OCCASIONAL PAPER

Corporate commitments to zero deforestation

An evaluation of externality problems and implementation gaps

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CGIAR RESEARCH PROGRAM ON Forests, Trees and Agroforestry

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Photo by Nanang Sujana/CIFOR
Aerial footage of palm oil and the forest in Sentabai village, West Kalimantan

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Abbreviations

CDP	Carbon Disclosure Project
CGF	Consumer Goods Forum
CSR	corporate social responsibility
FPP	Forest Peoples Programme
FSC	Forest Stewardship Council
FDI	foreign direct investment
GCP	Global Canopy Programme
GHG	greenhouse gas
GVC	global value chain
HCV	high conservation value
JA-ZD	Jurisdictional approach to zero deforestation
MPF	Ministério Público Federal
PEFC	Programme for the Endorsement of Forest Certification
RSPO	Roundtable on Sustainable Palm Oil
RTRS	Roundtable on Responsible Soy
TFT	The Forest Trust
TNC	transnational company
ZD	zero deforestation
ZGD	zero gross deforestation
ZND	zero net deforestation
ZDC	zero deforestation commitment

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Executive summary

Reducing the footprint of high forest-risk commodities (oil palm, soy, wood and cattle) – in the context of mounting concerns over climate change – has featured prominently in global environmental governance discourse. In the late 2000s, this led to civil society groups putting increased pressure on major commodity producers in Northern countries to eliminate deforestation from their supply chains. In 2010, a newly established industry platform, the Consumer Goods Forum (CGF), responded to this challenge by having its members collectively pledge to work towards achieving zero net deforestation (ZND) for high forest-risk commodities by 2020. Many leading commodity producers, traders, manufacturers and retailers soon followed suit with individual time-bound commitments. This culminated in the 2014 New York Declaration on Forests, through which 190 different organizations, including 57 transnational companies (TNCs), committed to eliminating deforestation from the agriculture and forestry sector by 2020.

These zero deforestation commitments (ZDCs) have the potential to make significant long-term contributions to curbing deforestation and reducing global greenhouse gas (GHG) emissions. With influential European and American consumer goods companies predominantly driving this trend, cascade effects are anticipated throughout the supply chain, as upstream producers will be required to align their practices to more stringent procurement standards imposed downstream. However, delivering on their promise without producing unintended side effects will be no easy feat. Because of the voluntary and self-regulatory nature of ZDCs, for example, implementation gaps may emerge. Moreover, ZDCs may also produce externality problems. Commitments will inevitably lead to increased demand for non-forested lands, which may exacerbate conflicts with other socially and environmentally significant land uses such as farmlands, grasslands or wetlands. This, in turn, could result in indirect deforestation. Additionally, many companies may be required to narrow their supply base to a smaller number of producers who have the capacity to conform to more stringent production standards in order to reduce transaction costs. This may then further exclude smallholders from participating in profitable commodity chains.

This research critically examines the ZDCs of 50 'powerbrokers' in order to identify potential implementation gaps and externality problems that demand greater attention going forward. Through interviews held with major ZDC adopters and an analysis of corporate policies and strategies using a hierarchical framework, this paper evaluates 'what' companies are committed to and 'how' companies are planning to deliver on those commitments. These are divided into commitments related to achieving 'zero deforestation' (ZD) and commitments related to the management of 'negative externalities.'

Our analysis, firstly, shows that while most ZDC adopters formulated strong ZDCs, there is significant room for further refining implementation mechanisms. We find that weak commitment to full transparency, notably disclosure of sourcing locations and suppliers, and to independent verification, undermine ZDCs' transformative potential and ability to hold companies accountable for their failure to comply with their ZDCs. Nevertheless, efforts to integrate ZDC principles into existing certification systems, such as SAN and RSPO NEXT, do highlight that the necessary implementation mechanisms are becoming accessible to ZDC companies, even though buy-in into those systems has, to date, been weak.

Results also give reasons to question the level of influence powerbrokers wield over the policies and practices of other actors in the chain. For example, almost three-quarters of the sampled companies did not demand that their suppliers also embrace

company-wide ZDCs, thereby enabling suppliers to sell commodities that have not (recently) involved deforestation to ZDC companies, whilst at the same time selling commodities that did involve deforestation to non-ZDC companies. This type of parallel marketing is further facilitated by widespread reliance on certification using mass balance systems, which allows uncertified producers to participate in certified chains. This reduces the producer incentive to fully comply with sustainability standards and the capacity of downstream companies to exert influence over the policies of individual companies. Equally, since only half of the sampled companies had committed to developing plantation-level traceability systems and the majority are reliant on truthful declarations by their suppliers, adequate rigorous control mechanisms to incentivize a wholesale change in practices upstream are currently lacking.

Finally, our analysis also reveals that most sampled powerbrokers fail to explicitly account for the socially detrimental externalities that their ZDCs threaten to produce. Where this is acknowledged, it is acknowledged implicitly through standing commitments to full voluntary certification, especially in the wood and oil palm sectors. This relates in particular to commitments to applying free, prior and informed consent (FPIC) principles to land acquisitions and protection of high conservation value (HVC) ecosystems. However, only few sampled committers explicitly sought to support and maintain marketing relations with smallholders in their supplier base, to address food security risks (e.g. arising from, for example, increased demand for non-forestland), to conserve forested land banks (e.g. by not off-loading these to producers who intend to bring that land under production) and to account for possible indirect land use changes (ILUC) (e.g. from displacing non-forested land uses, notably subsistence agriculture). Given their comparatively high dependency on small suppliers, oil palm companies were found to be more responsive to the challenges that ZDCs pose for smallholders. Notwithstanding this, because many of the unaccounted externality issues are also absent from certification systems, this points to the need to better leverage the authority and mandate of state institutions in producer countries.

1 Introduction

Major Northern corporations active in the agricultural and forestry sector have, since the 1980s, been some of the primary targets of international advocacy and consumer activism campaigns because of the negative social and environmental effects of many of their operations in developing countries. This has played an important role in enhancing corporate accountability and augmenting corporate environmental and social performance norms, as is evidenced by the mainstreaming of corporate social responsibility (CSR) and voluntary third-party certification schemes during the 2000s, especially in the Global North (O'Rourke 2003; Jenkins 2005; Utting 2005; Reed and Reed 2009).

Despite this, the production of a number of internationally traded commodities continues to result in a host of adverse impacts, such as land conflicts and environmental degradation (European Commission 2013; Schoneveld 2013; Henders et al. 2015). In particular, with mounting global concerns over climate change, the forest footprint of the so-called high forest-risk commodities (oil palm, soy, wood and cattle) has taken center stage. In the late 2000s, this led to increased pressure by civil society groups on major commodity producers to completely eliminate deforestation from their supply chains. This increased pressed on the large corporations involved in those chains to commit to further strengthening their procurement and/or production practices. One of the first commitments to that effect came from a newly established industry platform, the Consumer Goods Forum (CGF), whose members in 2010 collectively pledged to work toward achieving zero net deforestation (ZND) by 2020 for these high forest-risk commodities. Many leading commodity producers, traders, manufacturers and retailers followed suit with individual time-bound commitments. This culminated in the 2014 New York Declaration on Forests, through which 190 different organizations, including 57 transnational companies (TNCs), committed to eliminating deforestation from the agriculture and forestry sector by 2020.

These zero deforestation commitments (ZDCs) have the potential to make significant long-term contributions to curbing deforestation and reducing global greenhouse gas (GHG) emissions. With influential European and American consumer goods companies predominantly driving this trend, cascade effects are anticipated throughout the supply chain, as producers will be required to align their practices to more stringent procurement standards.

Despite the obvious opportunities that ZDCs present, the potential risks are also numerous and yet to be fully understood or addressed. For example, since commitments are not framed by legally binding agreements, and – unlike voluntary certification schemes – are not consistently subject to independent monitoring and evaluation, some may prove to be largely cosmetic. Because of the self-regulatory nature of ZDCs, there is a risk that ZDCs will suffer from the same deficiencies as the CSR movement of the 1990s and remain in many cases a mere public relations and marketing strategy (Utting 2005). Moreover, commitments will inevitably lead to increased demand for non-forested lands, which may exacerbate conflicts with other socially and environmentally significant land uses and ecosystems such as farmlands, grasslands or wetlands, thereby also risking indirectly driving deforestation (Meyfroidt et al. 2014; Colchester et al. 2016). Additionally, many companies may be required to narrow their supply base to a smaller number of producers who have the capacity to conform to these more stringent production standards in order to reduce transaction costs. This may

further exclude smallholders from participating in profitable commodity chains (Pirard et al. 2015; Nepstad et al. 2017). While some companies are explicitly complementing their ZDCs with other commitments aimed at respecting local land rights and protecting peatlands, it is unlikely that such complementary commitments completely counteract the full range of risks and negative externalities.

To identify potential gaps in companies' current commitments and opportunities for improving their contributions to sustainability development in future, this paper critically examines and scores the commitments of the 50 most influential companies that had adopted ZDCs by 2016.[1] Using a hierarchical framework developed to guide the analysis, this paper evaluates 'what' companies are committed to (the 'substantive scope' of commitments) and 'how' companies are planning to deliver on those commitments (the 'implementation mechanisms' of commitments). These are divided into commitments related to achieving 'zero deforestation' (ZD) and commitments related to the management of 'negative externalities,' as follows:

1. the substantive scope of individual ZDCs
2. the mechanisms through which ZDCs are implemented
3. the substantive scope of safeguards to manage negative social and environmental externalities
4. the mechanisms through which safeguards are implemented.

As context, Section 2 explores the evolution of regulatory perspectives and approaches to managing the impacts of high forest-risk commodities and some of the major antecedents of ZDCs. We subsequently examine some of the major ZD trends and processes, and the risks and implementation challenges that are likely to emerge. Following an overview of the paper's methodological approach, the results of the ZDC are presented. We first examine the types of companies that adopt ZDCs, before turning to the analysis of company performance across the four dimensions presented above. The paper concludes with a reflection of findings, with emphasis on options to address the sustainable development risks posed by ZD adoption.

1 Based on a list of 250 'powerbrokers' in high forest-risk commodity sectors compiled by GCP's Forest500, we selected those companies that had made ZDCs, using a number of selection criteria (see Section 3.1 for a more detailed discussion).

2 Background

2.1 Regulating high forest-risk commodities

Tropical deforestation continues to feature prominently on the global environmental governance agenda. Between 2000 and 2012, forests in the pan-tropics declined at an average rate of about 9.4 million ha per year (Henders et al. 2015). This accounts for about 12% of global GHG emissions (van der Werf et al. 2009). Recently, four internationally traded, so-called 'high forest-risk commodities' became the focus of global attention. As the study of Henders et al. (2015) showed, the production of beef, soybeans, palm oil and wood constituted about 40% of tropical deforestation between 2000 and 2011.[2,3] In the last year of this period, beef accounted for 2.1 million ha of forest loss (see Figure 1), of which three-quarters was in Brazil alone. For soy and palm oil, the majority of deforestation embodied in production was attributable to exports. In contrast, in the case of beef, more than 80% of deforestation was attributable to domestic markets. It should however be noted that the expansion of other internationally traded commodities, such as coffee, cocoa, rice and other traditional plantation crops also carries a significant risk of deforestation (Donald 2004; European Commission 2013).

The 1992 Rio Earth Summit played a critical role in enhancing public and private commitment to exploring new ways to regulate the environmental impacts of global commodity production. This happened in a context where state capacity to effectively regulate corporate conduct was declining because of deregulation and structural adjustment reform. At the same time, consumer awareness campaigns and confrontational activism in the North around issues such as labor rights and environmental management, facilitated and sustained by innovations in communication technology, incited fundamental shifts in the way the general public viewed the roles and responsibilities of TNCs. Because of the value tied into intangible assets such as brands, reputations and alliances, this in turn resulted in a profound change in the corporate stance on the so-called 'triple bottom line' (Bendell 2004; Elkington 2006).[4] This has stimulated TNCs, trade unions, NGOs and international aid agencies to commit expertise and resources to filling the regulatory vacuum and resolving public good problems arising from deregulation (Bartley 2003; Scherer and Pallazo 2011). This not only gave rise to self-regulatory CSR initiatives, but also to co-regulatory initiatives with considerably stronger accountability mechanisms. In 1994, the first major iteration of such regulatory initiatives was put forward by the Forest Stewardship Council (FSC), which then launched a voluntary multi-stakeholder certification program for timber, involving a comparatively rigorous standard that incorporates a wide range of both social and environmental compliance indicators. This involved industry, and social and environmental NGOs, amongst others.

This was followed in the timber sector by a competing scheme in 1999, the Programme for the Endorsement of Forest Certification (PEFC), which endorses national certification schemes based on their social and environmental guidelines for sustainable forest management. The PEFC

2 Henders et al. (2015) used data on seven tropical countries with high deforestation rates that collectively accounted for approximately 83% of deforestation in 2011: Argentina, Bolivia, Brazil, Paraguay, Indonesia, Malaysia and Papua New Guinea.

3 In comparison, a study by Hosonuma et al. (2012) showed that commercial agriculture drives about 40% of deforestation in developing countries. Other important drivers include subsistence agriculture, infrastructure, urban expansion and mining. Timber extraction and logging were listed separately under *forest degradation*, and accounted for 52% of that classification.

4 The triple bottom line (TBL) refers to the social, environmental and economic aspects of business performance (Elkington 2006).

