measures, a decrease in commodity prices, as well as a range of public and private efforts to delink commodity production from deforestation.[124]

Virtually all interviewees referred to the Soy Moratorium in the Amazon as a supply chain effort that clearly led to a direct and rapid decline in deforestation rates in the region. Studies show that among the 76 Amazon municipalities where most of the soy is produced (98 percent of all soy cultivation in the Amazon), deforestation dropped from 8,000 square kilometers a year in 2005 to around 800 square kilometers a year in 2009.[125] But while the Amazon has seen reduced deforestation coupled with increased commodity production and productivity, in the Cerrado (an area southeast of the Amazon) deforestation is continuing at unsustainable rates.[126] From 2003 to 2013, cropland agriculture more than doubled in the Cerrado. [127] In the Matopiba area of the Cerrado, where 30 percent of the expansion took place, most of the new production area was carved out of previously intact vegetation.[128]

The private sector has tried to reduce or eliminate deforestation in soy supply chains through standards and certifications processes (Table A2). However, they have provided limited environmental or conservation benefits because their reach is constrained by high implementation costs and difficulty in applying certification at scale.[129] Furthermore, most farmers simply lack the technical and financial resources needed to meet certification requirements. There are few economic incentives or markets available for certified products, and buyers show little or no willingness to pay more for certified products.

[123] Azevedo, A.A., Rajão, R., Costa, M. A., et al. (2017). Limits of Brazil`s Forest Code as a means to end illegal deforestation. *Proceedings of the National Academy of Sciences*, 114(29), 7653–7658.

[124] Moutinho, P., Guerra, R., & Azevedo-Ramos, C. (2016). Achieving zero deforestation in the Brazilian Amazon: What is missing? *Elementa: Science of the Anthropocene,* 4. Deforestation rates have, however, risen again with a 29 percent increase in the rate of clearing in 2016. This is linked to amendments made to the Brazilian Forest Code in 2012, which erased certain restrictions on deforestation, as well as the rising political influence of ruralist landowners. See for instance, Fearnside, P. (2017). Business as usual: A resurgence of deforestation in the Brazilian Amazon.*Yale Environment 360.* http://bit.ly/2rud7xl .

[125] Agrosatélite and GTS-Soy Task Force. (2016). *Soy moratorium*. https://bit.ly/2wlDsmH .

[126] Instituto de Pesquisa Ambiental da Amazonia (IPAM). (2017). Cerrado é desmatado cinco vezes mais rápido que a Amazônia. *IPAM.* https://bit.ly/2h3Vn9P.

[127] Spera, S. A., Galford, G.L., Coe, M.T., Macedo, M.N., et al. (2016). Land-use change affects water recycling in Brazil's last agricultural frontier. *Global Change Biology,* 22(10), 3405–3413.

[128] Filho, A.C., & Costa, K. (2016). *The expansion of soybean production in the Cerrado: Paths to sustainable territorial occupation, land use, and production*. Agroicone and INPUT. https://bit.ly/2t7XDgZ.

[129] de Freitas, F. (2017). It is time to recognize the limits of certification in agriculture (commentary). *Mongabay*. https://bit.ly/2KHpcYJ.

Table A2: Soy-Related Initiatives and/or Piloting Standards

INITIATIVE OR STANDARD	NATURE AND SCOPE	YEAR ESTABLISHED	IMPACT
Soy Moratorium	Voluntary initiative initiated by NGOs and which coopted the participation of the largest soy traders in Brazil. Participants agree not to purchase soy from newly deforested areas of the Brazilian Amazon. Restricted to the Amazon region.	2006	Direct reduction in deforestation in the Amazon. In the 76 municipalities where most soy is produced, deforestation dropped from 8,000 km^2/year in 2005 to 800 km^2/year in 2009.[130]
Round Table for Responsible Soy (RTRS)	Established as a response to accusations from Greenpeace that the soy industry was accelerating deforestation in the Amazon. Includes geographies beyond the Amazon and aims to provide an incentive to producers that would offset the costs of compliance and certification by creating a demand for certified products.	2006	1.6% of the total soybean area in Brazil (431,238 hectares) was RTRS certified in 2015.[131] In 2016, the certified soybean area grew to 1.2 million hectares, including 951,143 in the Cerrado and 294,876 hectares in the Amazon.[132]
Soy Plus Programme	Voluntary program that helps farmers improve their farms but does not require major investments or organizational changes, for which a farmer may not have the capacity.[133]	2011	By 2016, reached over 5,000 farmers through 29 workshops and provided technical assistance to 600 of them. In 2017, a memorandum of understanding was signed by partners from Aprosoja-MT, ABIOVE, FEDIOL, FEFAC, and IDH to develop a joint working plan for Responsible Soy.[134]
Soja Mais Sustentável	Cooperation between Cargill and The Nature Conservancy for the Brazilian state of Pará to support the implementation of the Brazilian Forest Code and therewith incentivize famers to expand their soy cultivation on previously deforested lands by purchasing only sustainable soy. Santarém stabilized its deforestation in the six years following the cooperation.	2004[135]	From 2004 to 2014, both illegal and legal deforestation reportedly reduced from 5.2 thousand ha to only 19.7 ha.[136]

[130] Agrosatélite & GTS-Soy Task Force. (2016). *Soy moratorium*. https://bit.ly/2wlDsmH .

[131] Lemoud, L., Potts, J., Sampson, G., et al. (2017). *The state of sustainable markets - Statistics and emerging trends*. International Trade Centre. http://bit.ly/2xcg2kk.

[132] Round Table on Responsible Soy (2017). *Associação Internacional de Soja Responsável anuncia seu "forte apoio" a ações urgentes no Cerrado Brasileiro*. https://bit.ly/2FUqnAA.

[133] Cameron, B. (2017). *A step toward supply chain sustainability: The Round Table on Responsible Soy in Brazil, 2005–2017.* Inovations for Successful Societies, a program of the Woodrow Wilson School of Public and International Affairs Princeton University. https://bit.ly/2K2aV7L.

[134] Aprosoja, Abiove, Fediol, Fefac, & Sustainable Trade Initiative (IDH). (2017, April 11). *1st steering group meeting mou partners on responsible soy.* http://www.fefac.eu/files/73806.pdf .

[135] Cargill.(n.d.) *Combatendo o desmatamento e a pobreza com soja sustentável*. https://bit.ly/2JYTeG5.

[136] Zafalon, M. (2015). Após baque em 2014, consumo de alumínio para de cair neste ano. *Folha Press*. https://bit.ly/2FPRYCX.

INITIATIVE OR STANDARD	NATURE AND SCOPE	YEAR ESTABLISHED	IMPACT
Proterra	Independent nonprofit foundation active in the certification of soybeans. The certification process draws on high-quality, improved sustainability, and non-GMO produced soybeans. In 2015, ProTerra certified 3.9 million metric tons of soybeans, which made up about 1.3% of global soybean production.[137]	2006: the ProTerra Standard for Social Responsibility and Environmental Sustainability was issued. 2012: the ProTerra Foundation was founded with a certification program.[138]	6.4% of the total soybean area in Brazil (around 1.8 million hectares) was Proterra certified in 2015.
3S Certification	Voluntary environmental certification developed by Cargill to contribute to zero deforestation and provide rural producers with guidance for sustainable production. The program is active in the states of Paraná, Mato Grosso, and Pará.[139]	2010	In 2016, 3S received technical assistance from the BioSystemic Institute. Currently 170 soybean producers are certified.

In the beef sector, the TAC and G4 cattle agreements had an immediate effect in the state of Pará, with rates of deforestation reportedly decreasing 50–75 percent on properties supplying cattle to JBS slaughterhouses. These early positive results may, however, have been compromised by a narrow application of the agreement, which allows for leakage and lack of control over indirect suppliers, including laundering practices (in which meat farmed by deforesting is smuggled into the market).[140] Interviewees noted that the cattle agreements must be brought to scale to eliminate cattle-sector deforestation in the Amazon.[141] A recent study presents evidence of hundreds of thousands of cattle in southwest Pará that continue to graze in areas that are in breach of the cattle agreements, highlighting the importance of continued improvement of systems for monitoring supply chains.[142]

The few initiatives that exist have been slow to develop (Table A3).

[137] Lernoud, J., Potts, J., & Sampson, G., et al. (2017). *The state of sustainable markets – Statistics and emerging trends 2017.* International Trade Center (ITC), Geneva. https://bit.ly/2umBkoV.

[138] Cert ID. *ProTerra certification*. https://bit.ly/2k6Vn7Q.

[139] Cargill. *Sustainability report 2016*. https://bit.ly/2K2jRKv.

[140] Gibbs, H. K., Munger, J., L´Roe, J., et al. (2016). Did ranchers and slaughterhouses respond to zero-deforestation agreements in the Brazilian Amazon? *Conservation Letters* 9 (1): 32–42; Barreto, P., Ritaumaria, P., Brandao A., et al. (2017). *Will meatpacking plants help halt deforestation in the Amazon?* Belém, PA: Imazon; Zero deforestation cattle. http://www.zerodeforestationcattle.org/.

[141] However, out of 25 companies recently audited under the TAC Agreements, JBS had the highest absolute number of cattle irregularly purchased in 2016. Only about half of JBS's cattle was sourced from a single farm, with the remaining cattle passing through a number of different farms. See Mengardo, B. (2018, March 9). TAC da carne: MPF divulga auditorias, mas evita punições. *O Eco.* http://bit.ly/2IKPEiV; Gibbs, H. K., Munger, J., L´Roe, J., et al. (2016). Did ranchers and slaughterhouses respond to zero-deforestation agreements in the Brazilian Amazon? *Conservation Letters* 9 (1), 32–42; and Barreto, P., Ritaumaria, P., Brandao, A., et al. (2017). *Will meatpacking plants help halt deforestation in the Amazon?* Belém, PA: Imazon.

[142] Klingler, M. Richards, P.D., & Ossner, R. (2018). Cattle vaccination records question the impact of recent zero-deforestation agreements in the Amazon. *Regional Environmental Change,* 18(1), 33–46.

Table A3: Cattle-Related Initiatives and/or Piloting Standards

INITIATIVE OR STANDARD	NATURE AND SCOPE	YEAR ESTABLISHED	IMPACT
Cattle Agreements	Includes (1) the G4 Zero-Deforestation Agreement between the then four major slaughterhouses and Greenpeace to cease purchase of cattle from farms with deforestation after 2009; and (2) the current practice adjustment (TAC) Agreements focused on curbing illegal deforestation by ranchers and the purchase of cattle with irregularities by meatpackers. Two thirds of the federally inspected slaughterhouses are covered by TACs.[143]	2009	About half of the slaughterhouses operating in the Amazon (representing 70% of the processing capacity) are currently committed to cattle agreements.[144]
Brazilian Roundtable on Sustainable Livestock (GTPS)	Multistakeholder initiative to improve the beef value chain in regards to sustainability, social and environmental responsibility, and economic viability. By focusing on standards, principles, and common practices in the beef supply chain, the GTPS aims to increase sustainability, as well as to scale sustainability schemes like the Sustainable Agriculture Network (SAN).[145]	2007	Around 27 initiatives are currently recorded by the GTPS.
Rede de Fomento ILPF	Led by Embrapa, in partnership with cooperatives, companies, and banks. Currently implementing its 2017–22 workplan, with a focus on adding value to sustainable agricultural supply chains.[146]	2012	Around 6 farms in the Amazon and 11 in the Cerrado have joined the initiative, which seeks to cover 1 million ha by 2030.[147]
Rainforest Alliance	Together with USAID, the Rainforest Alliance launched a certification scheme for sustainable beef, which was the first third-party certification program for beef in Brazil. It focuses on high environmental and social standards.[148]	2010	Four farms in Brazil and one farm in Costa Rica have been certified.[149]

A. 2. 3. Economic impacts

There is little evidence of economic value being created by company pledges and actors engage for different reasons. While some farmers adopt sustainable practices out of concern for the impacts of climate change and the exhaustion of key natural resources, most fear being excluded from markets, according to interviewees. These observations indicate that supply chain interventions may have had some positive effect in engaging mid-to-larger producers in sustainable practices and in making them mindful of (illegal and legal) deforestation issues. Associations, traders, NGOs, academia, and other

[143] Gibbs, H. K., Munger, J., L' Roe, J., et al. (2016). Did ranchers and slaughterhouses respond to zero-deforestation agreements in the Brazilian Amazon? *Conservation Letters* 9 (1), 32–42; Barreto, P., Ritaumaria, P., Brandao, A., & Baima, S. (2017). *Will meatpacking plants help halt deforestation in the Amazon?* Belém, PA: Imazon; and National Wildlife Federation (NWF) & the Gibbs Land Use and Environment Lab (GLUE). (n.d.). *A path towards zero deforestation cattle*. http://www.zerodeforestationcattle.org/.

[144] Barreto, P., Ritaumaria, P., Brandao, A., & Baima, S. (2017). *Will meatpacking plants help halt deforestation in the Amazon?* Belém, PA: Imazon; National Wildlife Federation (NWF) & the Gibbs Land Use and Environment Lab (GLUE). (n.d.). *A path towards zero deforestation cattle*. http://www.zerodeforestationcattle.org/.

[145] Forest500. *Brazilian Roundtable on Sustainable Livestock*. https://bit.ly/2HWb6Fc.

[146] Integração Lavoura Pecuária Floresta (ILPF). O que é ILPF. https://bit.ly/2IQsjj6 .

[147] Integração Lavoura Pecuária Floresta (ILPF). O que é ILPF. https://bit.ly/2IQsjj6.

[148] Rainforest Alliance. (2014). *What has more climate potential: Sustainable ranching or a meatless diet?* https://bit.ly/2IiPl1v.

[149] Rainforest Alliance. *Dashboard.* https://www.rainforest-alliance.org/impact.

experts all agreed, however, that retailers are not yet creating the necessary incentives or transmitting the market signals to the Brazilian soy and beef supply chains.[150]

None of the interviewees mentioned meaningful engagement by retailers who source commodities in Brazil. Some experts noted positive signs surfacing. The produce, conserve, and include (PCI) jurisdictional strategy led by the state of Mato Grosso sets a comprehensive agenda for the government, civil society, companies, and investors to reduce deforestation in the state, while also putting incentive systems in place for producers.[151] Through PCI, retailers, such as Carrefour and Walmart, are beginning discussions with the government on more sustainable solutions, such as developing jurisdictional sustainability labels for beef.

Small-scale producers, such as those in settlements and family farmers, need substantial support to engage with the supply chain movement. Companies looking to meet their commitments target growers who are already not deforesting or using sustainable methods. This type of preferential treatment can have a negative effect on poorer farmers, especially smallholders on the forest frontier.[152] While producers that are efficient, capitalized, and have access to credit and technology are able to increase productivity and adjust their practices, smaller producers depend on agricultural extension services, training, and positive economic incentives. A number of discrete interventions assist smallholder farmers in reducing or eliminating deforestation while increasing productivity (Table A4).

Table A4: Initiatives Providing Economic Incentives to Smallholder Farmers

INITIATIVE	DESCRIPTION
Pecuária Sustentável da Amazônia (PECSA)	Provides rural farms with technical knowledge and financial support. PECSA's objective is to make cattle ranching in the Amazon sustainable by sharing information, optimizing production, and conserving the environment.[153]
Novo Campo Program	Coordinated by the Instituto Centro de Vida, it seeks to promote good practices and enhance economic and social conditions for ranchers in the Amazon in a context of zero deforestation. The program has six components to engage ranchers, train technical assistance professionals, finance investments, monitor supply chains, and integrate sustainable development policies.[154]
Partnership Agreement for Green and Inclusive Growth	In this agreement, signed by the state of Mato Grosso and the Sustainable Trade Initiative (IDH), the IDH stated its support for Mato Grosso's produce, conserve, and include (PCI) initiative. IDH pledged to attract international investment, link international commodity markets and help build public-private partnerships.[155]
Good Agricultural Practices Program	Embrapa is working to create champions and multipliers of the Good Agricultural Practices Program, including a pilot project in the Pará State assisting 16 ranchers, and implemented in partnership with The Nature Conservancy, Marfrig, and Walmart.[156]

[150] Although retailers are not yet acting [on their promises to pay price premiums for sustainably produced soy and beef], some have reportedly been providing further predictability through long-term offtake agreements.

[151] Earth Innovation Institute. (2015). *Mato Grosso: Produce, conserve, include*. http://bit.ly/2ruxfPV .

[152] Durschinger, L., Hajek, F., Nelson, N., et al. (2015). *Incentivizing a transition to zero-deforestation commodities: Recommendations for Colombia, Democratic Republic of Congo, Liberia, and Peru.* Washington, DC: USAID-supported Forest Carbon, Markets and Communities Program; Latawiec A.E., Strassburg, B.B., Silva, D., et al. (2017). Improving land management in Brazil: A perspective from producers. *Agriculture, Ecosystems and Environment*, 240, 276–286.

[153] Pecuária Sustentável de Amazonia (Pecsa). https://pecsa.com.br/en/.

[154] Instituto Centro de Vida (ICV). Programa Novo Campo. https://www.icv.org.br/programa-novo-campo-2/.

[155] The Sustainable Trade Initiative (IDH). (2016). *International market support for Mato Grosso`s Produce, Conserve and Include plan.* https://bit.ly/2JHGnYQ .

[156] Suleiman, K. (2016). *Fazendas do Pará são certificadas por Boas Práticas Agropecuárias da Embrapa*. Emprada. https://bit.ly/2Iol4i9.

Amazon Eyes of Water (*"Olhos d`Água da Amazônia"*)	Executed by the Alta Floresta municipality in Mato Grosso, this initiative supports smallholders during the registration process of the Rural Environmental Registry (CAR) and provides assistance for improving cattle and pasture management.[157]
Collaboration on Forest and Agriculture	Implemented by National Wildlife Federation, The Natura Conservancy, and World Wildlife Fund among others, this initiative helps organizations define standards and outline incentives to produce zero-deforestation beef and soy. To eradicate deforestation in the Amazon and Cerrado regions in Brazil, this initiative is in the process of developing several innovative mechanisms to promote leadership in the private sector, guarantee robust transparency, and align capital flows.[158]
&Green	The &Green fund, which started operations recently in Brazil, focuses on jurisdictional approaches. Mato Grosso is on track to be qualified to receive resources from the fund.[159]

Financing is slow to reach actors at the forest frontier. As of 2017, the Amazon Fund, set up to raise finance in support of nonreimbursable investments needed to prevent, monitor, and combat deforestation, had commitments of over US$ 1.7 billion (partly in results-based finance).[160] However, disbursing this finance continues to be slow and there are only isolated examples of successful business models (e.g., PECSA, Novo Campo Program).[161] Furthermore, interviewees felt that funding was being diverted from traditional conservation to private sector and supply chain efforts (e.g., Collaboration for Forests and Agriculture).

Similarly, some interviewees observed that REDD+—an effort to transfer finance for forest protection through results-based payments — appears to have been largely forgotten at a critical moment when additional resources and positive incentives are essential to prevent deforestation rates from climbing back up. According to a civil society representative, a refocus on more traditional REDD+ activities could help ensure economic value is attached to forests that are kept standing. Other reports indicate that most REDD+ funds in Brazil still flow to preparatory activities, rather than to direct payments for results, technical assistance, and provision of credit.[162]

With respect to access to credit, the Low-Carbon Agriculture Plan of Brazil (ABC Plan) offers rural producers the possibility of credit with low-interest rates if their agricultural practices comply with environmental and sustainability requirements. The producers should be transitioning to low-carbon agricultural practices, leading, for example, to higher pasture productivity, which places less pressure on forests. [163] Proposals for revising the ABC Plan by linking it to sustainable supply chains have been put forward, in which access to climate-smart finance could be expanded through partnerships with, for instance, the Rede the Fomento ILPF, which brings together cooperatives, companies, and banks to create value in sustainable supply chains.[164] Achieving sustainability could be a key motivator for farmers to seek access to the ABC Program, but this is hampered by the absence of more effective communication and outreach mechanisms to promote the ABC Plan among farmers.

[157] Alves-Pinto, H.N., Newton, P., & Pinto, L. (2013). *Certifying sustainability: Opportunities and challenges for the cattle supply chain in Brazil.* CCAFS Working Paper No. 57. Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

[158] World Wildlife Fund. *Collaboration for forests and agriculture (CFA).* http://bit.ly/2KP3K3Z.

[159] &Green. *The Fund*. http://www.andgreen.fund/.

[160] Climate Focus. (2017). *Progress on the New York Declaration on Forests: Finance for forests-goals 8 and 9.* Assessment Report. Prepared by Climate Focus in cooperation with the New York Declaration on Forest Assessment Partners.

[161] Climate Focus. (2017). *Progress on the New York Declaration on Forests: Finance for forests-goals 8 and 9.* Assessment Report. Prepared by Climate Focus in cooperation with the New York Declaration on Forest Assessment Partners.

[162] Bastida, A.C., Cenamo, M.C., & Silva-Chávez, G. (2017). *Mapping REDD+ and land use financial flows in Brazil – National and subnational analysis for the period 2009 through 2016.* IDESAM and Forest Trends.

[163] Climate Focus. (2017). *Progress on the New York Declaration on Forests: Finance for forests-goals 8 and 9.* Assessment Report. Prepared by Climate Focus in cooperation with the New York Declaration on Forest Assessment Partners.

[164] Integração Lavoura Pecuária Floresta (ILPF). O que é ILPF. https://bit.ly/2IQsjj6.

A. 2. 4. Policy impacts

Though it is often difficult to attribute developments in one area to another, company commitments and forest legal requirements in Brazil can (and often do) complement each other. However, it is not always obvious. Policies and legal instruments such as the Forest Code and the Rural Environmental Registry (CAR) have evolved in parallel to the supply chain movement. For instance, an initial version of the CAR system developed by the state of Pará was used in piloting the Responsible Soy project between The Nature Conservancy and Cargill in 2004.[165] In addition, the Pará state CAR also served as a basis for TAC-bound slaughterhouses to ensure that farmers supplying cattle were licensed and provided some transparency over their level of environmental compliance.[166]

Findings from interviews and literature suggest that company commitments have helped push for farmers' adhesion to the CAR.[167] While the system was in place independent of company commitments, the fact that company traceability systems can benefit from the CAR indicates a possible positive correlation. Registering with CAR, however, did not necessarily translate to a reduction in illegal deforestation. Researchers instead observed variations in the effectiveness of CAR over time and across property sizes.[168]

Conversely, some experts have raised concerns that a zero-deforestation approach could make it more difficult to engage smaller producers in the supply chain movement. The Brazilian Forest Code allows for a certain amount of licensed deforestation in different biomes, driving a heated debate in the country between those who favor eliminating only *illegal* deforestation and those who support zero deforestation (zero illegal deforestation and net-zero legal deforestation).[169] In this sense, a couple of interviewees noted that more ambitious company goals seeking to eliminate all deforestation could actually divert attention away from the Forest Code and thus become counterproductive.

In general, companies and traders find it difficult to implement their commitments without supportive policies and institutions, and the CAR is an example of government action toward greater monitoring and enforcement of deforestation policies.[170]

A. 2. 5. Stakeholder perception and participation

The supply chain movement has increased public awareness and corporate action around deforestation within the beef and soy supply chains. Companies have clearly incorporated these concepts internationally through their policies and standards, although full implementation is lagging in some cases.

Civil society plays an important role in motivating and holding companies accountable to their deforestation commitments, while assisting in their implementation. They are also essential to

[165] Interviews; PR Newswire. (2011) *Nature Conservancy grant helps protect key area of the Amazon*. https://prn.to/2HUYvC5.

[166] Barreto, P., & Gibbs, H. (2015). *Como melhorar a eficácia dos acordos contra o desmatamento associado à pecuária na Amazônia.*

[167] Gibbs, H. K., Munger, J., L´Roe, J., et al. (2016). Did ranchers and slaughterhouses respond to zero-deforestation agreements in the Brazilian Amazon? *Conservation Letters* 9 (1), 32–42.

[168] Azevedo, A.A. Rajao, R., Costa, M.A., et al. (2017). Limits of Brazil`s Forest Code as a means to end illegal deforestation. *Proceedings of the National Academy of Sciences*, 114(29), 7653–7658.

[169] Vitali, I. & Zerbini, F. (2017). Desmatamento zero ou desmatamento ilegal zero: Uma falsa dicotomia. *HuffPost Brasil*. https://bit.ly/2rpH42b. See also Rausch, L. L., & Gibbs, H. K. (2016). Property arrangements and soy governance in the Brazilian state of Mato Grosso: Implications for deforestation-free production. *Land*, *5*(2), 7.

[170] Climate Focus. (2016). *Progress on the New York Declaration on Forests: Eliminating deforestation from the production of agriculture commodities – Goal 2.* Assessment Report. Prepared by Climate Focus in cooperation with the New York Declaration on Forests Assessment Coalition with support from the Climate and Land Use Alliance and the Tropical Forest Alliance 2020.

monitoring and transparency efforts and can trigger changes in corporate purchasing policies.[171] Greenpeace's high-profile campaign linking deforestation to soy exports to Europe led to a demand from companies for deforestation-free soy. [172] Similarly, civil society in Brazil drove the issuance of the Cerrado Manifesto in September 2017, where 23 global companies purchasing beef and soy from the Cerrado committed to halting vegetation loss in the biome. [173] The number of signatories to the manifesto stands at 62 companies but has not yet obtained the support of the region's main traders and importers such as Bunge, Cargill, Amaggi and China.[174]

While steps to operationalize the manifesto are still being discussed, political efforts such as this are effective in bringing the Cerrado to the fore of discussions internationally and domestically. However, some experts have pointed out that a wide gap remains between the companies adhering to such declarations and/or making international pledges and the producers at the other end of the supply chain. NGO representatives noted that international declarations and company pledges are usefully applied by local campaigners and activists in framing the debate domestically and in pushing for further action from company branches and subsidiaries. Some interviewees were optimistic that the Cerrado will follow the path of forest protection that occurred in the Amazon.[175]

One civil society representative noted that the zero-deforestation movement has enhanced the position of indigenous peoples as stewards of the forest. Imaflora's Origins Brazil program is an example of an effort that strengthens the role of indigenous groups and raises awareness on reduced deforestation in their areas.[176]

There are different views on the extent to which a zero-deforestation approach is and can be embraced by key supply chain actors. While NGOs and some experts noted the discourse in Brazil is already moving from "reduced" to "zero" deforestation – with the question being how to get there – others thought this view is unlikely to be adopted for the Cerrado where many small- to mid-size producers still hold areas that can be legally deforested and upon which these producers depend in the absence of any meaningful positive incentives to encourage different behavior. One expert from academia observed that the Brazilian society is mostly aware of discussions associated with the Forest Code and fully supports ending illegal deforestation. However, the notion of *zero* deforestation is incipient and unknown to the majority of the population.

A. 2. 6. Capacity needs

An increasing number of tools to improve transparency and access to information are being employed in the beef and soy supply chains. Nearly all interviewees agreed that the supply chain movement has leveraged further innovation in these chains.[177] They underscored the fact that 5 to 10 years ago most slaughterhouses would accept any cattle delivered from any source. Changes in cultural behavior, adoption of geographic information systems (GIS) to identify suppliers, use of the National Institute for Space Research's (INPE) near real time deforestation data, and dedicated procurement procedures have led to much greater transparency in the operations of meatpackers covered by the cattle

[171] Walker, N.F., Patel, S.A., & Kalif, K.A. (2013). From Amazon pasture to the high street: Deforestation and the Brazilian cattle product supply chain. *Tropical Conservation Science*, 6(3), 446–467.

[172] Walker, N.F., Patel, S.A., & Kalif, K.A. (2013). From Amazon pasture to the high street: Deforestation and the Brazilian cattle product supply chain. *Tropical Conservation Science,* 6(3), 446–467.

[173] Cerrado Manifesto. (2017). https://bit.ly/2wqGmqe.

[174] Gross, A.S. (2018). Cerrado manifesto could curb deforestation, but needs support: Experts. *Mongabay*. https://bit.ly/2jBOlYE.