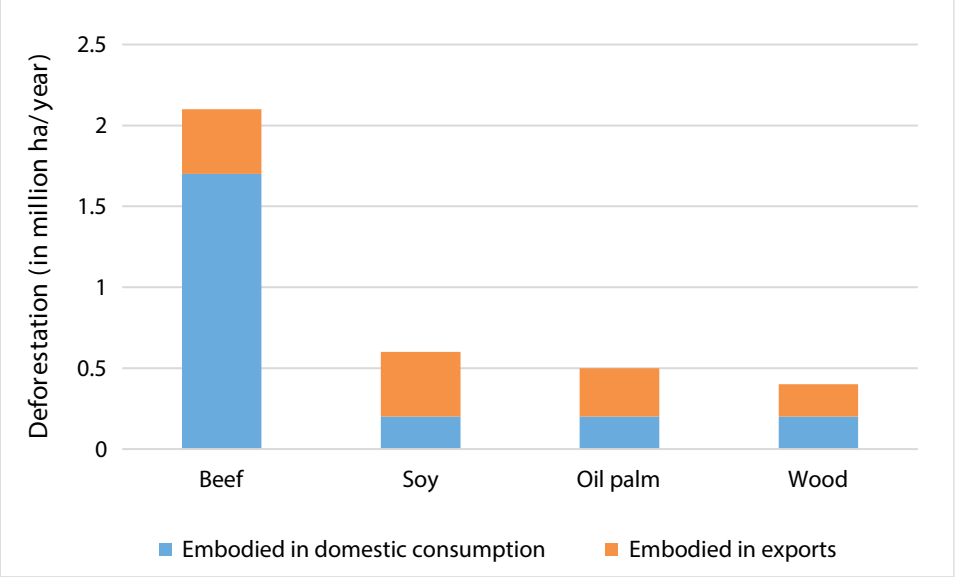

Figure 1. Deforestation attributable to high forest-risk commodities in 2011.

Source: Derived from Henders et al. (2015)

later overtook the FSC in terms of worldwide certified acreage, albeit not within tropical regions (Forrer and Mo 2013; Overdevest and Zeitlin 2014). Whereas the FSC is widely considered to have produced the most credible tropical forest certification standard, the industry-driven PEFC system remains disputed, as it largely fails to meet the forest management and assurance standards of FSC due to the variability in national systems (NEPCon 2012; Forrer and Mo 2013).

In the 2000s, similar initiatives employing similar standards emerged for other high forest-risk commodities, such as the Roundtable on Sustainable Palm Oil (RSPO) in 2002 and the Roundtable on Responsible Soy (RTRS) in 2006. RSPO was established by the World Wild Fund for Nature (WWF) and Unilever. Several other environmental and social NGOs, European consumer goods companies and palm oil producers joined the platform soon after (Silva-Castañeda 2012). The member producers are largely based in Indonesia and Malaysia, with the two countries collectively accounting for 85% of global palm oil production. WWF and Unilever were also closely involved in the development of RTRS. Later, three other stakeholder groups were incorporated – corporations, producers and other NGOs – who were afforded equal voting rights (Schouten et al. 2012). The member producers of the RTRS are mainly based in Latin America, where the lion's share of tropical soybean is produced.

The multi-stakeholder certification schemes have numerous commonalities. To gain certification, producers, traders or manufacturers are required to adhere to standards developed and periodically revised through best standard setting practices (based on ISEAL Code of Good Practice for Setting Social and Environmental Standards). Independent accreditation bodies certify production, with continued compliance established through annual audits. Most of the standards include provisions related to the protection of (only) primary forests and high conservation value (HCV) areas, as defined by the HCV Resource Network.[5] To protect indigenous rights and prevent involuntary displacement, producers are also required to apply the free, prior and informed consent (FPIC) principle to their land acquisitions.[6] Traceability is mainly based on a mass balance approach, where downstream actors

5 The HCV Resource Network defines HCVs as biological, ecological, social or cultural values that are considered outstandingly significant or critically important, at the national, regional or global level.

6 The recent land-grabbing debate gave rise to the FPIC principle as guidance to ensure fairness in land deals in the Global South. FPIC became the main pillar of the United Nations Declaration on the Rights of Indigenous Peoples, which affirmed the notion that indigenous peoples have the right not only to FPIC, but also to be represented by their own customary institutions (United Nations Declaration 2008). It was later acknowledged that communities that cannot be classified as indigenous people also have a right to FPIC (FAO 2014).

do not purchase material from certified mills; rather they purchase material that is offset against the total production volume of certified mills. Despite such certification schemes having become the benchmark for good social and environmental practice in various sectors, they govern only a small proportion of global production.[7]

While playing an important role in enhancing the sustainability of commodity production, only timber certification schemes are roughly based on ZD principles, since conversion of forests is generally prohibited and forest plantations have to be managed sustainably. The establishment of soy or oil palm plantations through the conversion of degraded or secondary forests is not prohibited under RSPO and RTRS when these are not classified as HCV.

The first tangible steps toward developing more stringent ZD standards in high forest-risk sectors came through two Brazilian multi-stakeholder initiatives, namely the Soy Moratorium and the Cattle Agreement. In 2006, a Greenpeace-led campaign against the Brazilian soy industry contributed to the development of the Soy Moratorium, to which most major buyers of soybeans from the Brazilian Amazon became signatories. They agreed not to purchase soy cultivated on lands deforested after July 2006. Federal, state and municipal governments supported its implementation, most notably through land registration, satellite monitoring and law enforcement, among other policy measures (Nepstad et al. 2014). This resulted in reducing the role of soy in deforestation in the Amazon biome from 30% to 1% (Gibbs et al. 2015a). However, the Soy Moratorium only applied to a specific geographic area, which resulted in undesirable spillovers to neighboring regions (Gibbs et al. 2015a).

The Cattle Agreement tells a similar story, as is well documented by Gibbs et al. (2015b). In 2009, NGOs and the Federal Public Prosecutor's Office in the Brazilian state of Pará (Ministério Público Federal, MPF-Pará) increased pressure on beef and leather retailers, as well as meatpacking companies and their slaughterhouses, to cease illegal deforestation associated with cattle production. The MPF-Pará sued incompliant ranchers and slaughterhouses that bought from such ranches. The state also used threats of litigation to convince Brazilian retailers to boycott slaughterhouses connected to illegal deforestation. As a result, individual meatpacking companies signed legally binding agreements with the state government of Pará. The model was later replicated in several other states in the region. However, while these agreements included the word "zero" before the words "illegal deforestation," deforestation was not entirely banned, as the Brazilian Forest Code stipulates that in many Amazonian areas only 80% of a property's forest area must be reserved for protection purposes. The agreement made in 2009 between Greenpeace and Brazil's four largest meatpacking companies however went over and beyond these legal requirements by fully committing to curbing any cattle-related forest clearing in the Amazon biome (Gibbs et al. 2015b).[8] The Cattle Agreement contributed to reducing (direct) ranching-induced deforestation from 36% to 4% over four years. However, there remains inevitable leakage problems, with some incompliant ranches reportedly 'laundering' their cattle via compliant ranches in order to continue supplying large slaughterhouses (Gibbs et al. 2015b).

2.2 The emergence of corporate zero deforestation pledges

In the late 2000s, civil society activism against deforestation in global value chains (GVCs) grew significantly. In particular, the palm oil sector came under closer scrutiny by international NGOs, which demanded that consumer goods companies cancel contracts and stop buying palm oil produced through primary forest conversion. Greenpeace in particular was successful in publicly naming and shaming a number of large producers and manufacturers (Greenpeace UK 2009; Steel 2010). At the same time, the ZD agreements in the Brazilian Amazon enabled international NGOs to lobby large TNCs such as McDonald's into restricting their soy and cattle product sourcing to ZD-compliant suppliers in the region (Greenpeace 2010).

The effect of rising pressure on major TNCs to extend their sustainability practices to ZD became especially evident when the industry association,

7 RSPO has been most successful, with Certified Sustainable Palm Oil (CSPO) accounting for about 21% of global palm oil production (RSPO 2017).

8 These meatpacking companies are Marfig, Minerva, JBS and Bertin.

the Consumer Goods Forum (CGF), was founded in 2009. One of its objectives was to improve the sustainability of consumer goods manufacturers and retailers.[9] In 2010, the CGF members committed collectively to helping achieve zero net deforestation (ZND) for four high forest-risk commodities by 2020 (WWF 2016). The CGF later released sourcing guidelines – incorporating HCV and FPIC provisions – for palm oil, soy, and pulp and paper (CGF 2013, 2015, 2016). At the same time, WWF and Greenpeace called for individual pledges to ZND and zero (gross) deforestation (ZGD), respectively (Fishman 2014). ZND implies that forest loss does not exceed forest gains in a certain geography, while ZGD refers to an end to all forms of forestland conversion, without permitting offsetting through reforestation.

Unilever and Nestlé were the first large CGF members to commit individually to ZD in 2010. Some of the large producers, especially in the oil palm sector, soon followed. Golden Agri-Resources (GAR) adopted its Forest Conservation Policy in 2011, which includes a commitment to a 'No Deforestation Footprint' across all of its plantations. In 2013, the world's largest palm oil producer, Wilmar, formulated and adopted its 'No Deforestation, No Peat, No Exploitation' policy, which, in addition to ceasing the conversion of forests and peatlands, also includes a commitment to securing the livelihoods of people affected by Wilmar's agricultural expansion (Fishman 2014). In contrast to GAR, Wilmar extended its commitments to all its suppliers, not just its own plantations. GAR soon followed. This corporate momentum behind ZD culminated in the nonbinding New York Declaration on Forests, signed in 2014 by 57 TNCs. Other signatories included banks, NGOs, governments and indigenous people's organizations. One of the key goals in the declaration was to eliminate deforestation from the production of agricultural commodities such as palm oil, soy, paper and beef products by 2020.

As more companies made their commitments, the question about what constitutes a forest for the purposes of ZD caused much controversy. One of the earliest attempts to address this came in 2011 from a partnership between GAR, Greenpeace and The Forest Trust (TFT) – referred to here as the Greenpeace group. They sought to develop a method for assessing the distinction between high carbon stock (HCS) areas, such as forests, and degraded areas with lower carbon and biodiversity value. They first piloted a HCS method, which established a maximum threshold of 35 tons of carbon per hectare to define forest boundaries (HCS Approach Steering Group 2015). In 2014, another group comprised of major palm oil producers, the so-called Sustainable Palm Oil Manifesto (SPOM) Group, funded the HCS Science Study.[10] Its approach was to measure both the above- and below-ground carbon, whereas the Greenpeace group intended to identify carbon-rich peatlands and forests separately (HCS Approach Steering Group 2015; Raison et al. 2015). This was interpreted by some environmental groups as an attempt to increase the land area available for development (Rowling 2014). Eventually, the Greenpeace group founded the HCS Approach Steering Group, which was supported by various other NGOs, service providers and companies, including some crossover members from SPOM (HCS Approach Steering Group 2015).[11] In 2016, members from the Greenpeace and the SPOM groups founded the HCS Convergence Group, which released a common HCS Approach Toolkit in May 2017. While the groups have agreed on a common methodology of defining forest areas that incorporates a number of externality issues, additional social and environmental parameters are expected to be integrated in the near future.

Despite some unresolved challenges, the ZD movement has great potential to fundamentally change how GVCs view their responsibility

9 The CGF has grown to a network of over 400 companies from 70 countries, including 256 brand manufacturers and retailers with annual revenues exceeding USD 3.5 trillion. CGF manufacturers purchase an estimated 20% of globally produced of high forest-risk commodities (WWF 2016).

10 This initially included seven signatories of SPOM, namely Asian Agri, Cargill, IOI, Kuala Lumpur Kepong Berhad, Musim Mas, Sime Darby, Unilever and Wilmar International. Apical later joined the group.

11 Cross-over members include Cargill, Musim Mas, Unilever and Wilmar. Other companies include Agropalma, Asia Pulp & Paper, Golden Veroleum (Liberia) and New Britain Palm Oil. NGOs include Greenpeace, Forest Heroes, Forest Peoples Programme, National Wildlife Federation, Rainforest Action Network, Rainforest Alliance, Union of Concerned Scientists and WWF. Service providers include TFT, Daemeter and Proforest (HCS Approach Steering Group 2015).

toward forests. Since ZD is endorsed by corporations that control a large share of the global market, positive cascade effects can certainly be expected. This is especially the case for palm oil, where more than 60% of production is subject to ZDCs (CLUA 2014). As more companies adopt and begin to align their ZD policies, major certification schemes will be better placed to develop dedicated ZD standards and jurisdictions in producer countries incentivized to develop public policies and regulations that facilitate ZD implementation, as has been the case in Brazil.

Nevertheless, much also speaks against too much optimism. The ZD movement resembles earlier attempts at corporate self-regulation, considering the prominent role of industry-driven initiatives such as the CGF and SPOM. Some multi-stakeholder certification schemes such as Sustainable Agriculture Network (SAN) and RSPO NEXT have begun to incorporate ZD indicators, but early evidence appears to suggest some reluctance by major actors in relevant sectors to embrace these schemes (see Section 4.2 for more details). While some companies have begun to pressure governments to develop and enforce more stringent public regulations in support of ZD, unresolved frictions have frustrated efforts to better align self- and hard regulations (Pacheco et al. 2017). The pivotal role of the state in helping companies implement their ZDCs in Brazil (e.g. in monitoring deforestation, sanctioning and registering landholdings) suggests that closer articulation of regulations is likely needed.

While ZD's resemblance to the early CSR movement has prompted some to label it a mere marketing strategy, there are important differences. The establishment and convergence of the two HCS groups to develop legitimate common definitions is one. Moreover, civil society groups, such as the Carbon Disclosure Project (CDP), Forest Trends and the Global Canopy Programme (GCP), systematically track the ZD performance of major committers. WWF also regularly releases progress reports about CGF members with regard to their sourcing policies around forest-risk commodities (WWF 2016). However, the question remains whether civil society will be sufficiently influential to stimulate the development of more cohesive governance arrangements that can effectively hold companies accountable for their commitments.

2.3 Risks and implementation challenges

The fact that lead firms exercise power over other value chain participants to drive new industry standards has been a characteristic element of GVC governance (Gereffi 1994; Gibbon and Ponte 2008). The assumption in the context of ZD is that adoption of ZDCs by powerful downstream actors (e.g. consumer goods companies) will stimulate upstream actors to follow suit in order to prevent disarticulation from profitable markets. However, some argue that there is a tendency to overestimate the influence that companies have on their supply networks (Choi et al. 2001; Kogg and Mont 2012; O'Rourke 2014). This stems from the fact that lead firms often struggle to fully trace raw materials back to their source, systematically monitor supplier performance and prove that a product meets sustainability standards. Because of these difficulties, suppliers might only formally commit to ZD without taking the necessary measures to ensure successful implementation. Moreover, producers might opt to target different markets if large downstream companies fail to offer the needed incentives (Gnych et al. 2015; Nepstad et al. 2017).

One of the largest challenges in terms of traceability is that many GVCs are comprised of large numbers of upstream actors with complex ownership structures that are often not entirely visible to lead firms (O'Rourke 2014). Many GVCs have multiple supply tiers, which implies that lead firms are often unaware of (changes in) supplier sourcing practices. Although operators of wood, palm oil and soy mills, or slaughterhouses are often surrounded by their own plantations or ranches, some are also supplied by many smaller suppliers to ensure that processing facilities operate at optimal capacity. This is especially the case in the Southeast Asian oil palm sector (Jelsma et al. 2017).

Effectively seeing through ZDCs requires traceability systems that can trace commodities to their source. Such systems are complex and expensive (personal communication from TFT, 2016). Monitoring producers' compliance requires demarcated production sites and spatially explicit forest baselines. Complete reliance on remote-sensing approaches and geospatial tools often does not provide sufficiently precise information, thereby requiring on-the-ground monitoring and triangulation, especially in establishing socially beneficial land uses. Because the burden and costs of compliance

(including those associated with changing land use practices) are often concentrated upstream, in addition to investing in traceability, downstream actors will need to invest in building the capacities of suppliers to comply with new procurement standards and to compensate for associated costs through premium pricing (Pirker et al. 2017; Nepstad et al. 2017). Failure to do so may result in deficient ZD implementation and/or cut into supplier margins. Moreover, companies dependent on many suppliers may be encouraged to reduce their number of suppliers in order to reduce their transaction costs, which will likely impact smaller producers whose operations are less likely to be completely formalized and often lack the necessary organizational and technical capacity to comply with more stringent procurement standards (Jenkins 2005; Miller and Jones 2010). Examples from other GVCs abound of smallholder exclusion as a consequence of raising environmental standards (Daviron and Ponte 2005; Miller and Jones 2010; Jelsma et al. 2017). Oil palm refiners in Indonesia already concentrate their 'sustainable' supply base around larger plantations (TFT 2014). To guarantee that ZDCs are inclusive and pro-poor, companies committed to ZD should also be committed to helping in the very least maintain the size of their smallholder supplier base. In practice, more smallholder-inclusive business models will likely be required to facilitate improved service delivery in support of resolving smallholder capacity constraints (Pasiecznik et al. 2017).

Further negative externalities are likely to arise when restrictions on the conversion of forests drive production expansion onto socially important lands such as farm- and pastureland, or environmentally significant lands such as wetlands and savanna grasslands. While adherence to HCV approaches and FPIC could serve to mitigate such impacts, poor implementation of such safeguards is prevalent (see, for example, Baker 2012; Fishman 2014; Franco 2014; Castka et al. 2016; Colchester et al. 2016; Schoneveld 2017), especially where these are adopted in the absence of independent monitoring and verification. Moreover, such approaches do not explicitly account for food security impacts, which are likely to emerge as demand for suitable non-forested land rises and croplands are displaced (e.g. much of the available land suitable for expansion is likely to be existing cropland) (Bregman et al. 2015). This could also result in indirect deforestation when such displaced producers and land uses are reestablished in forested areas (Meyfroidt et al. 2014).

Case studies in Indonesia and Cameroon have also shown that applying approaches such as HCS or HCV has the potential to further result in indirect land use change (ILUC) (Colchester et al. 2014, 2016). In these cases, companies sold or returned HCS/HCV areas in their concessions, which were subsequently converted by displaced local communities or less-sustainable producers (Colchester et al. 2016). Therefore, the strategies that ZD committers employ, especially with respect to existing land banks, will be critical in preventing such leakages and ensuring ZDCs do not merely involve transferring deforestation responsibilities to other parties. This requires commitment to also conserving landholdings.

3 Methods

3.1 Sampling approach

The study's sample frame is comprised of 250 companies identified by GCP's Forest500 project as 'powerbrokers'.[12] These powerbrokers are companies that have the potential to shape rules in high forest-risk commodity GVCs. This is determined on the basis of the volume of a given commodity either procured or produced, and the company's market share within the segments in which it operates (see GCP (2016) for more information on methods).[13] However, as noted by GCP (2016), its sample of powerbrokers should not be regarded as complete, since objectivity had to be sacrificed during the selection process due to lack of data on commodity flows and inconsistent corporate self-reporting. This resulted in manufacturers and retailers being better represented than producers, processors and traders. Nevertheless, the powerbroker sample was considered preferable over the CDP Forest Programme database, which also includes companies that voluntarily disclose information on their forest policies to CDP, thereby creating a sampling bias in favor of companies with more progressive forest policies.

Using the list of companies from the Forest500, desktop research was conducted to identify which companies made explicit ZDCs, drawing on corporate websites, the CDP database and media reports. For our purposes, a pledge was considered one that applied to all the company's geographies and operations with respect to a relevant forest-risk commodity. For retailers, this only applied to their own brands. The forest-risk commodities were defined as palm oil, soy, wood (divided into timber and pulp and paper) and cattle (divided into beef and leather). In the case of the timber sector, a commitment to fully FSC certifying all timber/paper procured and/or produced was considered an implicit ZDC, even though the conversion of natural forests is technically not entirely forbidden (see Box 1 for relevant criteria and definitions). For the purpose of this analysis, we consider FSC as a ZD equivalent due to the encompassing definition of 'natural forests' adopted, the comparatively small non-HCV area that can be converted and the need to ensure that conversion produces 'substantial long-term conservation benefits' (see also Fishman (2014) for a comprehensive evaluation of FSC and PEFC in the context of ZD). A dataset with basic characteristics of all of the 250 companies was developed to conduct an analysis of the drivers of (non-)adoption (Section 4.1).

3.2 Development of a hierarchical framework

A hierarchical framework was developed to help systematically analyze the commitments of those companies that we considered to have ZDC (50 out of the 250, see Annex 2–5 for an overview). It consists of a set of 7 principles, 12 criteria and 41 indicators. Appropriate criteria and indicators were developed through expert consultations, a literature review of zero deforestation risks (as summarized in Section 2.3), and by drawing on the standards of some of the more comprehensive certification schemes, such as RSPO and RSPO NEXT, RTRS, FSC and the Roundtable for Sustainable Biomaterials (RSB). The indicators were used to assess (1) the substantive scope of individual ZDCs; (2) the mechanisms through which ZDCs are implemented; (3) the substantive scope of safeguards to prevent potential social and environmental externalities; and (4) the mechanisms through which safeguards are implemented. Table 1 offers a summary of the principles and criteria, with the full hierarchical framework, including the indicators and explanatory text, found in Annex 1.

12 The mission of Forest500 is to rate influential companies, financial institutions and governments based on their policies and efforts to reduce tropical deforestation.

13 Forest500 distinguished between five value chain segments, namely production, processing, trading, manufacturing and retail.

Box 1. Forest protection under FSC

FSC natural forest conversion indicators (FSC 2015):
Conversion of *natural forests* to plantations or non-forest land uses shall not occur, except in circumstances where conversion (Criterion 6.9):

- affects a very limited portion of the area in question (i.e. less than 2% of the certified forest area on the forest management unit over a rolling five-year period)
- does not occur on high conservation value forest areas
- will produce clear, substantial, additional, secure, long-term conservation benefits.

FSC 'natural forest' definition (FSC 2015):
Natural forests include the following categories (Glossary):

- Forest affected by harvesting or other disturbances, in which trees are being or have been regenerated by a combination of natural and artificial regeneration with species typical of natural forests in that site, and where many of the above-ground and below-ground characteristics of the natural forest are still present.
- Natural forests which are maintained by traditional silvicultural practices including natural or assisted natural regeneration.
- Well-developed secondary or colonizing forest of native species which has regenerated in non-forest areas.
- The definition of 'natural forest' may include areas described as wooded ecosystems, woodland and savanna.

Table 1. Overview of principles and criteria used to evaluate ZDCs.

Principle 1: Commitment to ZD
Criterion 1.1: The company has adopted a ZD commitment and formulated specific targets to that effect.
Criterion 1.2: The company uses a comprehensive and unambiguous definition of what constitutes deforestation.
Principle 2: Full traceability and monitoring
Criterion 2.1: The company has adopted a traceability system that enables it to trace commodities to their origin in a manner that guarantees ZD.
Principle 3: Reporting, transparency and third-party verification
Criterion 3.1: The company provides adequate information to relevant stakeholders on its commitment implementation progress, in appropriate languages and forms to allow for effective scrutiny.
Criterion 3.2: The company enables credible third parties to monitor progress/compliance with its ZD policy.
Principle 4: Smallholder inclusion
Criterion 4.1: The company maintains or increases the level of sourcing from smallholders.
Principle 5: Protection of other important non-forest ecosystems
Criterion 5.1: Producers avoid development of areas of high biological and ecological significance and natural ecosystems of social or cultural value (HCV).
Criterion 5.2: Producers avoid development on wetlands and peatlands.
Principle 6: Land justice
Criterion 6.1: Producers proactively address tenure risks before new land acquisitions are made.
Criterion 6.2: Producers do not jeopardize food security through their land acquisitions.
Principle 7: Prevention of harmful indirect land use change (ILUC)
Criterion 7.1: Producers' spatial expansion on already occupied lands must not result in harmful ILUC, such as conversion of valuable ecosystems or land conflicts.
Criterion 7.2: The company extends ZDCs to company land banks that comprise forests regardless of ownership.

It should be noted that it was not this study's aim to develop a complete set of indicators that capture all issues pertinent to ZD. Instead, the indicators should be viewed as a selection of proxies to facilitate identification of substantive and procedural gaps in ZDCs and externality management. Some externality management criteria may also be more relevant to one industry and/or production system than another. For example, some companies in the timber sector are only involved in the exploitation of natural forests and are not involved in land use conversion (e.g. in contrast to the development of tree and crop plantations). Therefore, the ZDC risk related to indirect land use change for these companies may be of less concern. Similarly, powerbrokers in the soy, cattle and timber sectors are considerably less dependent on smallholders (and vice versa) than in the palm oil sector. Risks to wetlands and peatlands are also considerably higher in the oil palm sector than the other sectors (e.g. especially due to the comparatively high prevalence of peatlands in Southeast Asia). In order to account for these differences, we primarily present sector-disaggregated data. For most indicators (with the exception of those listed in Annex 1), we choose not to discriminate between commodities in the assignment of relevant indicators where it could not with confidence be ascertained that an indicator is categorically irrelevant. For example, companies sourcing wood products rarely exclusively source these from (producers involved in) natural forests and may also source wood from (producers of) planted forests. In some places in Latin America, an increasing number of smallholders are engaged in commercial forms of animal husbandry, where significant sales occur through intermediaries working with large-scale ranchers (Pereira et al. 2016). Nevertheless, in appraising our study's results, it must be acknowledged that the failure of committers to account for certain negative externalities may be more socially and/or environmentally detrimental in some sectors than in others.

3.3 Data collection and analysis

To explore the factors that shape the adoption of ZDCs, some basic firm characteristics were adopted from Forest500; these include information on corporate revenues (where available), headquarter location, value chain segment and type of ownership (publicly listed, private, cooperative, state owned).[14] Companies were often attributed multiple relevant value chain segments, which were defined as production, processing, trading, manufacturing and retail. This resulted in a variety of different combinations. For simplicity, they were aggregated into three categories:

a. *Upstream:* production, with processing and/or trade
b. *Integrated:* production, processing and trading in combination with manufacturing and/or retail
c. *Downstream:* manufacturing and/or retail.

For the analysis of the drivers of adoption (Section 4.1), we used these data to isolate those variables that are positively or negatively associated with adoption decisions. For this purpose, we employed a binary response model using a probit link function. The response variable, which is the decision to adopt a ZDC or not, was regressed onto a vector that reflects company characteristics.

For the analysis of ZDCs and externality management (Sections 4.2 and 4.3), we assessed each company's individual ZDCs against the indicators from the hierarchical framework, drawing on information available in corporate policies, annual reports, procurement policies, sustainability/CSR reports and other publicly accessible information. Moreover, publicly accessible information from 24 of the 50 companies was accessed through the CDP Forest Programme. Because relevant information was rarely contained within a single document, we were required to draw on multiple sources. If an indicator could not be measured in a binary way, multiple answer categories were created. If a company was committed to becoming fully certified under the RSPO, RTRS, FSC or PEFC

14 One modification was made to the Forest500 classifications. The issue was that the allocation of paper as a 'relevant' commodity for a company did not seem to be based on market analysis, but rather on the fact that each company is assumed to use paper for purposes such as transportation. This did not appear to be a reasonable assertion, as for example an agricultural producer does not use enough globally significant amounts of paper to be classified as a powerbroker. Consequently, in this research, paper was considered relevant to producers of paper and to manufacturers when paper and/or paper-based products were part of their product line/core business. This therefore excludes companies using paper-based products for packaging or transportation material.

schemes or to exclusively purchasing certified raw materials, it could pass certain indicators indirectly.

For the purpose of the ZDC analysis, ZDCs were disaggregated by commodity and analyzed individually given sectoral differences that need to feature in the interpretation of results. Thus, one single company could be attributed up to four ZDCs. This explains why the number of identified ZDCs (72) was higher than the number of companies with ZDCs (50).[15]

A scoring system was created to provide a comprehensive and succinct overview of the indicator results. The scoring scheme is summarized in Box 2. It scores ZDCs and negative externality commitments across two dimensions– the substantive scope of commitments and associated implementation mechanisms. Each company therefore received four scores for those commodities subject to a ZDC (see Annex 2–5 for individual company scores). We refrained from weighting indicators due to the risk of introducing biases resulting from what in our context would involve a normative and arbitrary assignment of weights. For example, we would need to make value judgments about the relative importance of different types of indicators (Limon and Sanchez-Fernandez 2010). Dimension reduction techniques were not considered necessary since indicators with high intercorrelation tended to belong to the same criteria. Because we average the scores of all indicators within a criterion, much of the bias that would result from intercorrelations is addressed.

Following this, a number of stakeholders were interviewed in order to help explain findings. Semistructured interviews were conducted with representatives of 9 of the 50 ZD committers and 3 third parties. Interviewed committers include Sinar Mas, Wilmar International, Danone, Pepsico, Unilever, Grupo Bimbo, Nestlé and Orkla. Third-party interviewees include TFT, Daemeter, and Forest Peoples Programme (FPP). Information obtained from these interviews are largely anonymized since most interviews were conducted under the condition of anonymity.