[175] Climate Focus. (2017). *The commodities and forests agenda 2020: Ten priorities to remove tropical deforestation from commodity supply chains*. https://bit.ly/2zEoUz7 .

[176] Origens Brasil. http://origensbrasil.org.br/origens-brasil/ .

[177] Although a number of interviewees observed that technology is also advancing faster in response to the current digital agriculture wave, including new intelligence on crop/farm management and geotechnology skills.

agreements. Results from an independent TAC audit have shown that, while some of the major meatpacking companies had nearly zero irregular cattle purchases in 2016, others had low compliance rates (with up to 72 percent of their purchases coming from noncompliant farms).[178]

Examples of useful practices, reporting techniques, and tracking tools are shown in Table A5.

Table A5: Transparency and Tracking Initiatives in the Beef and Soy Supply Chains

INITIATIVE	DESCRIPTION
The Mato Grosso Produce, Conserve, and Include (PCI) strategy	The PCI's monitoring system for measuring Mato Grosso's progress in achieving its 2030 goals. The system is developing baseline parameters, indicators and datasets for monitoring progress of the various PCI goals at jurisdictional level.[179]
Territorial intelligence center (*Núcleo de Inteligência Territorial*)	The Territorial Intelligence Center is a national satellite imagery monitoring system.[180] It surveys farms and evaluates agribusiness policies,[181] including for example the allocation of intensification (where the cattle ranching density of an area increases).[182]
Coalition for Forests and Agriculture	This 5-year project launched by the National Wildlife Federation, the Nature Conservancy, the World Wildlife Fund and the Gordon and Betty Moore Foundation is currently seeking to develop a clear and standardized approach for understanding, evaluating and monitoring company pledges, also helping to define zero deforestation and how it can be achieved.
Marfrig and Greenpeace Tracking Tools	These tools identify indirect suppliers and trace the origin of cattle via cross-checking information with government data on unapproved suppliers.[183]
Walmart Cattle-Purchase Monitoring System	In partnership with an agricultural intelligence company, Walmart has expanded and refined its internal cattle-purchase monitoring system for the entire Brazilian territory, integrating under a single satellite database all available information on deforestation and the location of its suppliers.
Mapbiomas	This initiative is led by the Greenhouse Gas Emissions Estimation System (SEEG) from the Climate Observatory, in collaboration with a network of NGOs, universities and technology companies. It uses data from biomes, land use, remote sensing, and GIS to generate annual land use and land cover maps of Brazil. The project is now in its third implementation phase, which will be completed by the end of 2018 through the publication of a collection of historical data covering the period 1985–2017.
Trase initiative	Jointly implemented by Global Canopy and the Stockholm Environment Institute, Trase aims to increase supply chain transparency. It maps how commodities that are major drivers of deforestation flow from producing to consuming countries, identifying key companies along the supply chain. For Brazil, Trase is providing relevant insights into agricultural expansion in the Cerrado and soy trade in the region.

[178] Mengardo, B. (2018, March 9). TAC da carne: MPF divulga auditorias, mas evita punições. *O Eco*. http://bit.ly/2IKPEiV .

[179] See, for instance, Governo do Mato Grosso and Instituto Centro de Vida (ICV). (2017). *Estratégia produzir, conservar e incluir em Mato Grosso – Base para o monitoramento das metas.*

[180] Alves-Pinto, H.N. Newton, P., & Pinto, L.F.G. (2015). Reducing deforestation and enhancing sustainability in commodity supply chains: Interactions between governance interventions and cattle certification in Brazil. *Tropical Conservation Science,* 8(4), 1053–1079.

[181] Haupt, F. (2014). *Sector profile: Brazil*. https://bit.ly/2jCbryd; background material for Dickie, A., Streck, C., Roe, S., et al. (2014). *Strategies for mitigating climate change in agriculture.* Abridged report, Climate Focus and California Environmental Associates.

[182] Alves-Pinto, H.N. Newton, P., & Pinto, L.F.G. (2015). Reducing deforestation and enhancing sustainability in commodity supply chains: Interactions between governance interventions and cattle certification in Brazil. *Tropical Conservation Science,*8 (4), 1053–1079.

[183] McCarthy, B., Rothrock, P., Leonard, J., et al. (2016). Supply change: Tracking corporate commitments to deforestation-free supply chains, 2016. *Forest Trends' Ecosystem Marketplace*; See Alves-Pinto, H.N. Newton, P., & Pinto, L.F.G. (2015). Reducing deforestation and enhancing sustainability in commodity supply chains: Interactions between governance interventions and cattle certification in Brazil. *Tropical Conservation Science,*8 (4), 1053-1079 .

Agroideal	Through a coalition of companies, NGOs, research institutes, and banks, the Nature Conservancy and the Collaboration for Forests and Agriculture are developing this free online territorial intelligence decision-making support system to assess the social and environmental risks associated with expansion of soy production and livestock.

Conversely, interviewees emphasized that the adoption and consolidation of new and more sustainable practices and tools remains slow among smaller producers and lacks scalability. While monitoring technologies for the Amazon have improved since 2009 (when the G4 Cattle Agreements were signed), deficiencies in public data and geomonitoring systems can still lead to nonintentional breaches of the TAC Agreements.[184] Indirect cattle suppliers (often smallholder farmers) still lack extension services and technical assistance to increase productivity. Lack of scalability is another problem commonly referred by NGOs, traders, and other experts.

Interviewees and the literature pointed to Sisbov (the system for bovine and buffalo origin identification and certification) and the Animal Transit Guide (GTA) (used for health and sanitary control) as possible tools to be further developed and linked to an environmental sustainability function.[185] Sisbov is designed to improve the traceability of cattle by tracking the animals from farm to the slaughterhouse to guarantee the quality requirements of export markets. However, given that 80 percent of beef in Brazil is consumed domestically, most farmers are hesitant to adopt it.

NGOs have been pressuring the government to link data from the CAR and the GTA. This would allow meatpackers to more easily trace the movement of cattle between farms before animals reach slaughterhouses. Interviewees, however, observed that there is still strong resistance from the Ministry of Agriculture, due to fear that farmers could be tempted to tamper with GTAs and compromise the quality and credibility of the animal transit system.

A. 2. 7. Conclusions and outlook

Interviews indicate that the supply chain movement is having an impact on the forest frontier, but there are challenges and risks. While it is difficult to attribute reduced deforestation to supply chain interventions, clear positive effects can be observed across all impact categories surveyed: environmental, economic, political, policy, stakeholder perception, and capacity. Despite this progress, economic benefits and positive incentives to sustainable production remain the exception, existing initiatives still lack scale, and a national consensus on how to deal with deforestation in the Cerrado biome is yet to be achieved.

Supply chain interventions in Brazil have contributed to reducing deforestation rates in the Amazon. The Soy Moratorium, in particular, was frequently underscored for clearly contributing to the substantial decline in deforestation in the Amazon between 2004 and 2014.[186] It is also clear that awareness by companies and producers of the need to discuss possible pathways to zero deforestation is now consolidated. The supply chain movement has provided an opportunity for high-profile international commitments, creating domestic momentum and maintaining deforestation at the top of the agenda. This is of particular importance for curbing vegetation loss in the Cerrado biome.

While there is debate around “reduced” versus “zero” deforestation, actors across sectors agreed that deforestation is viewed as a negative. Some experts felt that the discourse has already moved from

[184] Mengardo, B. (2018, March 9). TAC da carne: MPF divulga auditorias, mas evita punições. *O Eco*. http://bit.ly/2IKPEiV .

[185] Alves-Pinto, H.N., Newton, P., Pinto, L.F.G., et al (2015). Reducing deforestation and enhancing sustainability in commodity supply chains: interactions between governance interventions and cattle certification in Brazil. *Tropical Conservation Science*, 8 (4), 1053–1079.

[186] See, for instance, Gibbs, H. K., Rausch, L., Munger, J., et al. (2015). Brazil’s soy moratorium: Supply-chain governance is needed to avoid deforestation. *Science*, 347(6220), 377–378.; Gibbs, H. K., Munger, J., L´Roe, J., et al. (2016). Did ranchers and slaughterhouses respond to zero-deforestation agreements in the Brazilian Amazon? *Conservation Letters* 9 (1), 32–42.

reduced to zero deforestation; others said that an excessive focus on zero deforestation may eventually alienate key stakeholders from the discussions and pointed to the need for a new narrative. Overall, there is a growing acceptance that economic growth can be decoupled from the clearing of land. A number of initiatives linked to supply chain efforts are devoted to enhancing farmers' capacity through training and increasing productivity. In addition, the supply chain movement was often referenced by interviewees as a lever for innovation and further transparency in the Brazilian beef and soy value chains.

In terms of positive incentives, however, concrete actions remain limited. With a few notable exceptions, there is little evidence of premiums being paid in exchange for sustainably certified commodities. Companies have so far engaged with the supply chain movement mostly as a risk-mitigation strategy and have yet to take the lead in providing or transmitting the necessary market signals to catalyze action. This led a number of interviewees to argue that concrete positive incentives, such as REDD+ and payment for ecosystem services, are still needed and must be implemented in parallel (both at large and small scales).

B. Palm Oil in Indonesia and Malaysia

B. 1. Sector Background

Oil palm is grown on thousands of independently owned plantations, as well as on millions of smallholder farms spread across Indonesia and Malaysia. Most of these smallholders operate independently, but some are contractually attached to larger plantations. Within 24 hours of harvesting, oil palm fruit must be crushed into crude palm oil,[187] palm kernel oil, and residue. All larger plantations own their own crushing mills, but smaller plantations and independent farmers usually sell their fruit to mills, often through middlemen.

After milling, the oil can be stored, exported, or sent to a refinery, where it is purified and separated by quality. Refining is a capital-intense process that can take place in the country of export or the country of origin.

Indonesia and Malaysia together supply more than 80 percent of the world's palm oil.[188] In 2017, Indonesia produced 38.5 million metric tons of palm oil and Malaysia produced 20.5 million metric tons;[189] Indonesia's refining capacity is 45 million metric tons per year and Malaysia's is 27 million metric tons. Most of the refining capacity (74 percent) in both countries is controlled by companies with "no deforestation, no peat, no exploitation" (NDPE) commitments[190] (see Environmental impacts section below).

B. 1. 1. Historical context

Palm oil was a minor crop in both countries until the 1960s, when Malaysia's Federal Land Development Authority began promoting expansion to reduce poverty and diversify away from tin and rubber. By 1966, Malaysia had overtaken Nigeria as the world's leading palm oil exporter.[191]

Indonesia's growth came later and in a more frenzied manner after the 1998 fall of President Muhammad Suharto, who had emphasized the timber, pulp, and paper sectors but often granted palm oil concessions on lands degraded by these activities to promote transmigration and rural development. In 1977, the Nucleus Estate Smallholder program was launched, which required companies receiving new concessions to turn a portion of their development over to smallholders.[192] The company-run portion of the estate is termed the "nucleus" and the smallholder-run portions are called "plasma gardens"; referencing the plasma membrane that surrounds the nucleus of a cell. The regulations governing plasma farmers were last updated in 2007,[193] when any company developing 250 hectares or more was supposed to turn 20 percent of the developed land over to plasma farmers, who are obligated to sell their output to the nucleus plantation,[194]

[187] To avoid confusion, the generic term "palm oil" is used throughout this report.

[188] Index Mundi. (2018). *Palm oil production by country*. https://bit.ly/2rrrNwY.

[189] Index Mundi. (2018). *Palm oil production by country*. https://bit.ly/2rrrNwY.

[190] Steinweg, T, Drennen, Z., & Rijk, G. (2017). *Unsustainable palm oil faces increasing market access risks.* Chain Reaction Research. https://bit.ly/2JUpCcQ .

[191] Sime Darby. (2009). *Palm oil industry in Malaysia: Skills & knowledge for sustained development in Africa.* Presentation, June 24. https://bit.ly/2wpdsHo.

[192] Shah, V. (2015, November 23). Palm oil´s big issue: Smallholders. *Eco-Business.* https://bit.ly/1Tb2AxA

[193] Article 15 of Permentan No.26/2007.

[194] Hawkins, D., Chen, Y., & Wigglesworth, T. (2016). *Indonesian Palm Oil Production Sector. A Wave of Consolidation to come.* London: Hardman agribusiness. https://bit.ly/2F8rJaC.

Three elements of the plasma program are relevant to today's market structure. First, plasma farmers were often selected by local regents, or "bupatis," who used the plasma program to develop political patronage systems. Second, companies must convert the land to a plantation before turning it over to the smallholders, which is one reason plasma farmers enjoy higher productivity than independent farmers. Third, plantation owners have not always met their obligations.[195]

Indonesia's entire supply chain was tightly controlled until the 1990s, when two reforms set the stage for dramatic expansion at the end of Suharto's 30-year reign. First, in 1994, farmers were given the right to establish small farms independent of plantations.[196] Then, in 1995, independent mills were permitted for the first time.[197] In 1997–98, massive wildfires – probably set by palm-oil companies – opened up 10 million hectares of forest,[198] just as Suharto's tight reign gave way to a period of decentralization. During this transition, authority passed to local bupatis, who granted concessions to spur development, but also to enrich themselves through shell companies divvied up among relatives and associates.[199]

In the ensuing boom, legacy plantations and trading companies continued to dominate the export market, while smaller companies proliferated across the countryside. Today, these smaller companies comprise the bulk of membership in the Indonesian Palm Oil Association (GAPKI), which has roughly 700 members.[200] Smaller companies also dominate the Malaysian Palm Oil Association (MPOA), which has roughly 130 members.[201] Supply chain efforts are credited with "cleaning up" the larger companies, but not the smaller ones. Smallholders (not to be confused with "small companies") account for roughly 28 percent of the palm oil acreage (but not the production) across Indonesia[202] and 11 percent in Malaysia.[203]

Smallholder productivity per hectare is roughly half that of the large plantations,[204] and interviewees agreed that both countries can increase their output of palm oil without further deforestation by developing degraded lands and helping independent smallholders improve their yields. Some have argued, however, that the productivity difference may be overstated due to the younger age of trees planted by independent farmers.