Box 2. Scoring scheme

- By fully committing to an indicator, a company is awarded one point. It is given half a point if the company did not fully commit to an indicator, but did issue an announcement that a commitment was pending and/or referred only to its own production (rather than also extending requirements to its suppliers). Annex 1 highlights those indicators where partial scores were allocated.
- Scores were averaged at the criterion level. If a criterion included both commitment and implementation indicators, the average score of each type of indicator contributed 50% to the overall score of the criterion.
- The overall score of a principle was the average score of its criteria.
- The category "ZD" consists of principle 1, which includes the commitment indicators, and principles 2–3 which include the implementation indicators. Principle 1 and principles 2–3 contributed 50% each to the overall score of the category.
- The category "managing externalities" consists of principles 4–7. Every principle in this category contributed the same to the overall score of the category.

15 A company that is yet to adopt a ZDC for a ZD-relevant commodity in its portfolio was not marked down in our scoring since we did not intend to evaluate compliance of commodities with our indicators when these are not subject to ZDCs, given our interest in the quality of ZDCs.

4 Analysis

4.1 Drivers of (non-)adoption

Of the 250 sampled companies, 50 had made ZDCs by the end of 2016. This included 19 out of 23 signatories of the NY Declaration on Forests and 23 out of 56 CGF members that were included in the Forest500 sample, demonstrating that most companies involved in CGF's collective ZD pledge did not immediately follow up with individual commitments.

Descriptive statistics suggest that the ZD movement is largely driven by Northern markets. Table 2 shows that most adopters (72.0%) are headquartered in Europe or the United States, followed by Southeast Asia (18.0%). The Southeast Asian adopters are typically those that rely heavily on Northern end-markets. The data also suggest that more vertically integrated companies are more inclined to adopt ZDCs than companies in upstream or downstream segments. Because vertical integration enables companies to more closely control their supply chain, the implementation of ZDCs arguably involves fewer transaction costs for these companies than for downstream companies.

Almost a quarter of the sampled companies that are involved in the palm oil and wood industry adopted ZDCs (Table 3). Despite the soy and cattle industries having a larger forest footprint than palm oil and wood, a considerably smaller proportion of companies involved in these sectors adopted ZDCs. This is partly attributable to the long history of consumer activism against the palm oil and wood industries and the increasing legitimacy and mainstreaming of private standards

Table 2. ZDC adoption rates of Forest500 companies by value chain segment and geography.

Value chain segment	Rest of Asia	Latin America	Southeast Asia	USA	Europe	Others	Total
Upstream (%)	0 (1)	14.3 (7)	20.0 (15)	0 (0)	33.3 (3)	0 (1)	18.5
Integrated (%)	0 (4)	0 (3)	66.7 (9)	100 (1)	100 (1)	0 (2)	38.1
Downstream (%)	1.5 (68)	7.7 (13)	0.0 (4)	34.1 (44)	29.0 (62)	20.0 (10)	18.4
Total (%)	**1.4**	**8.7**	**32.1**	**35.6**	**30.3**	**15.4**	**20.0**

Note: Total number of companies per category is in parentheses (e.g. comprising the whole sample of 250 companies including both committers and non-committers).

Table 3. Adoption rates by value chain segment and commodity.

Value chain segment	Oil palm	Soy	Cattle	Wood
Upstream (%)	23.5 (17)	0.0% (0)	0.0% (0)	11.1% (9)
Integrated (%)	46.7% (15)	22.2% (9)	0.0% (0)	27.3% (11)
Downstream (%)	22.9% (131)	6.8% (118)	7.0% (71)	25.0% (48)
Total (%)	**25.2%**	**7.5%**	**7.0%**	**23.5%**

Note: Total number of companies per category are depicted in parentheses.

such as the FSC and RSPO. Some interviewed stakeholders also posited that because of the purported success of the Brazilian Soy Moratorium and Cattle Agreement, the soy and cattle industries have managed to avoid the level of public scrutiny experienced by the palm oil sector.

When controlling for income and whether a company is publicly listed, the results from the probit regression (Table 4) reveal similar results. They confirm that involvement in the palm oil and wood industries and being headquartered in a Northern country positively predict ZDC adoption. The model also shows that companies that are publicly listed are also more likely to adopt ZDCs. This is likely attributable to the added imperative of safeguarding the company's public image, shareholder pressures and (legal) disclosure requirements. Interestingly, corporate revenue was not found to be positively associated with likelihood of making ZDCs.

The respondents generally claimed that avoiding reputational fallouts associated with NGO activism campaigns was the primary driver of adoption. Constructive dialogues with NGOs on ZDC implementation also factored into this. Additionally, a number of respondents asserted that because they anticipate future mainstreaming of ZD norms, a competitive/early mover advantage can be gained from championing ZDC through improved brand value. One respondent claimed that their ZDC is also a tactic to 'socialize' the public about ZD, which may force competitors into adopting ZDCs that they are less able to implement and integrate as new practices.

Most respondents, however, claimed that external pressures from shareholders or financiers did not meaningfully play into the adoption decision. However, it was typically a boardroom decision due to its strategic relevance and implications. Despite this, ZDCs were generally not explicitly integrated into corporate strategies, but rather into specific sustainability or CSR policies.

While respondents acknowledged that ZDCs are driven primarily by Northern companies and markets, many expect cascade effects onto Southern markets and companies, especially considering how newer generations of executives, especially in Southeast Asia, are viewed as more progressive and sustainability oriented. Nevertheless, most respondents do consider the *bifurcation* of high forest-risk commodity markets an inevitability, whereby companies that are unwilling or unable to comply with new ZD norms will simply target emerging markets with fewer demand-side ZD pressures such as China, Russia, India and Pakistan, as also posited by others (Gnych et al. 2015; Nepstad et al. 2017).

4.2 Commitment to zero deforestation

4.2.1 Substantive scope

Only 40% of the 50 sampled companies formulated time-bound ZDCs to all commodities relevant to them (as identified by Forest500). The other 60% only partially committed to ZD

Table 4. Probit regression results – ZDC adoption determinants.

Dependent variable	ZD Commitment (binary)	
Independent variable	Standardized coefficients	Z-statistic
Revenues (USD/year)	0.000	–0.030
Northern origin (dummy)	1.298	4.960***
Produces soy (dummy)	–0.663	–2.180**
Produces oil palm (dummy)	1.533	4.200***
Produces cattle (dummy)	–0.343	–1.290
Produces wood (dummy)	0.992	3.530***
Publicly listed (dummy)	0.856	3.180***
Upstream (dummy)	–0.256	–0.580
Integrated (dummy)	0.385	1.700*

* significant at the 0.1 level, ** significant at 0.05 level, *** significant at 0.01 level

(primarily because commitments do not cover all of their ZDC-relevant commodities). Two-thirds of the ZDCs refer to the symbolic year 2020 (or earlier) in analogy to the collective targets of the CGF and the New York Declaration on Forests (Figure 2). The majority of ZDCs either explicitly refer to ZND or remain ambiguous about whether it is ZND or ZGD that they are committed to. Nevertheless, nearly all palm oil producers committed to ban development on HCS areas, which implies ZGD.

As regards the applied forest definition, most companies committed to adopt the HCS definition (Figure 3). If, aside from HCS, the forest definitions employed by FSC and PEFC are to be considered as acceptable (see Box 1), 76.7% of the adopters specified a forest definition.

With regards to company expectations of suppliers, approximately one quarter (comprised almost exclusively of companies involved in palm oil) expected suppliers to make ZDCs for at least one forest-risk commodity (Figure 4). Most companies only require that the commodities they procure do not involve deforestation. This suggests that most companies in principle tolerate deforestation in their supply chain as long as their own supply originates from non-deforested lands.

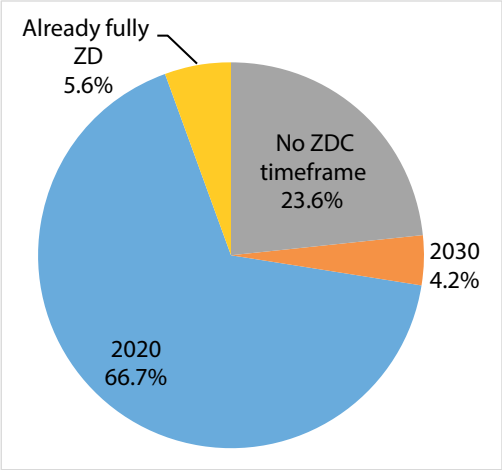

Figure 2. Target year for ZDC achievement.

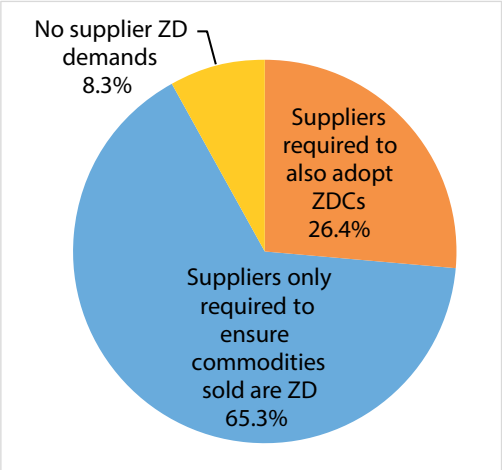

Figure 4. ZD demands on ZDC suppliers.

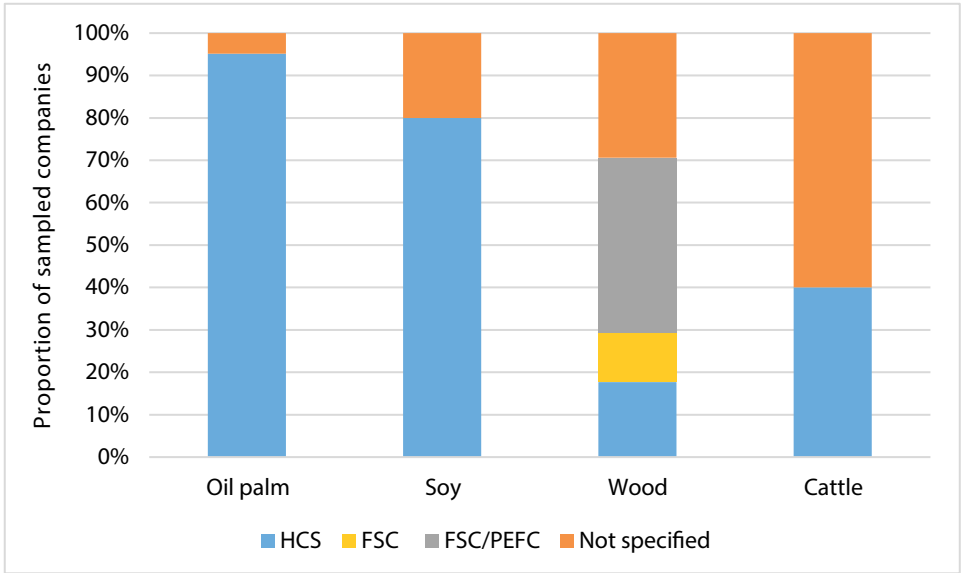

Figure 3. Forest definition adopted in ZDCs.

4.2.2 Implementation mechanisms

Adoption of standardized implementation approaches

In general, the companies disclosed only limited information on how they intend to implement ZD. An exception was wood, because for most companies fully committed to only purchasing FSC- and/or PEFC-certified materials, traceability and monitoring mechanisms were indirectly specified by certification standards. Two companies committed to purchase FSC-certified materials exclusively, whereas the others generally accepted PEFC certification. Many companies stated that they give 'preference' to FSC-certified materials, but rely on PEFC-certified materials otherwise. However, no company explicitly excluded the purchase of FSC Controlled Wood material, which is a mix of FSC-certified material and other material from "acceptable sources", which are defined by significantly weaker certification and monitoring standards based on a broader risk assessment. Among the four owners of wood plantations, only Precious Wood committed to full certification (FSC). This indicates there is a potential risk that ZD will be watered down to PEFC and FSC Controlled Wood, which are generally weaker in forest protection than the full FSC standard.

In 2017, SAN released their new Standard, which integrates the HCS forest definition. With RSPO NEXT, the RSPO has developed an add-on to its existing certification scheme, which enables companies to independently verify their ZD performance. However, unlike SAN, it is yet to fully integrate the HCS forest definition into its standard. However, none of the adopters disclosed any intention to work toward full certification under these specific schemes. Major companies in high forest-risk sectors have expressed little interest in either scheme; by November 2017, for example, only one company – a family business in Colombia – was certified under RSPO NEXT.

The HCS Approach Peer Review Process cannot be considered an acceptable equivalent to such certification systems since it does not require third-party verification, nor are companies required to address concerns raised by reviewers. While some oil palm companies (e.g. Wilmar and KLK) have begun to undertake and publicly disclose the results from their HCS assessments, none of the sampled companies unequivocally committed to the HCS Approach, rather committing just to the HCS definition. This would technically enable companies to demarcate HCS areas without complying with the additional social and environmental safeguards of the HCS Approach, such as, for example, FPIC and Integrated Conservation and Land Use Planning (ICLUP). The HCS Approach Steering Group considers the review process as an interim solution until the approach has been incorporated into third-party certification systems. However, with certification schemes seemingly looking to merely integrate the HCS forest definition, not the HCS Approach, it is questionable whether the HCS assessment will become subjected to independent verification in the foreseeable future.

Traceability

One of the first steps in implementing ZDCs without independent certification is establishing a system to trace commodities to their source. In the interviews, company representatives indicated that their efforts to achieve traceability simply involved asking the first-tier suppliers to provide information about their second-tier suppliers. This process continues through to the lower-tier suppliers until the targeted traceability level is reached. In this way, companies can map their value chains. However, the procedure cannot guarantee that the acquired traceability information is entirely correct, as it relies largely on truthful declarations from the suppliers.

Although various service providers have developed more sophisticated traceability tools,[16] most companies did not explicitly commit to any of them. One company representative explained that their attempt to apply such a traceability tool was met with strong resistance from suppliers. The anticipated increase in bureaucratic efforts, the associated costs and a reluctance to fully disclose all sources might be among the reasons why suppliers rejected them. Companies' traceability efforts may be further limited because they not only purchase their raw materials from contracted suppliers, but also rely on spot markets in the event of supply shortages. As one company representative conceded, this makes their proclaimed target of 100% traceability practically impossible.