At the turn of the century, Malaysia was still outproducing Indonesia with 11.9 million metric tons of output in 2000, compared with just 8.3 million metric tons in Indonesia.[205] Since then, Malaysia's output has increased steadily, while Indonesia's has *more than quadrupled* to 38.5 million metric tons.

[195] Afrizal. (2009, October 18). The trouble with oil palm. *Inside Indonesia*. https://bit.ly/2IRXxpV .

[196] Ministerial Decree No. 357/KPTS/HK.350/5/2002 as amended by Ministerial Decree No. 26/Permentan/OT.140/2/2007.

[197] Government Regulation No. 13/199.

[198] Barber C. V., & Schweithelm, J. (2000). *Trial by fire: Forest fires and forestry policy in Indonesia's era of crisis and reform.* Washington DC: World Resources Institute in collaboration with World Wildlife Fund Indonesia and Telapak Indonesia Foundation. http://pdf.wri.org/trialbyfire.pdf.

[199] Gecko Project. (2017). *The making of a palm oil fiefdom*. https://bit.ly/2yZ2tAB.

[200] Indonesian Palm Oil Association (GAPKI). *GAPKI members*. https://gapki.id/gapki-members.

[201] Malaysian Palm Oil Association (MPOA), personal communication with spokesperson, April 2018.

[202] Komisi Pemberantasan Korupsi. (2016). *Kajian sistem pengelolaan komoditas kelapa sawit* [Study of the palm oil commodity management system]. KPK, p. 20.

[203] Sime Darby. (2009). *Palm Oil Industry in Malaysia*. https://bit.ly/2wpdsHo.

[204] Glenday, S., & Paoli, G. (2015). *Overview of Indonesian Oil Palm Smallholder Farmers.* Daemeter Consulting. https://bit.ly/2FCJKC0 .

[205] IndexMundi. *Indonesia Palm Oil Production by Year*. https://bit.ly/2HUiwsu.

In terms of land area, oil palm covered just 4 million hectares in Indonesia in 2000, but that figure reached 11.9 million hectares in 2015[206] and is now estimated at 15.7 million hectares by Indonesia's Corruption Eradication Commission (KPK).[207] For the first five years of the new century, 56 percent of that expansion came at the expense of forests while 44 percent replaced other croplands, but deforestation has accounted for a higher percentage in more recent years.[208]

Indonesia lost 840,000 hectares of primary forest annually for the first 12 years of the century,[209] and much of this was carbon-dense peat forest that also provided habitat to iconic endemic species like the orangutan, the population of which dropped by more than 150,000 during the expansion.[210] A staggering 80 percent of the deforestation driven by conversion to commodity-producing agricultural land that took place in this period was carried out illegally.[211]

The dramatic rate of palm oil production growth has stabilized at 7 percent annually for Indonesia and 9 percent for Malaysia because much production is shifting abroad. Colombia's rate of palm oil production growth, for example, is 42 percent.[212]

B. 2. Impacts of the Supply Chain Movement

This section describes the type of supply chain commitments made in the Indonesian and Malaysian palm oil sector and their environmental, economic, and policy impacts, as well as stakeholder perception and participation, and capacity needs.

As companies sought to meet their "zero deforestation" commitments, most turned to sustainability standards that were not created with zero deforestation in mind. Four major standards are described below.

- **The Roundtable on Sustainable Palm Oil (RSPO):** Most of the companies aiming to reduce their impact on forests have tried to do so by purchasing products that are certified as sustainable through RSPO, which was formed by a consortium of NGOs and industry groups in 2004. The RSPO is a membership-based organization that sets standards and certifies individual plantations that meet social and environmental criteria as RSPO Certified Sustainable Palm Oil (CSPO). From its inception, the RSPO has faced criticism from some environmental groups, who complain that it certifies individual plantations and not entire supply chains, and that oversight is often lax, but also from some industry groups, who complain that it raises costs and favors larger players. Today, roughly 19 percent of all palm oil is RSPO certified, with most of it being shipped to Europe and the United States.[213]
- **Indonesian Sustainable Palm Oil (ISPO)** standard, established in 2009 by the Indonesian Ministry of Agriculture. The standard nominally espouses seven principles similar to those of RSPO, but interviewees characterized it as less rigorous than RSPO. The government was in the process of strengthening ISPO, but drafts of new rules leaked to the media indicate it may now be

[206] Neliti. (2017). *Exports of palm oil by major countries of destination*. https://bit.ly/2JX4Zge .

[207] Komisi Pemberantasan Korupsi. (2016). *Kajian sistem pengelolaan komoditas kelapa sawit* [Study of the palm oil commodity management system]. KPK, p. 20.

[208] Pin Koh, L., & Ghazoul, J. (2010). Spatially explicit scenario analysis for reconciling agricultural expansion, forest protection, and carbon conservation in Indonesia. *Proceedings of the National Academy of Sciences*, *107*(24), 11140-11144.

[209] Petrenko, C., Paltseva, J., & Searle, S. (2016). *Ecological impacts of palm oil expansion in Indonesia*. International Concil on Clean Transportation (ICCT). https://bit.ly/2KH3Nic.

[210] Gokkon, B. (2018, February 15). Borneo, ravaged by deforestation, loses nearly 150,000 orangutans in 16 years, study finds. *MongaBay*. https://bit.ly/2oeWCUj.

[211] Lawson, S. (2014). *Consumer goods and deforestation.* Forest Trends. https://bit.ly/2jBoZd2.

[212] IndexMundi. *Palm oil production annual growth rate by country*. https://bit.ly/2FPKhN7.

[213] Roundtable on Sustainable Palm Oil. (2018). *RSPO in numbers*. March. https://rspo.org/about/impacts.

weakened by, for example, removing independent monitoring and shifting focus from "protecting" to "managing."[214]

- **Malaysian Sustainable Palm Oil (MSPO),** which was launched by the Malaysian government in 2013 and became active in 2015. It has faced criticism similar to that of the ISPO.
- **International Sustainability & Carbon Certification (ISCC)** system, which was launched in 2010, is not a sustainability standard per se, but focuses on greenhouse gasses from several agricultural sectors, including palm oil. Corporate interviewees said it is used as an adjunct to RSPO, especially for palm oil sale into the biofuels sector.

Whereas larger, export-oriented plantation owners rallied around the RSPO, smaller companies have embraced the domestic standards, which indicate compliance with the respective national laws. Each is closely associated with the respective national trade associations (GAPKI and MPOA), and many interviewees characterized them as being nationalist reactions against the RSPO. A 2017 survey of market participants found a similar sentiment.[215]

In 2015, the Malaysian and Indonesian governments announced they would align ISPO and MSPO to create a new entity called the **Council of Palm Oil Producing Countries (CPOPC)**, which one interviewee described as "the OPEC of the palm-oil sector," focused on controlling prices in the world market.[216]

Table B1 summarizes the impacts of the supply chain movement in Indonesia and Malaysia.

Table B1: Summary of Impacts of the Supply Chain Movement in Indonesia and Malaysia

IMPACT AREA	POSITIVE AND NEGATIVE IMPACTS OF THE SUPPLY CHAIN MOVEMENT
Environmental	+ Incentivized sustainable practices in existing plantations + Provided a lever for enforcement and discovery + Sparked deeper and broader commitments under the "no deforestation, no peat, no exploitation" movement. ± Catalyzed a bifurcation of the palm oil sector into committed and noncommitted entities, which - Enabled some companies to hide deforestation - Failed to slow deforestation at the frontier
Economic	+ Helped some smallholders increase yields and earnings ± May be sparking a vertical integration among companies ± Sparked renewed interest in project-based REDD - Imposed costs on some companies that fail to meet their commitments
Political	+ Sparked the creation of smaller, informal cooperative efforts ± Has a mixed reception domestically

[214] Environmental Investigation Agency. (2018, February 8). *Backtracking on reform: How Indonesia's Government is weakening its palm oil standards*. https://bit.ly/2rq6ps6.

[215] Pirard, R., Rivoalen, C., Lawry, S., et al. (2017). *A policy network analysis of the palm oil sector in Indonesia* (Working Paper 230). CIFOR. https://bit.ly/2KGI5Ll .

[216] Indonesia-Investments. (2015, November 21). *Indonesia & Malaysia set up the council of palm oil producer countries.* https://bit.ly/2rqgK7v.

	- Has encountered organized backlash
Policy	+ Sparked emergence of jurisdictional certification programs + Dovetails with anticorruption efforts and moratoria + Gained legitimacy in Supreme Court
Stakeholder perception and engagement	+ Created near universal awareness among relevant NGOs + Created understanding among companies ± Variable understanding among smallholders - Is not embraced by all companies
Capacity needs	+ Has helped some smallholders improve practices + Forged some agreement over forest definition + Provided impetus for improved standards

B. 2. 1. Environmental impacts

The supply chain movement has incentivized sustainable practices in existing plantations as export-oriented companies embrace certification, but it has not had a noticeable impact on deforestation of frontier forests. Existing plantations are clearly being managed more sustainably to earn RSPO certification, but deforestation has increased in frontier areas far from existing mills.[217] While frontier deforestation is too far from existing mills to be associated with current palm-oil demand, some interviewees said this new activity could be "speculative" deforestation being undertaken with an eye toward planting oil palm in the future. There is some evidence to support this.

The supply chain movement – and, more specifically, RSPO membership – allows NGOs to shine a light on bad actors. AidEnvironment, for example, found that RSPO member, Indofood, was using shell companies to deforest in Borneo's Ketungau peat swamp to make way for future oil palm plantations,[218] and an earlier investigation showed that Malaysian palm oil giant, Felda Global Ventures (FGV), had violated Indonesia's peat moratorium and Malaysian labor laws.[219] More prominently, Greenpeace recently published two reports documenting systematic deforestation being undertaken by companies associated with RSPO members and companies with supply chain commitments.[220] In each of these cases, the NGOs used a dual approach – filing formal complaints with the RSPO while aggressively campaigning to force action. While many lauded the RSPO's response (see Economic impacts section, below), others said the organization needs to become more responsive in dealing with complaints filed without fanfare.

The supply chain movement has catalyzed a bifurcation of the sector into committed and noncommitted companies, but also into committed and noncommitted divisions within the same company. Interviewees generally stressed the importance of distinguishing between deforestation driven by companies that were supplying Western buyers which had deforestation commitments and those supplying domestic buyers or exporters in India and China. Many said that certification was approaching its limit, RSPO certification applies to 19 percent of supplies, roughly the

[217] Global Forest Watch. (2018). Indonesia country page [forest cover map]. https://bit.ly/2InjHjx .

[218] Aidenvironment. (2018). *Palm oil sustainability assessment of Salim-related companies in Borneo peat forests*. Amsterdam: Aidenvironment. https://bit.ly/2Hdumg3.

[219] Levicharova, M., Paul, S., & Wakker, E. (2016). *Felda Global Ventures*. Chain Reaction Research. https://bit.ly/2pr4xhq.

[220] Greenpeace. (2017). *How the palm oil industry is still cooking the climate*. https://bit.ly/2wicw7r.

amount that is exported to Europe and the United States.[221] There was a clear divide between interviewees who felt the supply chain movement in its current form could be leveraged to elevate the entire sector, and those who felt a new stepwise approach should be used to address demand from countries like China and India, where demand for certified palm oil has not materialized.

The broader supply chain movement has, nonetheless, sparked the creation of specific, detailed, and groupwide no-deforestation, no-peat, no-exploitation (NDPE) commitments undertaken primarily by major exporters like Wilmar International, but also by some retail companies like Unilever, working together with environmental NGOs.[222]

Unlike most of the higher-profile commitments that spawned them, NDPE commitments tend to be concrete, viable, and verifiable, with detailed descriptions of exactly which types of forest areas will be avoided, as well as firm commitments to avoid all development on peatlands. They also include commitments to restore previously disrupted forests and peatlands, and to embrace fair labor practices.

Most importantly, NDPE pledges go beyond the activities of individual plantations or companies and extend to all facilities that groups operate, invest in, or buy from – which brings them into conflict with the same third-party suppliers who prefer ISPO and MSPO over RSPO. This led to dramatic pushback from smaller companies in 2015 (see Political impacts section, below). Companies with NDPE commitments host dashboards showing the impact of their commitments on affiliated companies, and a 2016 AidEnvironment analysis of Wilmar's NDPE policy showed that supplier groups had halted development on 350,000 hectares of forest, peat, and community land,[223] but overall deforestation rates indicate large amounts of leakage into frontier areas.

While third-party suppliers have generally been resistant to the NDPE movement, Chain Reaction Research points out that companies with NDPE commitments account for roughly 74 percent of the refining capacity across Indonesia and Malaysia,[224] providing them with considerable leverage in raising the bar if they choose to do so.

Even companies with NDPE commitments are inconsistent in their approach to tracking, let alone dealing with, noncompliant suppliers, and many retail-facing companies rely on their traders to enforce compliance. Interviewees were divided over how easy this is to correct. Some said that all companies with NDPE commitments can and should simply refuse to deal with suppliers who don't at least publish their concession maps, while others said that would only increase the bifurcation of the sector.

B. 2. 2. Economic impacts

The supply chain movement has helped some smallholders increase yields and income: more than 100 companies have included "support for smallholders" in their supply chain commitments.[225] These efforts tend to be geographically narrow in scope, as companies are unwilling to make large-scale investments that pay off for competitors, and even the larger jurisdictional efforts seem to be suffering the tragedy of the commons. When applied, however, they do have a positive impact on smallholder earnings (See Capacity needs section, below).

[221] Roundtable on Sustainable Palm Oil. (2018). *RSPO in numbers*. March. https://rspo.org/about/impacts.

[222] Wilmar. (2013). *No deforestation, no peat, no exploitation policy*. https://bit.ly/1hDCOBB.

[223] Aidenvironment. (2016). *Impacts of no-deforestation policies*. https://bit.ly/2wnHTh2.

[224] Steinweg, T., Drennen, Z., & Rijk, G. (2017). *Unsustainable palm oil faces increasing market access risks: NDPE sourcing policies cover 74 percent of Southeast Asia's refining capacity*. Chain Reaction Research. https://bit.ly/2JUpCcQ.

[225] Supply Change. *Support smallholders*. http://www.supply-change.org/profiles/support-smallholders.