16 Traceability tools include, for example, *GeoTraceability, Known Sources* and *Ariba*.

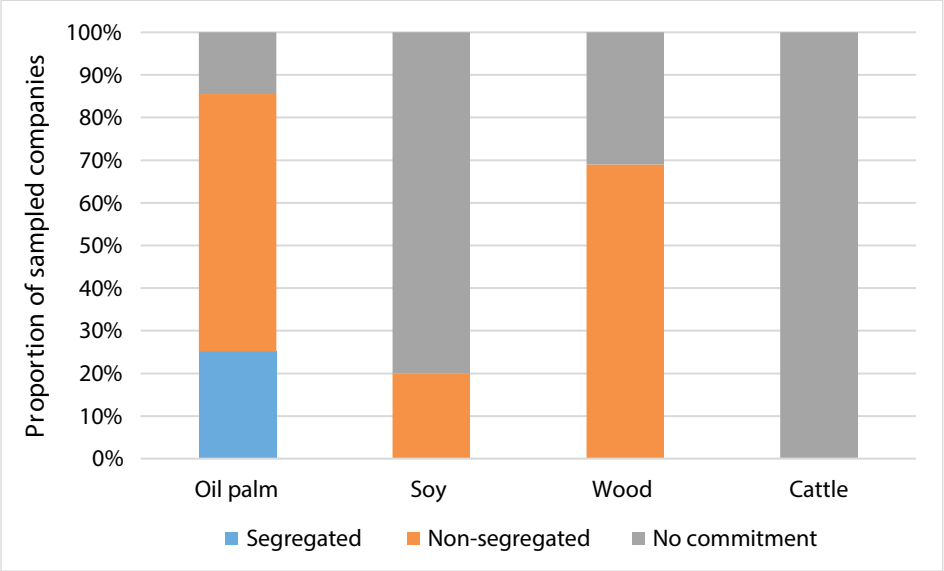

Figure 5. Commitment to full certification.

Note: Non-segregated refers to mass balance systems. Companies that committed to a mix of RSPO Mass Balance and Greenpalm certificates were also included as utilizing non-segregated products.

Existing traceability systems of the RSPO and RTRS are of little help in providing full traceability information. Only the RSPO's Identity Preserved scheme ensures traceability to plantation level; however, none of the companies fully committed to or even acknowledged Identity Preserved because it is substantially more expensive to segregate commodities throughout the value chain. One-quarter of the adopters of palm ZDCs committed to full certification under the RSPO Segregated scheme, which provides traceability to certified mills (Figure 5). The majority of RSPO-certified palm oil is produced under mass balance systems,[17] where materials from different certified and noncertified producers/mills are mixed to increase economic efficiency.

Figure 6 shows that wood scored significantly lower than palm oil in terms of targeted level of traceability. This is because, in our analysis, we did not regard a commitment to full certification without explicitly excluding FSC Controlled Wood as means to ensure traceability to or certification at plantation or mill level. However, we acknowledged that such a commitment partially ensures traceability to plantation level and therefore awarded it half a point in our scoring.

In the case of palm oil, mill level was often justified as a sufficient traceability target because the fresh fruit bunches of the palm trees are typically sourced from within a limited radius around each mill, so this area can be monitored through remote sensing. However, traceability to plantation level is necessary to exercise leverage over third-tier suppliers whose exact production sites would otherwise remain unknown. Moreover, the sourcing geographies of different palm mills often overlap and sourcing radiuses tend to differ depending on geography and mill density, which makes it imperative to trace back to plantation level in order to prove compliance with ZD. Adopters of palm ZDCs are however hesitant to target traceability to plantation level because palm mills are often supplied by a considerable number of smallholdings or intermediary businessmen. Some companies, notably Wilmar, are currently investing in mapping (part of) their smallholder supply base.

Some respondents claimed that ZD implementation could result in an undesirable loss of suppliers, with mill owners switching to other buyers if ZD implementation was too disruptive and insufficiently consultative. In this context, the representatives of downstream

17 In a mass balance system, certified and noncertified materials are mixed to avoid the costs of keeping the two separate. The purchase of certificates is limited to the volume of material that originates from certified production sites.

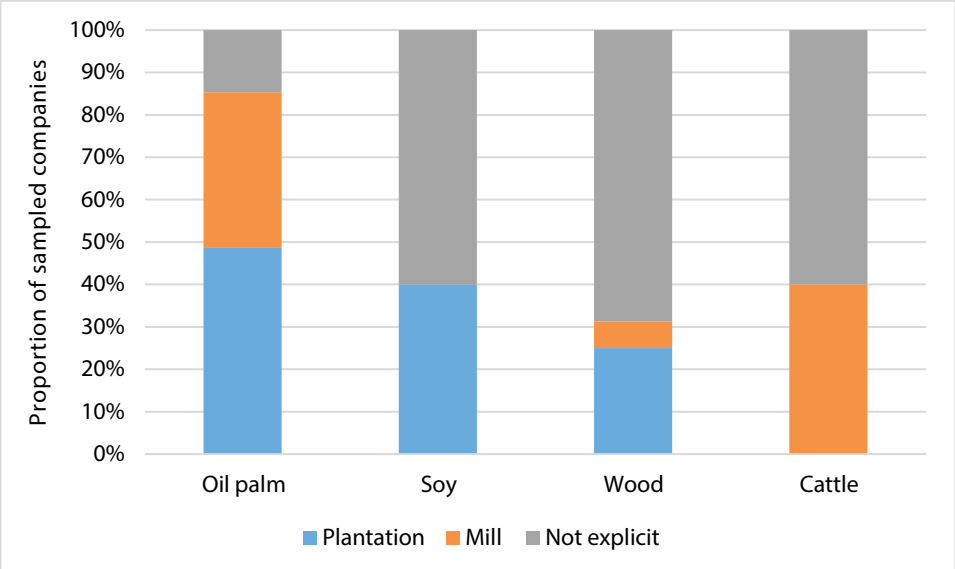

Figure 6. Target traceability level or certification level.

Note: For cattle, plantation and mill were considered the equivalent to ranch and slaughterhouse, respectively. A commitment to FSC certification without excluding FSC Controlled Wood equated to 'Not explicit'.

companies argued that their influence is limited to sending "small market messages" by reducing volumes purchased and engaging service providers to help sensitize mill owners. However, this argument may be interpreted as a justification for weak implementation in order to save costs. It appears that most downstream companies simply expect their suppliers to comply with ZD, rather than committing to investing in supplier capacity building and developing cost-sharing arrangements.

Only 40% of companies with soy ZDCs committed to traceability to plantation level, even though the mainly Latin American soy producers usually operate on medium- and large-scale plantations and rely minimally on smallholder suppliers. This would reduce the cost and complexity of achieving traceability, especially compared with palm oil, where small producers constitute a prominent producer group (personal communication with TFT, 2016). None of the adopters of cattle pledges targeted full traceability to ranches. Unilever reported it had obtained maps of the properties of their two main beef suppliers in Brazil. However, it did not clarify whether these ranches potentially received cattle or calves from deforestation frontiers. It is also worth noting that none of the adopters of cattle pledges extended their commitments to animal feed, where soy plays an important role (as a source of protein).

The majority of downstream companies in our sample failed to commit to full traceability to plantation level, while more than 80% of upstream and integrated companies did. This is likely a reflection of the comparatively high costs of achieving full traceability when not directly involved in commodity production.

Monitoring

Besides traceability, ZDCs should also involve active monitoring. However, the majority of companies did not make clear commitments on monitoring mechanisms, suggesting that in many cases suppliers will bear the burden of proof (if at all demanded). Approximately one-third of sampled companies committed to undertaking or commissioning geospatial monitoring of their plantations and suppliers (Figure 7). Several companies engaged specialized service providers such as TFT or ProForest to support these efforts. While the HCS Approach does not (yet) offer a monitoring framework, there are a number of tools that companies and service providers are exploring. These include the Global Risk Assessment System (GRAS), developed specifically for certification schemes under the EU Renewable Energy Directive, which provides information about biodiversity, carbon stock, land use change and tenure and can help identify areas where deforestation risks are especially high. Another tool that has proven to be effective is Agro Satellite, used to monitor the Soy Moratorium area for the Brazilian Government.

While the discussions on suitable monitoring mechanisms for ZDCs are still in its infancy, it appears likely that these will focus (purely) on remote sensing approaches due to their cost effectiveness. Consequently, there is a risk that social considerations will not be comprehensively captured in monitoring activities.

Transparency and verification

In the absence of standardized monitoring frameworks, enhanced transparency will contribute to outsourcing of monitoring by enabling third parties to evaluate progress more effectively.

However, less than half the ZDCs involved commitments to disclosure of sourcing regions and percentages of traceability disaggregated by traceability level (Figure 8). Integrated companies were found to be comparatively transparent. Most of the companies disclosed only partial or imprecise information on their progress or were not committed to reporting at all. Moreover, only 11.8% of companies displayed a willingness to disclose the identities of their suppliers. Wilmar has, to date, exhibited the greatest commitment to transparency by disclosing concession maps, supply locations and some spatial information on smallholders integrated into its supply base.

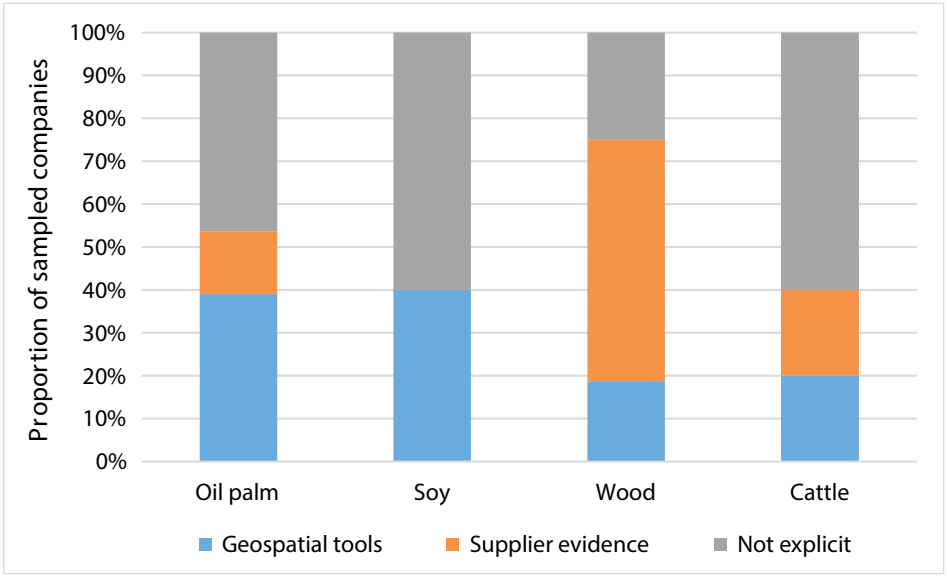

Figure 7. Monitoring mechanisms adopted.

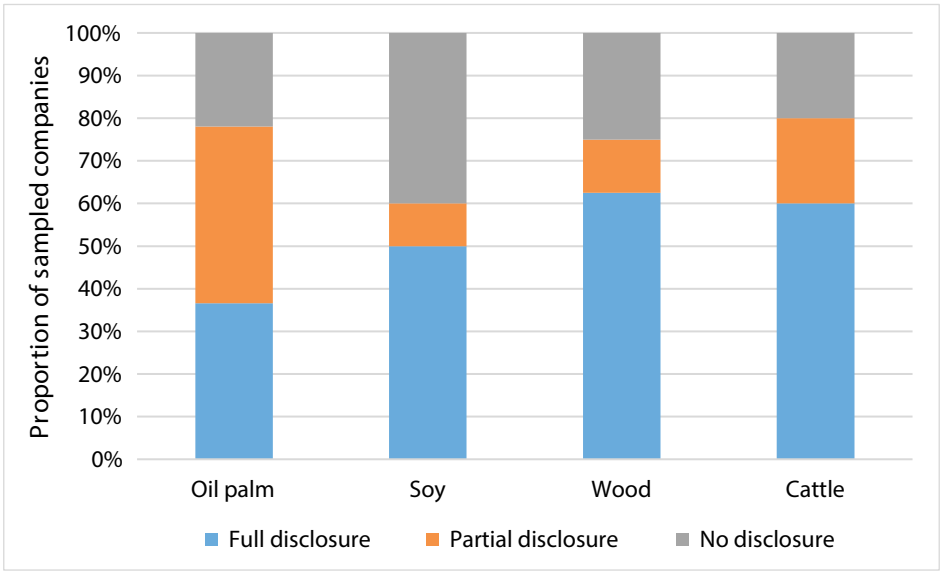

Figure 8. Transparency commitments.

Lack of transparency compromises the ability to hold companies accountable for their failure to deliver on their commitments. Lack of commitment to third-party verification further contributes to this. Approximately one-third of the ZDCs included commitment to third-party verification (Figure 9). Wood scored highest since most of the companies passed this indicator by committing to full FSC or PEFC certification; as RSPO or RTRS do not guarantee ZD, full commitment to those standards does not ensure independent verification. Future integration of the HCS Approach or definition into private standards could help resolve this, although companies' reluctance to commit to RSPO NEXT, and instead favoring the (unaudited) peer review process of the HCS Approach, suggests that companies are hesitant to commit to third-party verification.

4.2.3 Scoring

Results from the scoring show that companies in general make fairly comprehensive commitments, with the exception of those companies with ZDCs that relate to cattle (Figure 10). However, as expected, implementation mechanisms are yet to be fully worked out in the areas of traceability, monitoring, transparency and third-party

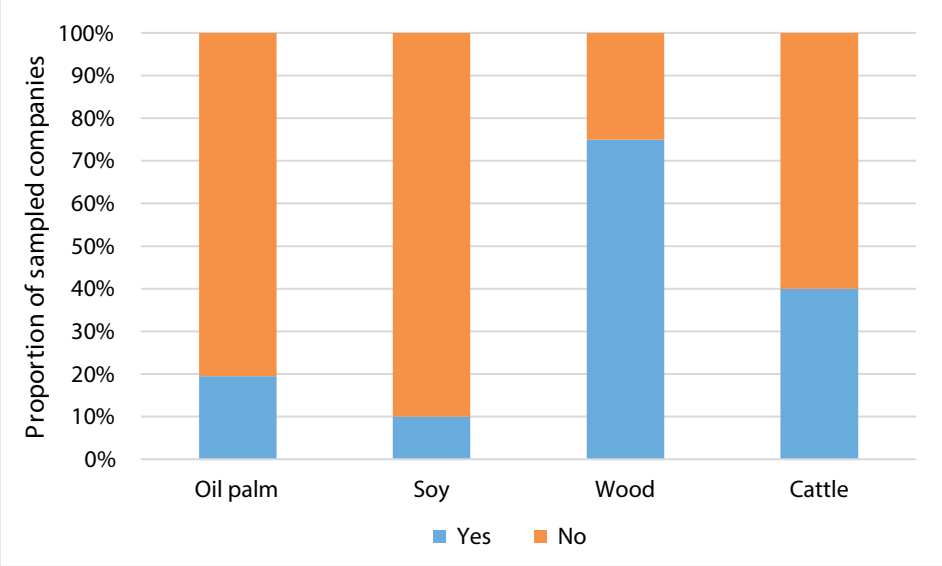

Figure 9. Commitment to independent verification.