Market forces have punished companies that violate their supply chain commitments, but only when NGOs aggressively leverage the situation. This was initially seen in a well-publicized 2016 incident, when RSPO suspended all certificates associated with Malaysian palm oil giant IOI Group after AidEnvironment demonstrated that the company was not only clearing peatlands illegally, but running roughshod over customary landowners and chopping trees in a protected area.[226] The suspension sparked massive cancellations of orders and an ugly legal battle that IOI lost.[227] Then, in 2017, banking group HSBC, in response to pressure from Greenpeace and the Environmental Investigation Agency, filed a complaint with RSPO against Hong-Kong-based Noble Group after the two NGOs uncovered similar transgressions. As a result, the company lost 27 corporate customers which had built their supply chain commitments on sourcing RSPO-certified product, and it reported a $15 million loss after taxes, while competitors like China-based Cofco, which is a strong advocate of NDPE commitments, appear to have benefitted.[228]

More recently, PepsiCo stopped purchasing palm oil from RSPO member Indofood Agri Resources (IndoAgri) after AidEnvironment showed that the company was deforesting in Borneo, and FGV reportedly lost several large orders after its certification was suspended following similar revelations [229] (see Environmental impacts section, below).

PepsiCo, however, maintains relations with IndiAgri's parent company, Indofood Sukses Makmur, through a joint venture called IndoFood Fritolay Makamur,[230] and Greenpeace has identified several similar cases of RSPO members violating their commitments through shell companies. Interviewees were divided over how best to proceed in such cases, with many arguing that it's best for committed companies to maintain relationships with companies perceived as bad actors if there is reason to believe they will change, and others arguing that bad actors should be eliminated from the supply chain.

Interviewees expressed disappointment in the lack of engagement from financial institutions beyond HSBC, which responded only after pressure from NGOs. While pension funds like the Norwegian Government Pension Fund have shown a willingness to divest of palm-oil companies that either don't make or don't stick to commitments,[231] the mainstream financial sector has been slow to associate deforestation risk with financial risk.

The supply chain movement has not produced high enough premiums on RSPO-certified products to incentivize increased capacity. The cost of becoming RSPO-certified varies widely—both in up-front costs and recurring costs[232] — and premiums tend to fluctuate over time.[233] Interviewees estimated that roughly half of all palm oil grown for certification ends up in the standard market, and said that premiums were too low to encourage further expansion. This was especially

[226] Roundtable on Sustainable Palm Oil. (2016). *Notice to RSPO members on the suspension of IOI group´s certification*. https://bit.ly/2jAAQZ9.

[227] Zwick, S. (2017). *Why HSBC´s recent response to Greenpeace really is a very big deal*. Forest Trends. https://bit.ly/2wlex2R.

[228] Zwick, S. (2018, January 23). A Tale of Two Companies, Interview with Jonathan Leonard. *Bionic Planet* [Audio Podcast] (29). https://bit.ly/2GqJAKI.

[229] Zwick, S. (2017). *Why HSBC´s recent response to Greenpeace really is a very big deal*. Forest Trends. https://bit.ly/2wlex2R.

[230] PepsiCo. (2018). PepsiCo sourcing of palm oil from Indonesia. https://bit.ly/2BwYoof.

[231] Regnskogfondet. (2018). *Norway's government pension fund puts pressure on companies driving deforestation*. https://www.regnskog.no/en/news/norwayss.

[232] Rietberg, P., & Slingerland, M. (2016). *Costs and benefits of RSPO certification for independent smallholders*. Wageningen: SEnSOR project. https://bit.ly/2HYxvxq.

[233] GreenPalm. *Market volume and price charts*. https://bit.ly/2FPVz3X.

challenging in larger-scale programs, such as the Malaysian state of Sabah's effort to create an entire RSPO-certified jurisdiction (see Policy impacts section, below).

Paradoxically, the supply chain movement may be sparking a vertical integration as larger companies position themselves for domestic regulatory risk and future demand from countries like China and India, and smaller companies, long resistant to change, simply sell out to the larger ones.[234] This hypothesis is bolstered by the fact that 86 percent of China's refining capacity is covered by NDPE commitments[235] and that Chinese companies like Cofco have embraced supply chain commitments. It's contingent in part on the government's willingness to impose a risk premium on deforestation, which it did after the 2015 wildfires sparked widespread health concerns, although it also seems to be backsliding on promises to improve ISPO (see Policy impacts section, below).

The supply chain movement has sparked renewed interest in project-based REDD as a vehicle for helping companies meet their deforestation liability under RSPO's remediation and compensation procedures.[236] which were formulated as new members struggled to carry out mandatory assessments to determine which land contained high- conservation-value (HCV) forest (see Capacity needs section, below). The procedures mandate that RSPO members who are found to have HCV liabilities either compensate for them by conducting restoration or face expulsion. Out of 70 growers in RSPO, 62 were found to have HCV liabilities, and only two of those have made good on them.[237] This leaves 60 companies obligated to demonstrate ecosystem restoration or face expulsion from RSPO, and credible negotiations are underway to meet these obligations by purchasing credits initially developed as voluntary carbon offsets that Reduce Emissions from Deforestation and Degradation (REDD).

B. 2. 3. Political impacts

The supply chain movement has had a mixed reception in popular culture across Indonesia and Malaysia, and it risks being perceived as foreign intervention in the national economy. The European Union's move to ban palm-based biofuels,[238] for example, has been conflated with RSPO in the eyes of the public – a conflation that many GAPKI and MPOA members have been happy to encourage.

While deforestation is not a priority issue among the general public, health concerns from haze caused by forest fires are. Several interviewees said that advocates of sustainable supply chains are not adequately linking health risks and smallholder wellbeing to supply chain demands. Conversely, several interviewees said popular magazines like Tempo[239] were providing more coverage of corruption in the palm sector. Most interviewees, however, said there is little understanding among the general public of the linkages between sustainable palm oil production, high-value export markets, and deforestation or public health.

Efforts to organize individual commitments into national mandates have galvanized equally organized resistance from smaller companies who see supply chain commitments as

[234] Hawkins, D., Chen, Y., & Wigglesworth, T. (2016). *Indonesian palm oil production sector. A wave of consolidation to come.* Hardman agribusiness. https://bit.ly/2F8rJaC.

[235] Steinweg, T., Drennen, Z., & Rijk, G. (2017). *Unsustainable palm oil faces increasing market access risks: NDPE sourcing policies cover 74 percent of Southeast Asia's refining capacity*. Chain Reaction Research. https://bit.ly/2JUpCcQ.

[236] Roundtable on Sustainable Palm Oil. (2014). *RSPO remediation and compensation procedures related to land clearance without prior HCV assessment.* https://bit.ly/2HUaqzW.

[237] Based on interviews conducted for this study.

[238] Reuters. (2018, January 18). *European move to ban palm oil from biofuels is `crop apartheid`* - Malaysia. https://reut.rs/2DLDoge.

[239] Tempo.Co. (2018, March 22). *Palm oil time bomb*. https://bit.ly/2jzeerP.

burdensome. By late 2014, for example, five of Indonesia's largest palm oil companies – Wilmar, Golden Agri Resources, Cargill, Asian Agri, and Musim Mas – had already published NDPE policies and together they signed the Indonesia Palm Oil Pledge (IPOP) at the United Nations Climate Summit in September in New York.[240]

The Indonesian Chamber of Commerce (KADIN) had championed IPOP as a way to ensure demand for Indonesian palm oil in a world increasingly concerned with sustainability, and the pledge itself was, essentially, a five-party NDPE commitment that became a six-party commitment when Astra Agro Lestari joined in 2015.

The pledge never mentioned RSPO and explicitly pledged to support ISPO, but the mid-size trading companies that comprise the bulk of GAPKI derided it as an effort to create an export cartel that would disadvantage both smaller companies and smallholders.[241] Interviewees all agreed that IPOP conformity would have raised the operating costs of mid-size companies, but they denied that it would shift the burden of compliance to smallholders. Indeed, most interviewees see more stringent standards as a boon to smallholders. This corresponds to a 2017 survey of market participants, which found high concern among smaller companies that IPOP would have restricted their market access, but only a tiny minority saw it negatively impacting smallholders.[242]

From a practical standpoint, interviewees said that the dissolution of IPOP didn't alter the commitments of the "big six" traders, but it did deprive the country of a formal forum for coordinating issues around sustainability, and it left sustainability advocates leery of embracing large, high-profile efforts.

The supply chain movement has sparked clusters of local and often informal cooperative sourcing arrangements among buying companies, local authorities, and NGOs, but details are scarce as the initiatives have not yet been publicized. Many of these cooperative initiatives evolved from efforts to meet traceability commitments made under larger supply chain commitments because buying companies found it difficult to ensure the quality of mills they were purchasing from.
One program that has been publicized is Unilever's memorandum of understanding with PT Perkebunan Nusantara (PTPN), a government-owned plantation operator, to help local mills and smallholder farmers meet NDPE standards under a produce-protect partnership,[243] but even this is early stage.

B. 2. 4. Policy impacts

The supply chain movement has sparked a flurry of jurisdictional certification programs, but corporate buy-in appears weak. Several initiatives have been launched since the 2014 New York Declaration on Forests explicitly to capitalize on private sector commitments. The most ambitious are the Malaysian province of Sabah's effort to be 100 percent certified under RSPO by 2025[244] and the Indonesian province of Central Kalimantan's effort to achieve that even sooner.

While retail-facing companies have pledged to support these efforts by purchasing certified product once statewide certification is achieved, few have stepped up to help the provinces with the tedious and costly process of achieving certification. As a result, several interviewees expressed enthusiasm

[240] Indonesia Palm Oil Pledge. (2014). https://bit.ly/2roRCOZ .

[241] Based on interviews, not on direct analysis of contemporary media reports.

[242] Pirard, R., Rivoalen, C., Lawry, S., et al. (2017). *A policy network analysis of the palm oil sector in Indonesia* (Working Paper 230). Center for International Forestry Research (CIFOR). https://bit.ly/2KGI5LI.

[243] Unilever. (2018). *Unilever and PT Perkebunan Nusantara (PTPN) reach agreement to accelerate production of sustainable palm oil in Indonesia*. https://bit.ly/2FddKjR.

[244] Roundtable on Sustainable Palm Oil. (2015). *RSPO congratulates the Sabah state government for its recent milestone decision towards palm oil sustainability.* https://bit.ly/2IkIrsw.

for newer, smaller initiatives such as those being spearheaded by the Sustainable Trade Initiative (IDH) in West Kalimantan,[245] South Sumatra,[246] Aceh,[247] and Jambi.[248]

Another notable initiative is the Sustainable Districts Platform (Lingkar Temu Kabupaten Lestari; LTKL), which is being pioneered by progressive bupatis interested in promoting green development in line with the Sustainable Development Goals and supply chain commitments. One interviewee described the participating districts as a "microcosm of Indonesia," because of their diversity and geographical distribution. Some are home to established palm oil plantations, while others are located in frontier areas or parts of the country where palm oil is not a significant crop. Interviewees stressed, however, that companies wishing to purchase certified palm oil will need to show early commitment for the program to succeed.

The supply chain movement appears to complement growing anticorruption efforts and a series of deforestation moratoria. Several interviewees said there is growing support for reforms of the palm oil sector after the KPK found that corruption was reducing tax revenues, and health concerns flowing from haze associated with forest fires related to palm oil clearance had resulted in charges against several people and large fines against two companies. PT Kallista Alam was fined 366 billion rupiah (US$25.6 million), and Sampoerna Agro, was fined a record 1.07 trillion rupiah ($81.62 million) for illegally setting fires to clear land.[249]

This comes along with a series of increasingly strict moratoria on forest activities that began with then-President Susilo Bambang Yudhoyono's two-year moratorium on the issuance of new plantation licenses on forest and peatland in 2011.[250] While media at the time attributed the moratorium to $1 billion of potential REDD+ finance from Norway, some interviewees stressed that the overall REDD+ strategy was being developed with an eye on export markets. They pointed out that Yudhoyono's successor, Joko Widodo, has continued to extend and expand the moratorium every two years since taking office in 2014, despite the lack of REDD+ finance.

The most recent iteration extends through 2019 and comes on the heels of a 2016 presidential decree that prevents any development that can damage peatlands, regardless of whether such concessions already exist.[251] A separate moratorium that has not yet been implemented would end all new concessions, and, if enforced, would mean that 6.1 million hectares of existing concessions in forests and peatland are "stranded assets."[252]

Interviewees generally (but not universally) gave the government high marks for enforcing the peat moratorium, and said that this, combined with NDPE commitments, had dramatically reduced incursions into Indonesia's peatland forests.

Conversely, interviewees also chided the government's reticence about embracing international standards, and universally criticized the proposed weakening of the ISPO standard.

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[245] The sustainable trade initiative (IDH). West Kalimantan, Indonesia. https://bit.ly/2K17Ep5.

[246] The sustainable trade initiative (IDH). South Sumatra, Indonesia. https://bit.ly/2JX83sM.

[247] The sustainable trade initiative (IDH). Aceh, Indonesia. https://bit.ly/2IS65x1.

[248] The sustainable trade initiative (IDH). Jambi, Indonesia. https://bit.ly/2k5MbAx .

[249] Center for International Forestry Research (CIFOR). *Managing palm oil risks. A brief for financiers*. https://bit.ly/2KEKAOe.

[250] Kandy, D., & Diaz, D. (2011). Indonesia bets on REDD with new moratorium, but can it deliver? May. *Ecosystem Marketplace.* https://bit.ly/2jBQRy2.

[251] Chain Reaction Research. (2017). *Indonesia´s palm oil landbank expansion limited by proposed moratorium and NDPE*. https://bit.ly/2HZU7xJ.

[252] Chain Reaction Research. (2017). *10 million football fields of undevelopable land*. https://bit.ly/2EjovVg.