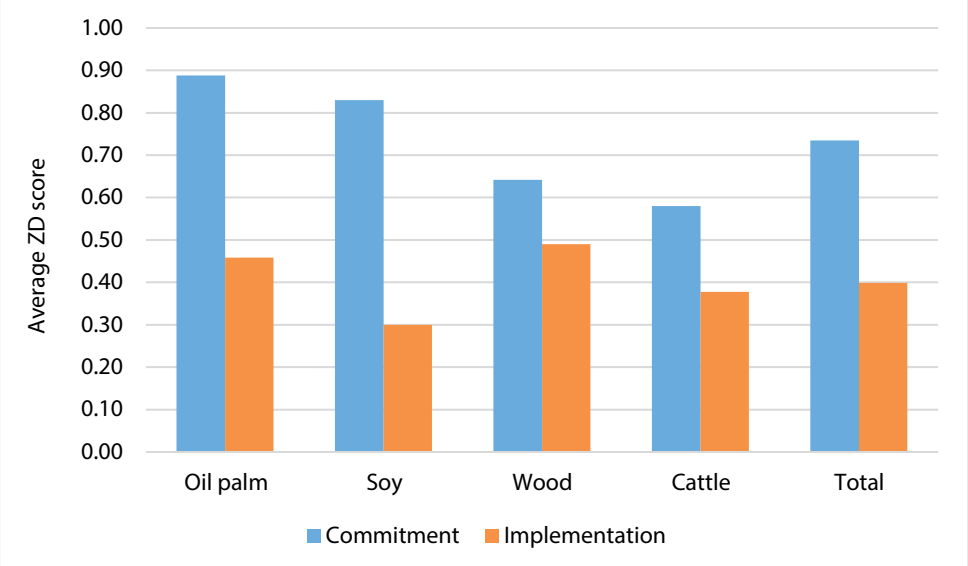

Figure 10. ZD scores, by commodity.

verification. These are best defined in the wood industry, largely because certification schemes to which companies are committed incorporate ZD principles (see Annex 2–5 for individual company score by commodity). Integrated companies on average tended to adopt more comprehensive implementation mechanisms than up- and downstream companies. This is likely attributable to reduced transaction costs resulting from their enhanced capacity to coordinate activities across value chain nodes.

4.3 Commitment to managing social and environmental externalities

4.3.1 Substantive scope

As illustrated in Figure 11, most ZDCs involve additional commitments to HCV and peatland protection (albeit often without reference to peat depth). Wetland and peatland protection commitments are logically more prevalent amongst companies involved in the palm oil industry, due to the increasingly poor public image of companies involved in peatland conversion and associated fire risks. Many ZDCs also comprise commitment to FPIC for land acquisitions, either directly and/or indirectly (e.g. through full commitment to certification schemes that incorporate principles of FPIC). Less than a quarter of relevant companies that made ZDCs, however, committed to providing support to smallholders in their supply base; for example, in order to prevent that suppliers lacking capacity and resources to comply with new procurement and traceability demands are alienated from GVCs.

None of the sampled companies, however, passed four of the commitment indicators: (1) maintaining marketing relations with the smallholders in their supplier base; (2) ensuring ZDCs do not adversely affect food security because of changing land use patterns (e.g. increased demand for non-forestland); (3) conserving existing forested land banks (e.g. not off-loading these to producers that intend to bring that land under production); and (4) preventing indirect land use change (ILUC) (e.g. from displacing non-forested land uses, notably subsistence agriculture). It must be noted that a handful of companies did express a commitment to safeguarding food security in specific locations and a general willingness to support smallholders in complying with the new standards. Such expressions of intent were not, however, considered the equivalent of a full commitment.

The willingness to support smallholders was largely limited to those in the palm industry. This is unsurprising given the fact that a comparatively large number of companies in the palm oil sector are involved in smallholder sourcing. Although the termination of supplier relationships was often

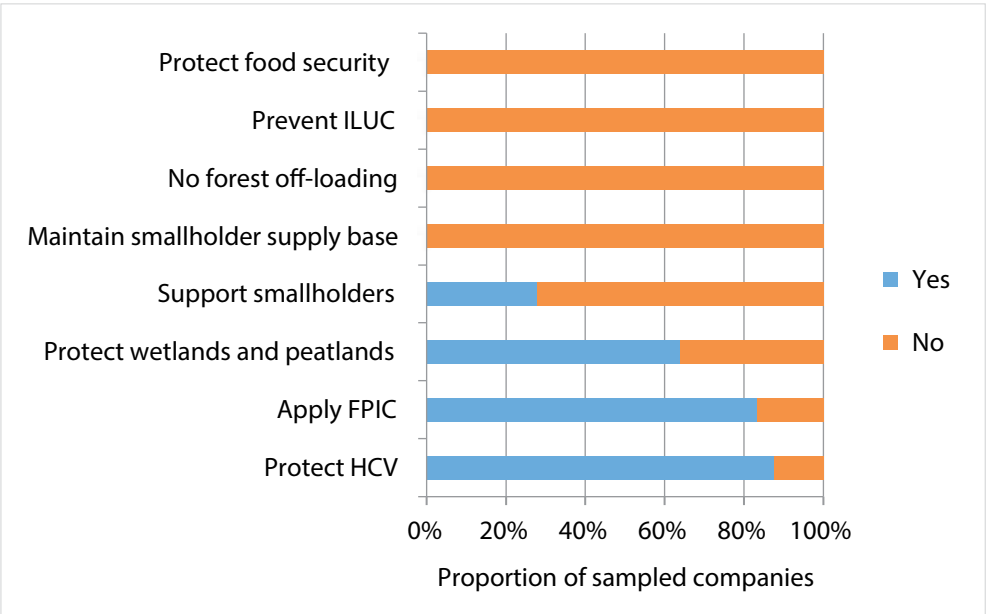

Figure 11. Commitment to managing externalities.

described as a last resort, most companies refrained from making explicit smallholder commitments. This is reflected by the following statements:

> *We will work with and seek support from government and civil society to assist smallholders in achieving the required standards.*
>
> Astra Agro Lestari (undated) – Indonesian palm oil producer

> *We cannot, and should not expect small suppliers to have comprehensive systems in place to manage traceability. Hence, we have a responsibility to guide and lead them towards improvements for them and us to benefit from a more transparent supply chain.*
>
> AAK (2016) – Swedish manufacturer of vegetable fats

Considering the lack of unequivocal commitments to supporting smallholders and the high cost and complexity of establishing plantation-level traceability systems (Pirker et al. 2017), many smallholders will likely be unable to supply ZDC companies in future, especially in the palm oil industry. A number of civil society organizations share these concerns. In the other sectors, smallholders for various reasons tend to service parallel markets and are in some cases poorly integrated into GVCs; typically, they exclusively target domestic markets (see for example Cerutti and Lescuyer 2011). With ZDCs further exacerbating smallholder barriers to participation in GVCs, the lack of explicit commitment to smallholder integration in these sectors will in future only alienate smallholders further as the ZD performance divide between corporations and smallholders widens. More explicit acknowledgement of smallholder compliance and marketing challenges by all ZDC adopters, irrespective of the sector, is therefore much needed in order to ensure smallholders are not further marginalized in a ZD future.

4.3.2 Implementation mechanisms

Those companies that committed to externality implementation mechanisms typically did so indirectly (e.g. by committing to certification or exclusive sourcing certified products) – some implementation indicators are incorporated into notably RSPO, FSC and RTRS. As shown

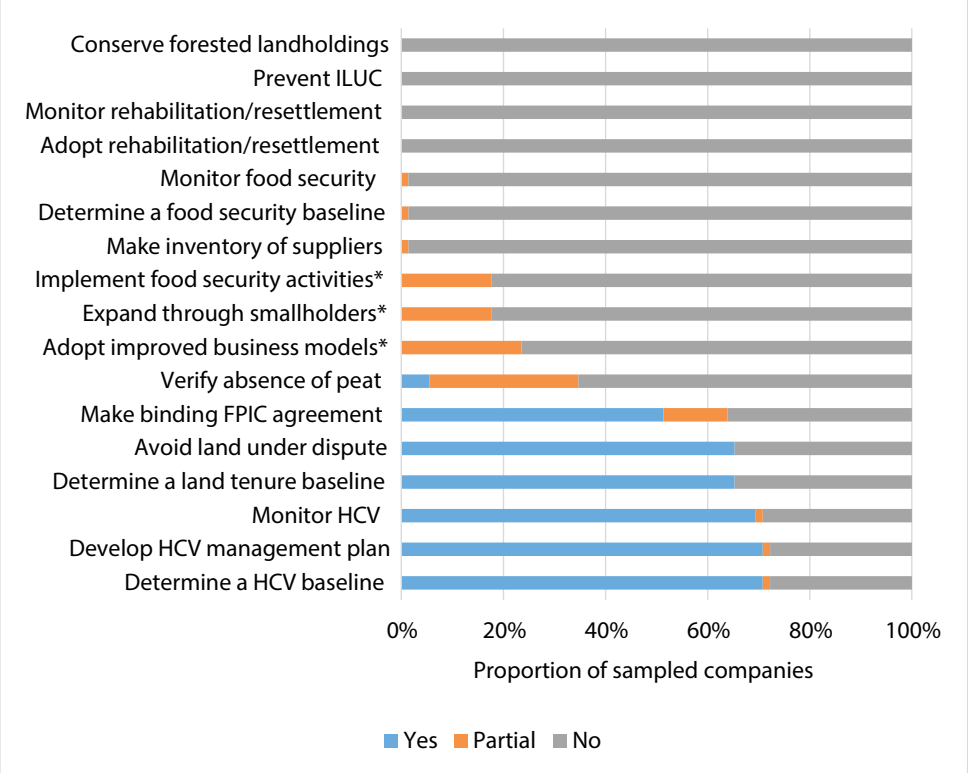

Figure 12. Externality implementation mechanisms.

* Only applies to companies involved in upstream activities.

in Figure 5, most of the sampled companies involved in the palm and wood industries are fully committed to certification. In the soy sector in contrast, only the food manufacturer Danone committed to procure only RTRS-certified soy, albeit without specifying a timeframe in which this will be achieved. With the cattle industry lacking a dedicated international certification system, none of the companies involved in cattle either made or were able to make certification pledges.

Through their commitment to full certification, companies passed the following indicators: independent baseline assessments of HCV and land tenure prior to commencing operations; independent HCV/FPIC monitoring; HCV management plans; and evaluation of pre-existing tenure disputes (Figure 12). In addition, the RSPO and FSC also demand that companies develop binding FPIC agreements with affected communities.

As discussed in Section 4.2.2, comparatively few companies explicitly excluded mass balance approaches. Although mass balance approaches ensure that the volume of certified raw materials on the market does not exceed the total volume produced by certified producers, the approach is problematic because it allows uncertified growers to participate in certified value chains. This reduces the producer incentive to fully comply with RSPO standards and the capacity of downstream companies to exert influence over the policies of individual companies.

Moreover, it is widely acknowledged that even when companies adhere to certification requirements, processes such as FPIC are notoriously difficult to implement well and, as one respondent conceded, because "FPIC is often done badly," the risk that ZDC companies will be complicit in land grabbing in future cannot be resolved through certification alone (see Schoneveld (2013) for a more elaborate reflection on implementation challenges associated with FPIC).

One of the underlying reasons for the problems in implementing FPIC, and also HCV, some respondents claimed, is that because auditors can be paid directly by their clients, the independence and credibility of the assessments can be compromised. To ensure a more transparent and independent verification process, FPP, amongst others, suggested that certifiers could be paid through a fund.

While certification bodies reportedly expressed reservations about such a payment system, TFT is trialing a program that will offer improved verification through such a fund system (personal communication with TFT, 2016).

Implementation mechanisms are comparatively well-defined for those indicators that were passed indirectly through certification commitments (e.g. FPIC and HCV). The exception is full wetland and peatland protection, which is not explicitly integrated into RSPO. Only 4 out of 46 companies made commitments to pursue independent verification of their peatland commitments. This points to a potentially serious implementation gap.

With regards to support to smallholder suppliers, companies are yet to establish clear implementation mechanisms (e.g. developing improved business models and undertaking a situational analysis). Rather, there is evidence to suggest that some companies are beginning to take drastic measures to prove compliance with their ZDCs that may not be smallholder friendly. For example, one respondent reported that, since early 2016, the company has suspended its sourcing activities with the majority of its existing suppliers. Another interviewed company stated that in order to achieve full traceability to plantation level by 2020, they will inevitably need to remove a "huge chunk" of smallholders from their supply chain. The company complained that it was forced to reduce the number of suppliers to please NGOs campaigning for ZD because they expect NGOs to be more inclined to hold them accountable for failure to protect forests than to acknowledge their efforts to support smallholders.

4.3.3 Scoring

Our results show that companies score more poorly on externality management than on their ZDCs, with implementation mechanisms being particularly ill-developed (Figure 13). With regard to externality management specifically, results do however demonstrate that significant differences can be observed between commodities, with both the substantive scope of externality management commitments and implementation mechanisms being better developed in the palm industry than in the wood, soy and cattle industries. This is partly a reflection of the palm sector's increased commitment to (and dependency on) smallholders and peatlands. No major differences could be observed between companies in different value chain segments.