The supply chain movement also seems to be gaining legitimacy in the courts, as Indonesia's Supreme Court recently recognized that land left undeveloped to meet the set aside requirements of RSPO cannot be confiscated as "neglected land" under Plantation Law UU No. 39/2014. This 2014 law imposes mandatory recognition of community rights on plantation owners but also said that plantation owners can lose parts of their concession if they do not develop it. Most interviewees said that authorities would be reticent about enforcing those provisions in the current environment, and the Supreme Court recently upheld the London-Sumatera company's right to set aside land on the grounds that the set aside constituted part of its management obligations under the RSPO.[253]

B. 2. 5. Stakeholder perception and participation

Interviewees universally agreed that NGOs were aware of supply chain commitments and were doing their best to either move the process forward or use commitments as leverage to hold companies accountable. Commitments clearly enabled both the jurisdictional initiatives identified above and the successful efforts by Greenpeace, AidEnvironment, and others to hold companies to their commitments.

The supply chain movement has widely differing perceptions among Indonesian smallholders, depending on the degree and type of local engagement. In some cases, for example, interviewees told of spontaneous disruptions and demonstrations after companies refused to buy their fruit, and two interviewees reported firsthand experience with mills being burned by disgruntled independent farmers whose fruit was rejected. Conversely, other interviewees described high levels of enthusiasm among smallholders engaged in mapping projects under emerging jurisdictional efforts.[254]

B. 2. 6. Capacity needs

The supply chain movement has clearly helped smallholders involved in jurisdictional efforts and corporate engagement, but these efforts need to be scaled up. Asian Agri, for example, has made a high-profile "one-to-one partnership agreement" to support an area of smallholders equal to its owned plantation area. The company owns 100,000 hectares of plantations spread across three provinces in Sumatra, and has 60,000 hectares of plasma land owned by farmers who are contractually obligated to deliver their fruit to the company. In 2012, it started helping independent smallholders overhaul their farms to increase productivity, and it has spread this activity across 31,000 hectares to date, with a target of 40,000 by 2020. At that point, its plantation operations will be 200,000 hectares, equally divided between owned plantation and smallholders, 40 percent of whom are not contractually obligated to the company. The company has even helped many of its smallholders get certified under RSPO, which has certified 78,000 smallholders across Indonesia so far.[255] The program currently covers less than 1.5 percent of Indonesia's existing palm oil area, but the company believes it can be scaled up nationwide – although most interviewees were skeptical. Interviewees stressed that the term "independent farmers" covers a broad spectrum in Indonesia, ranging from small-scale family farmers with no formal land title and no access to capital to large-scale independents who may have formal tenure but lack access to bank loans. Technically, anyone who wishes to convert more than 25 hectares of land to palm oil must apply for a Plantation Business License (IUP-B), and even smaller farmers must register their farms, but in practice few do.[256] The challenge to scaling these efforts is first in reaching out to illegal or undocumented farmers, whose

[253] Pirard, R., Rivoalen, C., Lawry, S., et al. (2017). *A policy network analysis of the palm oil sector in Indonesia.* Working Paper 230. CIFOR. https://bit.ly/2KGI5LI.

[254] Earth Innovation Institute. (2016). *Mapping and monitoring smallholder palm oil producers in Central Kalimantan.* https://bit.ly/2KIq1QP.

[255] Roundtable on Sustainable Palm Oil. Smallholders. https://rspo.org/smallholders.

[256] Jelsma, I., Schoneveld, G.C., Zoomers, A., et al. (2017). Unpacking Indonesia's independent oil palm smallholders: An actor-disaggregated approach to identifying environmental and social performance challenges. *Land Use Policy*, *69*, 281-297.

activities must first be mapped,[257] and then in encouraging migrant farmers to commit themselves to a specific patch of land.

The supply chain movement has forced growing agreement among committed companies as to what constitutes a "viable forest," but this remains a contentious issue – especially after decades of degradation and fire. The RSPO uses a high conservation value (HCV) approach that was developed by the Forest Stewardship Council in 1999, but the need for a clear definition led to a new approach pioneered by palm-oil group Golden Agri Resources Ltd, Greenpeace, and The Forest Trust. Dubbed the "high carbon stock" (HCS) this assessment layers in biomass thresholds.[258] It divides HCS forests into six categories, four of which are generally considered forest. It is now overseen by a rapidly growing and well-supported membership organization, and gaining popularity among those interviewed.

The supply chain movement has provided an impetus for improved standards, as committed companies look to beef up or supplement the RSPO**.** The Palm Oil Innovation Group (POIG),[259] for example, was launched by a subset of RSPO members in 2013 to accelerate the ambitions of the RSPO by providing focused technical support on key issues. A second initiative, the Sustainable Palm Oil Manifesto (SPOM), was launched by Malaysia's five largest companies (Sime Darby Plantation, IOI Corporation Berhad, Kuala Lumpur Kepong Berhad, Musim Mas Group and Asian Agri) [260] in 2014 as a more rigorous adjunct to the RSPO, but environmental NGOs balked at supporting it because it allowed for continued deforestation until HCS criteria were further developed.[261] Interviewees said SPOM has proven to be an effective incubator for new HCS methodologies, but has not fulfilled its intended purpose of providing an adjunct to RSPO.

RSPO, meanwhile, has continued to evolve, with the launch of RSPO Next in 2015[262] and the launch of a smallholder's hub in 2016.[263] Interviewees attributed both developments to the rise of corporate commitments, and RSPO Next provides add-on criteria that echo the ambitions of the failed IPOP initiative.[264]

B. 2. 7. Conclusions and outlook

Jurisdictional certification efforts can save money for companies and increase the effectiveness of RSPO and the supply chain movement. Attracting up-front financial support during the readiness phase in these jurisdictions could be seen as a good investment by consumer-facing companies. They have, however, been slow to react.

Leakage to India, China, and domestic markets remains the greatest threat to the sustainable development of the palm oil sector, but steps can be taken to bring these countries into the fold by inviting them to join the Amsterdam Declaration and starting a dialogue on the deforestation emissions embedded in their palm oil imports.

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[257] Glenday, S. & Paoli, G. (2015). *Overview of Indonesian oil palm smallholder farmers.* Daemeter Consulting. https://bit.ly/2FCJKC0.

[258] High Carbon Stock Approach. https://bit.ly/2oTKWW3.

[259] Palm Oil Innovation Group (POIG). POIG Members. http://poig.org/poig-members/.

[260] Musim Mas. (2014). *Palm oil industry comes together in groundbreaking sustainability initiative.* https://bit.ly/2rqcViy.

[261] Gaworecki, M. (2015). Sustainable Palm Oil Manifesto group´s High Carbon Stock forests study would continue business as usual, environmentalists say. *Mongabay.* https://bit.ly/2nYGBCX.

[262] Roundtable on Sustainable Palm Oil. RSPO NEXT documents. https://bit.ly/2FQXs01.

[263] Roundtable on Sustainable Palm Oil. Smallholders. https://rspo.org/smallholders .

[264] Roundtable on Sustainable Palm Oil. RSPO Next. https://rspo.org/certification/rspo-next.

Some interviewees were encouraged by the high number of Chinese processors making NDPE commitments and saw this as an opportunity to leverage more scale in the sector.

If smallholders are given technical and financial support, palm oil production can become efficient enough to avoid deforestation, allow other crops to use available land, and even encourage reforestation of retired areas. Companies with NDPE commitments may look to investments in smallholders – especially those in new jurisdictional efforts – to achieve sustainable growth.

C. Cocoa in Ghana and Côte d'Ivoire

C. 1. Sector Background

Cacao trees evolved in the understory of the Amazon forest, where they thrived in the shade of larger trees. Today roughly 66 percent of the world's cocoa comes from two countries—Ghana and Côte d'Ivoire[265].

Millions of people across both countries earn their living either producing or processing cocoa. In Côte d'Ivoire, for example, cocoa generates more than 40 percent of export revenues[266] and 30 percent of the country's GDP,[267] while in Ghana, cocoa generates roughly 20–25 percent of export revenues and 7 percent of GDP.[268] It directly employs more than 3 million farmers across both countries.

In 2016, six trader/grinders traded and processed 89 percent of the world's cocoa,[269] and three of them – Barry Callebaut, Cargill, and Olam – controlled 60 percent of the market.[270] These companies purchase their beans from farmers who ferment and dry the beans either individually or in cooperatives. The grinder/traders then process the beans into a commoditized product, liquefy it, and either create a finished product themselves or sell to chocolate companies or both.

Both Ghana and Côte d'Ivoire have cocoa boards that set domestic prices at a percentage of world prices for the previous year. In Côte d'Ivoire, the Conseil du Café-Cacao (CCC) uses an algorithm to determine the price, while in Ghana, the Cocoa Board (Cocobod) sets the price together with other industry stakeholders.[271] Both boards finance themselves by collecting the difference between domestic and world prices, and a portion of this money is supposed to provide seedlings, training, and inputs to farmers.

In Ghana, Cocobod is especially powerful, because it essentially owns all of the cocoa, thanks to a system that prevents international traders from dealing directly with farmers. Instead, Licensed Buying Companies (LBCs) are licensed to purchase from farmers and then sell to Cocobod, which in turn sells to international traders, many of whom own their own LBCs in in the country. Thus, in many cases, an international trader sells to Cocobod through an LBC only to repurchase the same cocoa later.

In Côte d'Ivoire, the CCC does not take as active a role in controlling supplies, but it has been mandated to promote sustainability in the cocoa sector.[272] To that end, it created a private-public-

[265] World Cocoa Foundation. (2017) Cocoa & Forests Initiative. http://www.worldcocoafoundation.org/cocoa-forests-initiative/.

[266] Observatory of Economic Complexity (OEC). (2016). Cote d´Ivoire. https://bit.ly/2s4nIzl.

[267] Export.gov. (2015). Cote d´Ivoire – Market Overview. https://bit.ly/2FKFs7m.

[268] Geiger, M., Kwabena, G.K., Tchale, H., et al. (2018). *3rd Ghana Economic Update. Agriculture as an engine of growth and jobs creation.* Washington DC: World Bank Group. https://bit.ly/2s2M9Ni.

[269] Kroeger, A. (2017). *Eliminating Deforestation from the Cocoa Supply Chain.* Washington, DC: World Bank https://openknowledge.worldbank.org/handle/10986/26549.

[270] Terazono, E. (2014, December 18). Welcome to the world of big chocolate: Three companies will dominate the processing sector. *Financial Times.* https://on.ft.com/2rPYqoc.

[271] Oomes, N., Tieben, B., Laven, A., et al. (2016). *Market concentration and price formation in the global cocoa value chain*. Amsterdam: SEO Amsterdam Economics.

[272] Le Conseil du Café-Cacao. (2011). Statut & objectifs du conseil du café-cacao. https://bit.ly/2JYwWUY.

partnership platform in 2013 to act as a forum for addressing sustainability issues,[273] but this is not seen as a successful effort.

The two countries that dominate the cocoa sector have achieved most of their growth in the last quarter century – largely through policies that encouraged the rapid expansion of cocoa farming without providing horticultural training or technical support to farmers.

Whereas cacao trees thrived in the shade of the Amazon understory, they are less productive in the full-sun plantations of Ghana and Côte d'Ivoire. In Ghana, most of the newer farms have been planted without protective shade trees, in part due to a mistaken belief that new varieties thrived in the sun,[274] but also because farmers fear that shade trees bring pests and fungus.[275] For these reasons, productivity in the region is less than half that of other parts of the world – specifically, 550 kilograms per hectare in Côte d'Ivoire and 400 kilograms per hectare in Ghana, compared with between 1,000 and 1,500 kilograms per hectare in the rest of the world.[276]

As a result of low productivity and poor soil management, these farms quickly deplete the land, forcing farmers to clear forested areas for new plantations, thus accelerating deforestation.[277] In Côte d'Ivoire, at least 60 percent of new farms were developed on land classified as forest.[278] In the high-forest regions of Ghana, forest conversion rates increased to 6 percent a year between 2000 and 2011,[279] and the country currently loses nearly 140,000 hectares of high forest to agriculture annually with cocoa responsible for over a quarter of that loss.[280]

Because of this extension into new areas, Côte d'Ivoire's cocoa output more than doubled from 1995 to 2017,[281] while Ghana's tripled over the same period (Figure C1).[282] In Côte d'Ivoire, forests cover just 4 percent of the countryside – down from more than 25 percent a half century ago – and the loss of forest cover leaves the land extremely vulnerable to climate change.[283]

[273] Le Conseil du Café-Cacao. (2013). *Documentation de la deuxieme session pleniere de la PPPP*, Hotel Sophia San Pedro, 26.29 Mai 2013, Documentations sur la PPPP en 2014 et en 2015. https://bit.ly/2rqZCOW.
[276] Wessel, M., & Quist-Wessel, P. F. (2015). Cocoa production in West Africa, a review and analysis of recent developments. *NJAS-Wageningen Journal of Life Sciences*, *74*, 1-7.
[276] Wessel, M., & Quist-Wessel, P. F. (2015). Cocoa production in West Africa, a review and analysis of recent developments. *NJAS-Wageningen Journal of Life Sciences*, *74*, 1-7.
[276] Wessel, M., & Quist-Wessel, P. F. (2015). Cocoa production in West Africa, a review and analysis of recent developments. *NJAS-Wageningen Journal of Life Sciences*, *74*, 1-7.
[277] Ruf, F. & Zadi, H. (1998). *Cocoa: From deforestation to reforestation*. Centre de cooperation internationale en recherche agronomique pour le développement (CIRAD). https://s.si.edu/2IlRhq5.

[278] Readiness preparation proposal of Cote D'Ivoire. (2014). https://bit.ly/2rp35hs.

[279] Emission reductions program idea note (ER-PIN) of Ghana. (2014). https://bit.ly/2HXMUSQ.

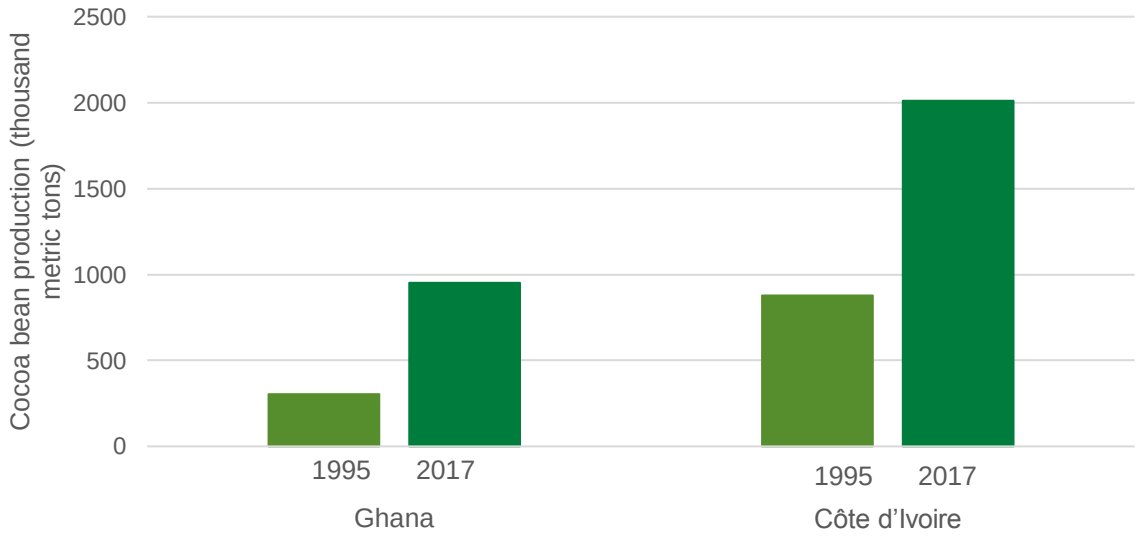
[280] Partnership for Forests. (2017). *Partnership for productivity protection and resilience in cocoa landscapes.* https://bit.ly/2yClpIL.

[281] International Cocoa Organization. (2017). Quarterly Bulletin of Cocoa Statistics, Vol. XLIII No. 3, Cocoa year 2016/17. https://bit.ly/2IffyhJ.

[282] Wessel, M., & Quist-Wessel, P. F. (2015). Cocoa production in West Africa: A review and analysis of recent developments. *NJAS-Wageningen Journal of Life Sciences*, *74*, 1-7.

[283] Schroth, G., Läderach, P., Martinez-Valle, A.I., et al. (2016). Vulnerability to climate change of cocoa in West Africa: Patterns, opportunities and limits to adaptation. *Science of the Total Environment*, *556*, 231-241.

Figure C1: Rapid Growth in Cocoa Bean Production in Ghana and Côte d'Ivoire, 1995–2017



Source: International Cocoa Organization. (2017). Quarterly Bulletin of Cocoa Statistics, Vol. XLIII No. 3, Cocoa year 2016/17. https://bit.ly/2IffyhJ; and Wessel, M., & Quist-Wessel, P. F. (2015). Cocoa production in West Africa, a review and analysis of recent developments. *NJAS-Wageningen Journal of Life Sciences*, *74*, 1-7.

The obvious solution is to replace poorly planned and aged cocoa farms with modern agroforestry initiatives that intermingle fruit- and fodder-bearing shade trees with newly planted cacao trees.[284] At first glance, this solution appears tantalizing simple: many of the existing cacao trees are nearing the end of their productive lives anyway and will need to be replenished.

Unfortunately, institutional barriers discourage this, because most farmers are tenants on land owned by hereditary chiefs, and until recently had no rights to income derived from non-cacao trees on their farms, leaving them with no incentive to let shade trees grow in among their cacao trees. Indeed, they were incentivized to destroy any trees capable of providing protective shade, out of fear that they would draw the attention of logging companies, which were known to destroy swaths of cacao to remove one timber tree.

Although Ghana's tenure laws have incrementally changed so tenant farmers now have shared rights to income from all trees they nurture, most farmers are not aware of the changes.[285] Thus, farmers are not inclined to plant shade trees among the cacao. In addition, most farmers are not in the financial position to replenish their farms by chopping older cacao trees and planting new ones, because they would have to commit to multiple years without a cocoa-based income before the new trees became productive.

C. 2. Impacts of the Supply Chain Movement

This section describes the type of supply chain commitments made in the cocoa sector in Ghana and Côte d'Ivoire and their environmental, economic, and policy impacts, as well as stakeholder perception and participation and capacity needs.

C. 2. 1. Company commitments

[286] Kroeger, A. (2017). *Eliminating Deforestation from the Cocoa Supply Chain.* Washington, DC: World Bank https://openknowledge.worldbank.org/handle/10986/26549.

[286] Kroeger, A. (2017). *Eliminating Deforestation from the Cocoa Supply Chain.* Washington, DC: World Bank https://openknowledge.worldbank.org/handle/10986/26549.

Cocoa companies are well aware of the challenges facing smallholder farmers, and many have launched programs to help address them, including training programs that help farmers become certified under one of four widely recognized standards –the UTZ sustainable farming initiative, Rainforest Alliance/Sustainable Agriculture Network (RA/SAN), Fairtrade International, and Organic.

A 2017 survey of 19 companies involved in the cocoa and chocolate trade found that 12 had made cocoa-related deforestation commitments, but none were yet reporting progress.[286] Included in the survey were six trader/grinder companies who traded and processed 89 percent of annual global cocoa production in 2016. Of these, four companies responsible for 73 percent of global processing had made deforestation commitments, with a single company, which is responsible for 24 percent of global processing, committing to 100 percent sustainable sourcing by 2020.

C. 2. 2. Multilateral cooperation

An industrywide commitment to remove deforestation from the cocoa supply chain was established only in 2017. Because cocoa is not one of the "big four" commodities[287]driving most deforestation, it was not covered by the Consumer Goods Forum's 2010 deforestation pledge, and it wasn't until March of 2017 that the Cocoa and Forests Initiative (CFI) was launched "to end deforestation and forest degradation in the cocoa supply chain, with an initial focus on Ghana and Côte d'Ivoire."[288]

CFI was spearheaded by the World Cocoa Foundation (WCF), a nonprofit membership organization representing more than 80 percent of the global cocoa market, with support from the Sustainable Trade Initiative (IDH) and the Prince's International Sustainability Unit (ISU). The CFI traces its genesis to 2014, when the WCF launched an industry-led effort called CocoaAction, to spur cooperation on smallholder productivity. Because most cocoa companies also deal in soy and palm oil, CocoaAction members had seen firsthand the advantages of coordinated action on tackling deforestation, but also the limitations of trying to move forward without the backing of governments of the countries where commitments are made.

In contrast to earlier supply chain efforts, the CFI explicitly aimed to involve the governments of both countries from an early stage to ensure enforcement and to address land-use impacts from commodities beyond cocoa. Ghanaian President Akufo-Addo and Ivorian President Alassane Ouattara supported the Joint Frameworks for Action (F4A) at year-end climate talks in Bonn.[289] Both F4A's are built on the same eight core commitments – ranging from prohibiting activities that degrade national parks and reserves to respecting the rights of cocoa farmers to aligning actions with national REDD+ strategies. Both then break those commitments down into country-specific actions and timelines divided into three action areas: forest protection and restoration, sustainable production and farmers' livelihoods, and community engagement and social inclusion.

Adding pressure to the forest, cocoa farmers in Ghana are being pushed into the forest as they are displaced by rubber plantations[290] **and illegal gold mines.**[291] All interviewees expressed concern over the impact of incursions by illegal gold miners, who not only displace cocoa farmers but

[286] Kroeger, A. (2017). *Eliminating Deforestation from the Cocoa Supply Chain.* Washington, DC: World Bank https://openknowledge.worldbank.org/handle/10986/26549.

[287] The "big four" deforestation commodities are palm oil, soy, cattle, and pulp and paper.

[288] Collective Statement of Intent. The Cocoa and Forests Initiative. https://bit.ly/2wkBSS8.

[289] World Cocoa Foundation. Cocoa & Forests Initiative. https://bit.ly/2mSSCci.

[290] Opoku-Gakpo, J. (2018). Cocoa communities hit with food insecurities of destruction of farms. *Joy News.* https://bit.ly/2HV1vOS.

[291] Schwartz-Taylor, M., & Taylor, K. (2018). Illegal gold mining boom threatens cocoa farmers (and your chocolate). *National Geographic.* https://bit.ly/2D9OCt9.

poison the waters. There was, however, no consensus on how the zero-deforestation movement could remedy this, other than by supporting landscape approaches that explicitly supported forest conservation, regardless of which commodity was driving deforestation.

Ghana also has several palm oil plantations, covering 41,086 hectares.[292] The four largest – Ghana Oil Palm Development Company Ltd. (GOPDC), Twifo Oil Palm Plantations Ltd. (TOPP), Benso Oil Palm Plantations Ltd. (BOPP), and NorPalm Ghana Ltd – are members of RSPO, and interviewees said that membership may have encouraged more transparent relations with employees and neighbors as they expanded their work with smallholder farmers, but none had insights into how that might impact deforestation.

Most companies making deforestation commitments said they were doing so because they perceived an existential threat to their long-term supplies. Early programs, therefore, focused primarily on increasing productivity among farmers, with deforestation impacts seen as a by-product. Cadbury, for example, launched the Cadbury Cocoa Partnership in Ghana in 2008 to help its farmers become certified under the FairTrade standard,[293] and that evolved into the Mondelēz's Cocoa Life Program[294] after Cadbury was purchased by Kraft and then placed in the Mondelēz portfolio.[295] That same year, Lindt & Sprüngli launched the Lindt & Sprüngli Farming Program,[296] which also provides technical and business-management training to farmers. In 2010, Mars initiated its Sustainable Cocoa Initiative, which aims for all of its farmers to be certified under one or more standards by 2020.[297]

Table C1 summarizes the impacts of the supply chain movements in Ghana and Côte d'Ivoire

Table C1: Summary of Impacts of the Supply Chain Movement in Ghana and Côte d'Ivoire

IMPACT AREA	POSITIVE AND NEGATIVE IMPACTS OF THE SUPPLY CHAIN MOVEMENT
Environmental	+ The majority of the cocoa sector has committed to increased forest protection in both Ghana and Côte d'Ivoire + Catalyzed two large private sector programs aligned with Ghana's REDD+ efforts + Was designed with the benefit of hindsight
Economic	+ Could unlock as much as $50 million in performance-based REDD finance. + The greater benefit will be increased income from increased yield and crop diversification
Political	+ Has catalyzed cooperation and organization among farmers, often in cooperation with NGOs + Has catalyzed cooperation among governing bodies and private sector toward shared goals on forests, production, and livelihoods
Policy	+ Supply chain initiatives have broad buy-in from both governments + The F4A include verifiable commitments and actions from governments to enact new policies in support of the Cocoa and Forests Initiative (CFI)
Stakeholder perception and engagement	+ Enjoys near universal awareness among relevant NGOs - Has not helped the general public understand the link between cocoa production and deforestation

[292] Ministry of Food & Agriculture. Republic of Ghana. *Brief on the oil palm sector in Ghana*. http://mofa.gov.gh/site/?page_id=8819.

[293] Gregory, D. (2010). Fairtrade hopes for Cadbury cocoa farmers in Ghana. *BBC News*. https://bbc.in/2JZschL.

[294] Cocoa Life. Cocoa Life in Ghana. https://www.cocoalife.org/in-the-cocoa-origins/cocoa-life-in-ghana.

[295] Reuters. (2011, August 4). Factbox – Kraft to split into two companies. https://reut.rs/2IvyPYX.

[296] Farming Program. The Lindt & Sprüngli Promise. https://bit.ly/2jFQHWt.

[297] Mars. Cocoa. *Caring for the future of cocoa*. https://bit.ly/2zMxXvd.

	- Has not been fully integrated into planning among chocolate companies
Capacity needs	± Has had isolated success in helping farmers develop their technical capacities
	- Does not yet adequately address the costs to farmers of transitioning to more sustainable cocoa production

C. 2. 3. Environmental impact

Deforestation – as opposed to security of supply – started becoming a focus after the mechanism now known as REDD+[298] was greenlighted at the 2005 climate talks in Montreal. REDD+ recognized deforestation as a major cause of carbon emissions and sparked renewed interest in earning income by maintaining standing forests, and for planting shade trees, which absorb carbon, among cacao trees.

Two of the most ambitious supply chain initiatives grew out of Ghana's early embrace of REDD+. The first program explicitly tied to deforestation came in 2011, when Singapore-based Olam Group, together with Rainforest Alliance/UTZ, launched an agroforestry initiative in Ghana's high-deforestation Juabeso-Bia landscape, which covers 243,561 hectares spread over two jurisdictions: Juaboso and Bia West . The landscape is home to 130,000 people and includes two large forest reserves, the Krokosue Forest Reserve and the Bia National Park, both of which have experienced extensive encroachment from farmers. Olam, one of many LBCs active in the landscape, launched its program with support from the Norwegian government, partly to pilot REDD+ financing strategies that encourage the restoration of shade trees.[299] It paid a premium to farmers who planted and maintained a minimum number of shade trees per hectare and earned certification from the Rainforest Alliance.

The supply chain movement, in the form of CFI, has committed most of the cocoa sector to increased forest protection in both Ghana and Côte d'Ivoire flowing from the F4A agreed in Bonn, which called for an immediate end to the conversion of forest land and to illegal production and sourcing of cocoa from national parks and protected areas in both countries by January 1 of 2018.

Companies and forestry authorities jointly committed to the aggressive deadline to send a signal that they were serious about implementing a phased approach that will end all sourcing of cocoa from the least degraded forest reserves by the end of 2019 and immediately end planting of new cacao trees in more degraded reserves and manage a peaceful resettlement of farmers in Ghana's Forest Reserves over the next 25 years, as existing cacao trees die off. Similar plans for forest areas are under development in Côte d'Ivoire.

CFI has catalyzed at least two programs in Ghana that are now fully aligned with its core commitments, actions, and timelines. The most advanced is an initiative begun in 2016 between the Ghana Forestry Commission and the agro-industrial group Touton SA, which was designed to reduce emissions under the country's REDD+ program.[300] The initiative, now known as the Partnership for Productivity, Protection, and Resilience in Cocoa Landscapes (3PRCL), was realigned in 2017 to fit the parameters of the CFI.[301] The 3PRCL is a produce-and-protect initiative launched with support from international partners like the Partnership for Forests (P4F), which is a project of the UK Department for International Development, as well as IDH, the Netherlands Development Organization (SNV), and Agro Eco/Louis Bolk Institute (AE-LBI), a Dutch advisory group focused on

[298] REDD+ stands for Reducing Emissions from Deforestation and Degradation and Fostering Conservation, Sustainable Management of Forests, and Enhancement of Forest Carbon Stocks.