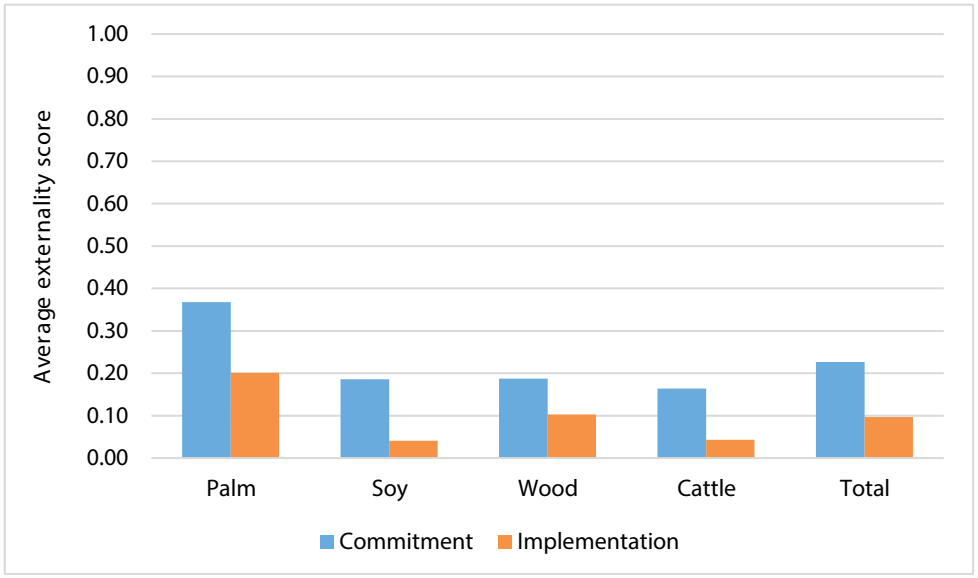

Figure 13. Externality management scores, by commodity.

4.4 Overall performance

Scoring results demonstrate two things: (1) implementation mechanisms are poorly defined, and (2) externality problems are insufficiently recognized. The implementation gap is most significant in the soy sector and least significant in the wood sector, where ZD principles are already comparatively well integrated into existing certification schemes (Figure 14). Overall, largely because of company commitments to the RSPO and the increased pressure and/or imperative to protect peatlands and smaller suppliers, the substantive scope of commitments in the palm oil sector are better defined. Although Northern companies are more inclined to develop ZDCs, no major difference could be observed between Northern and Southern companies in the substance of their actual commitments or in the mechanisms adopted to implement these commitments. However, integrated companies on average scored almost 20% higher on both their commitments' substantive scope and implementation mechanisms than did down- and up-stream companies. This is unsurprising given their ability to more efficiently and effectively incorporate new practices, because of their increased capacity to coordinate activities across different nodes in the value chain.

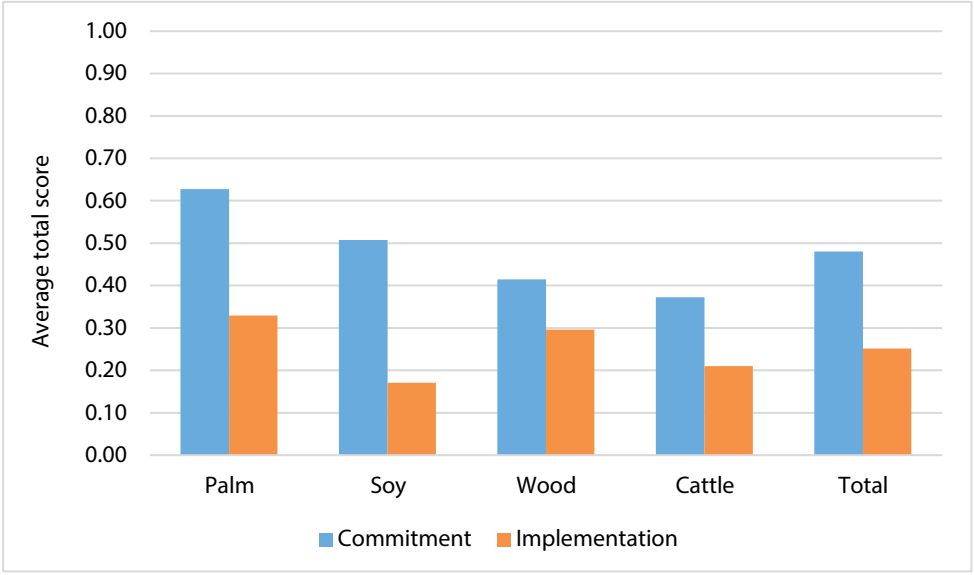

Figure 14. Overall scores, by commodity.

5 Opportunities for better leveraging the sustainability potential of zero deforestation commitments

Most ZDC adopters formulated strong ZDCs, but failed to specify concrete implementation mechanisms or adequately account for externality problems. While the HCS Approach is currently the most promising and well-developed mechanism to help partially resolve both of these challenges, there is little evidence to suggest that it will be applied to plantations other than those of large-scale commercial producers, and that it will involve independent monitoring, in its current format. Despite it having gained significantly more traction by industry (notably in the oil palm sector) than, for example, RSPO NEXT, much still needs to happen before the HCS Approach becomes a *de facto* industry standard and is fully integrated into third-party certification systems, as the HCS Approach Steering Group intends. Lack of apparent industry commitment to RSPO NEXT does suggest – at least in the early phases of implementation – that there is understandably more buy-in in approaches where companies are able to exert some influence over design features and in approaches that demand less accountability.

The speed with which the HCS Approach has been developed through consultative processes is testament to the commitment of a multitude of stakeholders to the development of a standardized and legitimate approach to ZDC implementation. This remarkable momentum will no doubt result in further innovation and facilitate the integration of ZD principles into regulatory instruments and support programs. However, going forward, care should be taken to prevent excessive reliance on third-party certification systems. Ultimately, most certification schemes in high forest-risk commodity sectors are primarily concerned with minimizing the negative direct social and environmental footprint of commodity production, not inclusive sector development or broader societal trade-offs (e.g. related to ILUC or land concentration processes). Despite valiant attempts, especially by RSPO and some civil society organizations, to help smallholders overcome certification barriers, making certification principles and criteria more comprehensive and stringent inevitably disproportionately disadvantages smallholders. Many of the externality indicators introduced in this paper – which often pertain to preventing the alienation of smallholders from GVCs and socially undesirable land use competition – will likely never be incorporated into most certification schemes. Making the ZD movement also a pro-poor movement will demand concerted efforts to integrate diverse regulatory and development efforts. Such an agenda however still needs to emerge in earnest at the international level, with leading ZD watchdogs focused on monitoring ZDC performance (especially on corporate landholdings) rather than on negative externalities.

The thinking around jurisdictional approaches to zero deforestation commodities (JA-ZD) is however maturing and has the potential to contribute to the development of the sort of integrated regulatory and development frameworks needed to overcome the limitations of certification and self-regulation. JA-ZD can be seen as the intellectual amalgam of REDD+, landscape approaches and ZD. It emerged as an effort to delink commodity production from deforestation within subnational political units through programs involving, for example, integrated landscape planning, deforestation monitoring and improved regulatory enforcement. Although a growing number of JA-ZD pilot projects are being established that involve more commodity-centric models such as jurisdictional sourcing and certification, because such approaches are

still in their infancy, little can yet be said about their ability to effectively support corporate ZDC implementation over time and at scale.[18] However, such approaches have generally been received well by most interviewed ZDC adopters since the cost and responsibility of curbing deforestation is generally shifted to the state. If effective, companies can confidently produce in and source from a ZD jurisdiction without having to develop comprehensive in-house monitoring and traceability systems. It will also enable smallholders to comply with private ZD requirements without having to comply with complicated and expensive certification standards. The emphasis of such approaches on land use planning could also contribute to resolving a number of externality problems by identifying lands suitable for expansion, without generating detrimental forms of land use competition. Negative spillover effects from a ZDC jurisdiction to a non-ZDC jurisdiction can, however, be anticipated (e.g. where unsustainable producers shift expansion plans to jurisdictions with fewer restrictions). This points to the need for more nested approaches, where the foundational incentive and regulatory support structures are developed at the national and perhaps even regional scales in order to promote greater uniformity across jurisdictions.

The importance of the state is emphasized by most ZDC stakeholders interviewed, and not just from a transaction costs and efficiency perspective. Many of the externality problems are challenging to resolve at the firm and the sectoral level and require integrated regulatory and social support programs that are adapted to specific geographic realities and are complementary to private ZDCs. This includes land use planning, formalization and tenure reform initiatives that are beyond the remit of the private sector. Despite this, many interviewed companies cautioned that while the state plays a critical role in enabling effective ZDC implementation, many currently see the state as the primary cause of the problem. After all, one of the underlying reasons for deforestation and pervasive poverty in many tropical developing countries has been misgovernance. Nevertheless, the general consensus is that the ZD movement needs to channel the leverage of its various stakeholders into efforts to engage national, regional and local governments in the sustainable and inclusive implementation of ZD. This requires additional efforts to improve multi-stakeholder dialogue and learning processes. As one company representative asserted, they are prepared to source from alternative regions if local governments are not open to collaboratively exploring new governance arrangements.

18 Well-established and comparatively successful examples of JA-ZD initiatives can be found, particularly in Brazil. This includes initiatives under the Brazilian Soy and Cattle Moratoria and the Green Municipalities Program. The ability to replicate these programs to other countries has been widely questioned, however. In Indonesia and Malaysia, provincial governments are beginning to position themselves in this movement, including for example Sabah in Malaysia and Central Kalimantan and South Sumatra in Indonesia. Companies such as Unilever and Marks & Spencer are exerting pressure on jurisdictions by intending to only source from those jurisdictions that comply with a range of ZDC-related criteria, including adoption of social safeguards (see GCF 2015).

6 Conclusion

The adoption of ZDCs by many of the major 'powerbrokers' in the soy, palm oil, cattle and wood industries reflect rising corporate accountability for environmentally destructive activities occurring within their supply chains. This has the potential to significantly slow global deforestation rates. Findings suggest that this is foremost an expression of pressures from Northern governments, shareholders, consumers and civil society organizations – especially on large consumer goods manufacturers (CGMs) with brands to protect – to operate responsibly in developing countries, where the necessary social and environmental safeguards to guarantee sustainable production are typically absent.

It is widely assumed that because high forest-risk commodities are generally produced in consolidated buyer-driven chains, cascade effects can be anticipated, which will motivate actors upstream in the value chain to also embrace ZD principles in order to protect their access to Northern end markets. This could ensure that ZD norms extend to Southern producers and become more than a Northern phenomenon. It is premature to critique this assumption, but our analysis, which highlights just how poorly developed ZDC implementation mechanisms are, gives reasons for questioning the level of influence 'powerbrokers' wield over the policies and practices of other actors in their respective chains. For example, three-quarters of committers do not demand that their suppliers also embrace company-wide ZDCs, thereby enabling suppliers of such companies to sell commodities that did not (recently) involve deforestation to ZDC companies and commodities that did involve deforestation to non-ZDC companies. This type of parallel marketing is further facilitated by widespread reliance on certification using mass balance systems, which allows uncertified growers to participate in certified value chains. This reduces the producers' incentive to fully comply with sustainability standards and the capacity of downstream companies to exert influence over the policies of individual companies. Equally, since only half of the sampled companies were committed to developing plantation-level traceability systems and the majority were reliant on truthful declarations of their suppliers, adequately rigorous control mechanisms to incentivize a wholesale change in practice upstream are currently lacking.

Weak commitment to full transparency, notably disclosure of sourcing locations and suppliers, and to independent verification, further undermines ZDCs' transformative potential and ability to hold companies accountable for failure to comply with their ZDCs. However, while imperfect and lacking industry buy-in, efforts to integrate ZDC principles into existing certification systems do highlight that the necessary implementation mechanisms are becoming accessible to ZDC companies. With an increasing number of governments, development agencies and multi-stakeholder initiatives also constructively engaging the private sector in the development of the necessary enabling conditions to support implementation (notably around more cohesive regulatory structures), ZDC companies are increasingly receiving the type of assistance needed to effectively deliver on their ZDCs. The emergence of such initiatives also highlights how private ZDCs are creating new economic incentives for governments to improve governance on the ground and engage in public–private partnerships (e.g. as a result of jurisdictional sourcing and rising investor interest in ZD jurisdictions). Where demand-side pressures on suppliers to embrace ZD may be lacking, improved governance at the subnational level could produce the needed supply-side pressures to enhance upstream compliance with ZD (as has proven to be effective in parts of Brazil).

In fostering improved alignment between ZDCs and national sustainable development objectives, much rests on what comes out of this institutional innovation. Our results clearly show that most companies fail to acknowledge the socially detrimental externalities that their ZDCs threaten to produce. Where this is acknowledged, it is acknowledged indirectly through standing commitments to full voluntary certification. However, with certification not comprehensively encompassing the full breadth of externality issues, drawing on the resources, authority and mandates of organizations outside the value chain with greater territorial embeddedness will be critical in properly leveraging ZDCs' sustainable development potential. This should ideally yield public–private partnerships with the (adaptive) capacity to control sector expansion through appropriate spatial–economic planning, with emphasis on avoiding the displacement of socially and environmentally valuable land uses, reducing undesirable indirect land use change, and aligning with emerging low emission development and forest landscape restoration agendas. Moreover, given company intentions to limit the number of suppliers in their supply base in order to reduce transaction and monitoring costs, it will especially be the issue of smallholder disarticulation that will need to be more comprehensively addressed in future ZD implementation structures.