[299] Olam. (2011, December 7). *Olam and Rainforest Alliance announce world´s first climate-friendly cocoa*. https://bit.ly/2rr6CLv.

[300] Touton. (2016). *Touton S.A partners with the Government of Ghana to develop climate smart cocoa to reduce emissions from deforestation and degradation*. https://bit.ly/2wh5fog.

[301] Partnership for Forests. (2017). *Partnership for productivity protection and resilience in cocoa landscapes*. https://bit.ly/2yClpIL.

smallholder farmers. More importantly, it includes both Cocobod and the Ghana Forestry Commission, and draws on the expertise of local NGOs like the Nature Conservation Research Centre (NCRC).

In accordance with the F4A, the 3PRCL is working with farmers' groups and local chiefs to create governance structures that can implement federal policy at the local level. The effort operates in the Juabeso-Bia landscape, where Touton works directly with 60,000 farmers and purchases 60,000 metric tons of cocoa annually: 48,000 from Bia West and 12,000 from Juabeso. The goal of the program is a measurable reduction in deforestation, enhanced resilience, significant increases in farmers' yields and incomes, and the marketing of climate-smart cocoa beans. The expected environmental outcome is to preserve approximately 160,000 hectares of protected forest reserve while delivering socioeconomic benefits to an estimated 150,000 people by 2020.

The second program, involving longtime collaborators Olam Ghana and Rainforest Alliance/UTZ, [302] adapted and fast-tracked a new initiative called the Rainforest Alliance-Olam Partnership for Livelihoods & Landscapes in Western Ghana. Launched with support from the Partnerships for Forests, it is also a produce-and-protect initiative that aims to attract REDD+ finance by creating two landscape management boards that will monitor and protect 61,190 hectares of forest reserves.

While it is too early to gauge either program's success, if they work they will protect existing forests and create agroforestry "cocoa forests" across the rural landscape. Both programs are clearly aligned with the new CFI initiative, and the 3PRCL has garnered tremendous attention across the country**.**

C. 2. 4. Economic impact

Both countries have an opportunity to earn REDD+ finance if these private sector initiatives pay off, but only Ghana has been accepted into the pipeline of the Forest Carbon Partnership Facility's Carbon Fund, which directs REDD+ finance, meaning that up to $50 million in performance-based payments are on the table[303] if these supply-chain-based initiatives can be shown to reduce emissions. The 3PRCL alone has the potential to reduce up to 2.3 million metric tons of carbon emissions each year, which in turn has the potential to generate US$11.5 million in carbon revenue from the Carbon Fund. Many interviewees, however, were skeptical – having grown weary of waiting for REDD+ financing to materialize.

Earlier efforts to help smallholders have boosted yields and incomes in isolated cases and provided sustainability premiums to some farmers, but the improvements were minimal and more than offset by the decrease in world cocoa prices. Indeed, the economic impacts of increased certification are difficult to identify because interviewees say certification focuses less on production and more on issues like child labor and gender equality. In terms of pure direct return, farmers do receive a small price premium for certified product, but it is not enough to warrant a change in behavior. The civil-society Cocoa Barometer[304] has proposed the creation of a fluctuating premium for sustainably produced cocoa that would create a floor price,[305] but chocolate companies would have to get behind that effort.

[302] Rainforest Alliance. (2018). *Eliminating deforestation in Ghana´s cocoa industry*. https://bit.ly/2HVZOk3.

[303] Muriuki, T. (2016). *To avert a chocolate shortage, Ghana bets on jurisdictional REDD+.* Forest Trends. https://bit.ly/2HV4tD0.

[304] The Cocoa Barometer is published biennially by a global consortium of civil society organisations; ABVV-FGTB/Horval, FNV, Green America, Hivos, Inkota Netzwerk, International Labor Rights Forum, Mondiaal FNV, Oxfam (Belgium, Netherlands, USA), Public Eye, Solidaridad, Stop The Traffik (Australia, Netherlands), Südwind Institut, and the VOICE network.

[305] Oomes, N., Tieben, B., Laven, A., et al. (2016). *Market concentration and price formation in the global cocoa value chain.* Amsterdam: SEO Amsterdam Economics. https://bit.ly/2ILNx53.

At least one effort, spearheaded by Hershey's and the LBC Ecom Agroindustrial Group, aims to help cocoa farmers survive, paradoxically, by diversifying away from cocoa. The two are working with the U.S. Agency for International Development (USAID) and Winrock on a pilot program to help farmers replace ageing cocoa trees with a combination of maize, plantain, and new cocoa with shade trees,[306] while also experimenting with new tenure approaches.

Interviewees said most large trader/grinders have still not proposed solutions for helping farmers through the replenishment period. Most solutions seem focused on providing rewards down the road, but not on providing up-front assistance.

C. 2. 5. Political impact

Even before the creation of CFI, the supply chain movement was effective at catalyzing farmers' cooperatives, often with help from local NGOs. NCRC, for example, helped develop community resource management areas (CREMA) while supporting Mondelēz International's Cocoa Life program. CREMAs provide a mechanism for informal groupings of farmers to engage with traditional authorities (chiefs) and the federal government, in this case to manage forest resources.

The same organization is now helping 3PRCL create landscape governance boards that can first map the forests and identify farmers living there and then help enforce new laws created in support of CFI. This will require a dual process of negotiating relocation with those who have been there for a long time and working with the Forestry Commission to evict farmers who try to move in later. That, in turn will require unprecedented willingness on the part of local farmers to draw up local bylaws designed to enforce federal laws protecting trees. This is a dramatic ask in a region where income-producing trees are treated as weeds by cocoa farmers and dismissed as *aban dua* – "government trees" – because of their status under traditional tenure systems.

The supply chain movement has already helped promote deeper cooperation and coordination on several fronts: between the governments of both countries, between the public and private sectors within both countries, and among various government ministries with different but complementary mandates, like the cocoa boards, the forestry commissions, and the ministries of lands and natural resources.

C. 2. 6. Policy impact

To address the tenure issue, the WCF and Ghanaian Forestry Commission recently launched a new system for registering shade trees planted by cocoa farmers. The system debuted in Ghana's Western Region with 150 farmers,[307] and required cooperation among the Forestry Commission, the Ministry of Lands and Natural Resources, and Cocobod, as well as private sector actors engaged in the zero-deforestation movement.

Interviewees saw the involvement of government and its regulatory powers as a critical component of the new CFI, as earlier supply chain initiatives focused almost exclusively on private sector activities. Public sector buy-in appears high, but many also warned that it could quickly fade if more private sector funding is not forthcoming. The private sector buy-in has been partially contingent on new forest governance policies.

C. 2. 7. Stakeholder perception and participation

[306] USAID.Gov. (1992). *A financial model for cocoa and farm rehabilitation and income diversification.* https://bit.ly/2I3HD80.

[307] World Cocoa Foundation. (2018). *Cocoa farming breakthrough in Ghana: Farmers grated first-time ownership of timber trees*. https://bit.ly/2G15Hra.

The supply chain movement enjoys broad awareness among NGOs and companies, but many interviewees said that government agents remain skeptical. Paradoxically, many said that years of developing REDD+ readiness had forged deep ties among NGOs in both countries, as well as between NGOs and the forestry commissions.

Beyond actors in the cocoa sector, however, there is little awareness of the link between cocoa production and deforestation – although there is a growing awareness of the impact that climate change will have on forests and agricultural production.

C. 2. 8. Capacity needs

The costs of transitioning to more sustainable cocoa production are extensive, with cocoa and chocolate companies doing little to financially support farmers despite enjoying tremendous profits due to the current depressed cocoa prices, which have not had an impact on finished chocolate. By one estimate, cocoa farmers now receive only 6 percent of what consumers pay for a chocolate bar, down from 16 percent in the 1980s,[308] and that estimate came before the recent price drops. Farmers are keenly aware of this, and most interviewees tempered their optimism with a warning that all of the efforts to improve the sustainability of production will come to nothing if trader/grinders are unwilling to pay sufficient premiums for cocoa that ultimately costs farmers more to produce.

Companies with deforestation commitments have not yet determined how to meet them. Four trader/grinder companies – responsible for 73 percent of global processing – have made deforestation commitments, yet none have reported on progress.

Improving farm productivity is essential to tackling deforestation, yet farmers lack the necessary knowledge and resources, and institutional barriers prevail. The spread of agroforestry can dramatically boost productivity and long-term sustainability, but it will require tremendous up-front costs in materials and training.

C. 2. 9. Conclusion and outlook

The supply chain movement has been successful at capturing a cocoa industry that is dominated by a small number of companies and geographically concentrated. However, to impact the forest frontier, significant financial commitments will be needed. By one estimate, it will cost $150 million to conduct restoration and replanting on 200,000 hectares across both countries.[309] Companies may view part of these needs as an investment in their future prosperity. Deforestation-related commitments have largely been made in response to signals from consumer-facing companies, and it is now up to these companies to keep their end of the bargain.

Consumer-facing companies like Hershey's, Mars, and Nestle, have vowed to ramp up their engagement in the supply chain movement, often with charismatic projects like Hershey's effort to help small farmers diversify away from cocoa. These projects have the potential not only to help companies meet their supply chain commitments, but also to ensure that consumers understand the impacts their purchases can have on people at the opposite end of the supply chain.

Both countries have outlined detailed frameworks for action with clear benchmarks for success under the CFI, and companies and NGOs are stepping up to implement them. A more detailed map and action plan is set to be published in June 2018 including detailed government plans

[308] Terazono, E. (2014, December 18). Welcome to the world of big chocolate: Three companies will dominate the processing sector. *Financial Times*. https://on.ft.com/2rPYqoc.

[309] Kroeger, A., Koenig, S., Thomson, A., et al. (2017). *Forest- and climate-smart cocoa in Côte d'Ivoire and Ghana, Aligning stakeholders to support smallholders in deforestation-free cocoa*. Washington DC: World Bank. https://bit.ly/2rqVpvo.

for resettling farmers from forested areas and corporate plans to provide traceability and accountability across their supply chains. Interviewees said that the timelines were realistic and achievable, and stressed the importance of ensuring that progress is clearly reported.

D. Methodology for Media Coverage of Deforestation

The social and news media coverage review consisted of a search for deforestation-related terms in global and regional media outlets to assess trends in the dialogue around supply chains and forests over five years. The review considered both social media and news media globally and in the five countries studied in this report over the last five years. A total of 34 media outlets were reviewed (Table D1).

Table D1: Media Outlets Reviewed for this Study

Country	Media Outlet Reviewed
Global	New York Times, Financial Times, BBC, China Daily, Al Jazeera, The Wall Street Journal, The Guardian, The Economist, YouTube, Facebook
Brazil	O Globo, Folha de S. Paulo, Correio Braziliense, Zero Hora, O Estado de São Paulo, Valor Econômico
Indonesia	Jawa Pos, Bisnis Indonesia, Media Indonesia, Kompas, The Jakarta Post
Malaysia	The Star Online, Utsan Malaysia, New Straits Times, Malay Mail
Ghana	Ghana News Agency, News Ghana, GhanaWeb, My Joy Online, CitiFM Online
Côte d'Ivoire	Abidjen.net, L'Intelligent, Le Patriot, L'Inter

The media coverage review results are presented as global aggregates (Figure 1 and Figure 2 in the main text). however, the review of regional media outlets excluded searches of commodity terms that were not specific to the country contexts (e.g., mentions of palm oil were not reviewed in Brazilian outlets, and beef was not reviewed in Indonesian outlets). The key terms that were searched for in global or regional outlets (see Table D1), are presented in Table D2. The translations used for the key terms in searching the regional outlets are shown in Table D3.

Table D2: Key Deforestation-Related Terms Reviewed

Country	Key Terms	Country	Key Terms
Global	Deforestation Zero-deforestation Deforestation AND Beef, Deforestation AND Soy, Deforestation AND Palm Oil, Deforestation AND Cocoa, Company AND Commitments AND Deforestation Company AND Commitments AND Forests Drivers AND Deforestation	**Indonesia** **Malaysia**	Deforestation Zero-deforestation Deforestation AND Palm Oil, Company AND Commitments AND Deforestation Company AND Commitments AND Forests Drivers AND Deforestation [in Malay, in Bahasa]

Brazil	Deforestation Zero-deforestation Deforestation AND Beef Deforestation AND Soy Company AND Commitments AND Deforestation Company AND Commitments AND Forests Drivers AND Deforestation [in Portuguese]	**Ghana** **Côte d'Ivoire**	Deforestation Deforestation AND Cocoa Action Framework Company AND Commitments AND Deforestation Company AND Commitments AND Forests Drivers AND Deforestation [in French and English]

Table D3: Translations Used for Key Deforestation-Related Terms

English	Portuguese	Indonesia	Malay	French
deforestation	desmatamento	deforestasi	penebangan hutan	la déforestation
zero-deforestation	desmatamento zero	nol deforestasi	tiada penebangan hutan	deforestation zéro
beef	carne	-	-	-
soy	soja	-	-	-
palm oil	-	sawit	minyak sawit	-
cocoa	-	kakao	koko	cacao
company + commitments	compromisso e empresa	komitmen perusahaan	komitmen syarikat	engagement privé or industries
action framework	-	-	-	cadre d'actions
drivers + deforestation	vetores / agentes de desmatamento	penyebab deforestasi	punca penebangan hutan	causes + la déforestation
company + commitments + forests	empresa + compromissos + florestas	komitmen perusahaan hutan	komitmen syarikat hutan	engagement privé + forêts

The review used Google's news-site search function as a standardized method to collect data from each media source. This was done by using the Boolean operator 'search:site'. The settings were adjusted to fit single-year date ranges, that is 1/1/2013 – 12/31/2013, for 2013 – 2017. For 2018, the date range used was 1/1/2018-3/12/2018. To find the total number of hits for 2013–2018, the single-year findings were summed.

It is important to note that the exact methodology behind Google's 'search:site' method is not available to the public and there have been slight inconsistencies in results when researching the same sites over the same time periods. However, due to the diversity of media reviewed and the need to use a single method for research, this method has was used with this qualification.