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Annexes

Annex 1. Hierarchical framework

Principle 1. Commitment to ZD	
Criteria	**Indicators**
1.1 The company has adopted a ZD commitment and formulated specific targets to that effect.	1.1.1 Publicly adopted a zero (net) deforestation pledge 1.1.2 The pledge covers all relevant operations controlled by the company 1.1.3 The pledge covers all suppliers and geographies from where relevant commodities are produced and/or procured[1] 1.1.4 The pledge is explicitly time-bound and specifies ZD targets[2] 1.1.5 Direct suppliers are required to commit to 1.1.1–1.1.5
1.2 The company uses a comprehensive and unambiguous definition of what constitutes deforestation.	1.2.1 The term forest is clearly defined and does not exclude any forest types[3] 1.2.2 Must not originate from lands that have been deforested after a specific date in the past[4]
Principle 2. Full traceability and monitoring	
Criterion	**Indicators**
2.1 The company has adopted a traceability system that enables it to trace commodities to their origin in a manner that enables the monitoring of zero deforestation.	2.1.1 Value chain mapping tool is applied to identify the origin of a commodity, irrespective of who produces it (e.g. also captures origin of supplier commodities) 2.1.2 The formulated target is full traceability back to plantation level (or a third party certifies ZD at plantation level)[5] 2.1.3 A geospatial monitoring tool is applied in-house, by third parties or by suppliers[6] 2.1.4 The company categorically excludes mass balance approaches from the value chain mapping (*no score*)
Principle 3. Reporting, third-party verification and transparency	
Criterion	**Indicators**
3.1 The company provides adequate information to relevant stakeholders on its commitment implementation progress, in forms that allow for effective scrutiny.	3.1.1 Annual public disclosure of comprehensive information on commitment progress, disaggregated by commodity and region (e.g. via annual reports, CDP, etc.)[7] 3.1.2 Provision of company's concession maps (*only producers*)[8] 3.1.3 Provision of spatially explicit information on suppliers' production sites and/or requests direct suppliers to do the same when not a producer 3.1.4 Full disclosure of names of direct suppliers (*only downstream companies*)[9]
3.2 The company enables credible third parties to monitor progress/compliance with its ZD policy.	3.2.1 (Progress on) ZD is annually verified and regularly monitored by a qualified and independent third party[10]

continued on next page

Annex 1. Continued

Principle 4. Smallholder inclusion	
Criterion	**Indicators**
4.1 Maintain or increase level of sourcing from smallholders.[11]	4.1.1 Commitment to maintaining or increasing smallholder sourcing levels[12] 4.1.2 Program in place to monitor the number of smallholders 4.1.3 Enhancing the smallholder supply base is a key strategy for expanding production (*only producers*)[13] 4.1.4 A business model is applied that strengthens smallholder productivity and compliance capacity (*only producers*)[14]
Principle 5. Protection of other important non-forest ecosystems	
Criteria	**Indicators**
5.1 Producers avoid development of areas of high biological and ecological significance and natural ecosystems of social or cultural value (HCVA).[15]	5.1.1 Commitment to stop new developments on HCVA 5.1.2 Ensures that HCV baseline assessment is undertaken prior to commencing operations by recognized auditors that apply best-practice HCV frameworks 5.1.3 Ensures that management plans for all HCVA are in place to safeguard their integrity through buffer zones, ecological corridors and other measures 5.1.4 Ensures systematic independent monitoring of HCVA is undertaken
5.2 Producers avoid development on wetlands and peatlands.	5.2.1 Commitment to stop new developments on wetlands and peatlands 5.2.2 If 5.2.1 is passed, all types of wetlands and peatlands (regardless of depth) are explicitly included 5.2.3 Ensures independent verification that the integrity of wetlands and peatlands is not compromised in new developments of lower-tier suppliers
Principle 6. Land justice	
Criteria	**Indicators**
6.1 Producers proactively address tenure risks before new land acquisitions are made.[16]	6.1.1 FPIC principles are adopted as the basis for decision-making on the relinquishment of rights by *all* land owners and users[17] 6.1.2 Ensures that FPIC is implemented through binding agreements between communities and investors 6.1.3 Ensures that independent baselines to evaluate existing tenure arrangements (that also capture periodic, subsidiary and secondary rights) are examined prior to land acquisition 6.1.4 Ensures that both formal and informal land tenure is not under dispute 6.15 Ensures that where customary land is acquired, a rehabilitation and resettlement plan that complies with international standards and principles has been adopted. This should apply to all land users whose legitimate land claims are adversely affected by land acquisition[18] 6.1.6 Ensures that independent monitoring is systematically undertaken to ensure adversely affected households are effectively rehabilitated and resettled
6.2 Producers do not jeopardize food security through their land acquisitions.	6.2.1 A policy has been adopted that aims to safeguard food security in the areas where commodities are produced 6.2.2 Ensures independent baseline assessments to identify potential food security risks 6.2.3 The company adopts activities to enhance local food security (*only producers*) 6.2.4 Ensures that systematic independent monitoring of local food security impacts is undertaken

continued on next page

Annex 1. Continued

Principle 7. Prevention of harmful indirect land use changes	
Criteria	**Indicators**
7.1 Producers' expansion on already occupied lands must not result in harmful ILUC.[19]	7.1.1 Commitment to avoid large-scale developments on lands that involve displacement of land users and other socially or economically valuable land uses and/or take appropriate corrective actions
	7.1.2 Ensures that displaced land users and uses are facilitated in re-establishing land users on lands that are not forested or HCVAs and do not result in new land conflicts
7.2 The company extends ZD commitments to company land banks that are comprised of forests, regardless of ownership.[20]	7.2.1 Commitment that no forest land banks are sold to other companies or other buyers, where ZD is not guaranteed in the long term
	7.2.2 Ensures that a long-term conservation plan is in place to protect forest land banks

1 Half a point if company only referred to certain high-risk areas or top suppliers.

2 Half a point if the time target was beyond 2020.

3 This included commitments to the HCS definition (1 point) and FSC/PEFC certification (half a point).

4 Not relevant for timber.

5 Palm and cattle pledges received half a point for mill or slaughterhouse level. However, no company explicitly excluded the purchase of FSC Controlled Wood material, which is a mix of FSC-certified material and other material from "acceptable sources", which are defined by significantly weaker certification and monitoring standards based on a broader risk assessment.

6 Half a point if evidence was simply expected to be provided by the suppliers.

7 Half a point if formulation was imprecise or only partial information was disclosed.

8 Half a point if it was stated that maps are available on request.

9 Refers to downstream and integrated companies. Half a point if only key suppliers were named.

10 Half a point for 'monitoring' through service providers and commitments to full FSC certification (without excluding Controlled Wood) or both FSC and PEFC certification.

11 Without such a commitment, smallholders often lack sufficient technical, organizational and business capacity building in order to comply with increasingly stringent consumer requirements in the North, as for example manifested in global certification schemes (Miller and Jones 2010).

12 Half a point if smallholder support for compliance with ZD was stated.

13 Half a point if smallholder programs clearly stood out in relation to other companies.

14 Half a point if smallholder programs clearly stood out in relation to other companies.

15 This criterion and corresponding indicators are incorporated into major certification schemes, such as those from the FSC, RSPO and RTRS. For each implementation indicator, only half a point was awarded if companies merely committed to full FSC certification (without excluding Controlled Wood) or both FSC and PEFC certification.

16 This criterion is incorporated into major certification schemes, such as those from the FSC, RSPO and RTRS. The indicators 6.1.2–6.1.5 were adapted from FSC, RSPO and RTRS. Only half a point was awarded for each of these indicators if companies merely committed to full FSC certification (without excluding Controlled Wood) or both FSC and PEFC certification.

17 Half a point for a general commitment to FPIC without further specification of the types of land users and rights that have rights to FPIC. Failure to specify the types of land users and rights could result in persons with, for example, subsidiary rights or those who are not acknowledged by (customary) law being excluded from FPIC (Schoneveld 2014).

18 FPIC only guarantees full livelihood reconstruction when a commitment is supplemented with a resettlement and rehabilitation plan (Schoneveld 2013).

19 ZD pilots revealed harmful ILUCs (Colchester et al. 2014, 2016).

20 ZD pilots have shown that large-scale producers may expand into non-forested areas, but tend to excise forested areas from their concessions, which can cause ILUCs on the forested areas (Colchester et al. 2016).

Notes:

- Grey-shaded areas highlight the implementation indicators; the others are commitment indicators.
- Passing an indicator was awarded with 1 point, and half a point if the company announced it would deliver adequate information soon or only referred to its own concessions. If partial scores were otherwise awarded, they are mentioned in a footnote.
- Each criterion received the average score of its indicators. If it included both commitment and implementation indicators, the average score of each type of indicator contributed 50% to the overall score of the criterion.
- The overall score of a principle was the average score of its criteria.
- The category 'ZD' consists of principle 1, which includes the commitment indicators, and principles 2–3 which include the implementation indicators. Principle 1 and principles 2–3 contributed 50% each to the overall score of the category.
- The category 'managing externalities' consists of principles 4–7. Every principle in this category contributed the same to the overall score of the category.

Annex 2. Individual company scores – palm

Company name	ZDC – substantive scope	ZDC – implementation mechanisms	Externality – substantive scope	Externality – implementation mechanisms	Total
AAK	0.90	0.61	0.36	0.25	0.53
Agropalma	0.90	0.50	0.36	0.27	0.51
Archer Daniels Midland	0.90	0.56	0.36	0.25	0.52
Astra Agro Lestari	0.90	0.22	0.43	0.12	0.42
Avon Products	0.95	0.50	0.36	0.25	0.51
Barilla	1.00	0.28	0.36	0.18	0.45
Cargill	0.85	0.58	0.43	0.27	0.53
Carrefour	0.85	0.28	0.36	0.18	0.42
Colgate-Palmolive	1.00	0.78	0.36	0.25	0.60
ConAgra Foods	0.90	0.28	0.36	0.18	0.43
Danone	1.00	0.78	0.43	0.32	0.63
Estée Lauder	0.90	0.44	0.29	0.25	0.47
Felda Global Ventures	0.25	0.31	0.21	0.00	0.19
Ferrero	0.90	0.61	0.29	0.25	0.51
First Resources	0.90	0.33	0.43	0.20	0.47
General Mills	1.00	0.61	0.36	0.25	0.55
Grupo Bimbo	0.95	0.44	0.43	0.00	0.46
Henkel	0.90	0.33	0.29	0.18	0.42
IKEA	0.90	0.33	0.36	0.18	0.44
IOI Group	0.90	0.58	0.36	0.25	0.52
Johnson & Johnson	0.90	0.44	0.43	0.25	0.51
KAO	0.90	0.33	0.36	0.18	0.44
Kellogg	0.90	0.61	0.36	0.18	0.51
Kuala Lumpur Kepong	0.90	0.31	0.43	0.18	0.45
Les Mousquetaires	0.90	0.44	0.36	0.25	0.49
L'Oréal	0.90	0.39	0.29	0.18	0.44
Marks & Spencer	0.90	0.28	0.29	0.18	0.41
Mars	0.90	0.67	0.36	0.25	0.54
McDonald's	0.85	0.33	0.43	0.18	0.45
Mondelez	1.00	0.44	0.36	0.25	0.51
Nestlé	1.00	0.61	0.43	0.25	0.57
Orkla	1.00	0.28	0.29	0.18	0.43
PepsiCo	1.00	0.33	0.43	0.18	0.48
Procter & Gamble	0.40	0.39	0.36	0.18	0.33
Reckitt Benckiser	0.80	0.61	0.36	0.25	0.50
Sime Darby	0.80	0.33	0.36	0.18	0.42
Sinar Mars	0.80	0.63	0.50	0.27	0.55
Target	0.90	0.28	0.29	0.00	0.37
Unilever	1.00	0.56	0.50	0.18	0.56
Wilmar International	1.00	0.83	0.43	0.25	0.63
Yum!	0.90	0.33	0.36	0.25	0.46

Annex 3. Individual company scores – soy

Company name	ZDC – substantive scope	ZDC – implementation mechanisms	Externality – substantive scope	Externality – implementation mechanisms	Total
Carrefour	0.40	0.11	0.00	0.00	0.13
Archer Daniels Midland	0.85	0.47	0.29	0.10	0.43
Cargill	0.90	0.42	0.36	0.00	0.42
Danone	0.60	0.33	0.00	0.00	0.23
Kellogg	0.90	0.11	0.00	0.00	0.25
Marks & Spencer	0.90	0.28	0.21	0.00	0.35
Mondelez	0.90	0.11	0.00	0.00	0.25
Nestlé	0.95	0.61	0.43	0.17	0.54
PepsiCo	1.00	0.11	0.36	0.00	0.37
Unilever	0.90	0.44	0.21	0.15	0.43

Annex 4. Individual company scores – wood

Company Name	ZDC – substantive scope	ZDC – implementation mechanisms	Externality – substantive scope	Externality – implementation mechanisms	Total
APRIL	0.80	0.47	0.21	0.13	0.40
Danzer	0.78	0.58	0.21	0.19	0.44
Henkel	0.90	0.11	0.00	0.00	0.25
Home Retail	0.55	0.33	0.14	0.00	0.26
IKEA	0.65	0.56	0.21	0.11	0.38
Inditex	0.65	0.56	0.21	0.11	0.38
KAO	0.65	0.61	0.36	0.11	0.43
Kimberly-Clark	0.65	0.56	0.21	0.11	0.38
Kingfisher	0.65	0.56	0.21	0.11	0.38
Les Mousquetaires	0.65	0.56	0.21	0.11	0.38
Precious Woods	0.65	0.56	0.21	0.11	0.38
Procter & Gamble	0.55	0.56	0.21	0.11	0.36
Reckitt Benckiser	0.30	0.11	0.14	0.00	0.14
Sekisui House	0.30	0.11	0.00	0.00	0.10
Sinar Mars	0.90	1.00	0.21	0.29	0.60
Unilever	0.65	0.56	0.21	0.11	0.38

Annex 5. Individual company scores – cattle

Company name	ZDC – substantive scope	ZDC – implementation mechanisms	Externality – substantive scope	Externality – implementation mechanisms	Total
Carrefour	0.40	0.11	0.00	0.00	0.13
Kering	0.40	0.39	0.00	0.07	0.22
Marks & Spencer	0.40	0.44	0.25	0.00	0.27
McDonald's	0.80	0.22	0.36	0.00	0.34
Unilever	0.90	0.72	0.21	0.14	0.49

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CIFOR Occasional Papers contain research results that are significant to tropical forest issues. This content has been peer reviewed internally and externally.

This research critically examines implementation gaps and externality problems associated with the recent proliferation of zero deforestation commitments (ZDC) by large commodity producers. By developing and employing a hierarchical framework, we evaluate the policies and strategies of 50 leading ZDC adopters in high forest-risk commodity sectors (soy, oil palm, cattle and wood). The analysis shows that while most ZDC adopters formulated strong ZDCs, there is significant room for further refining implementation mechanisms. Specifically, it finds that weak commitment to full transparency, notably disclosure of sourcing locations and suppliers, and to independent verification, undermines ZDCs' transformative potential and ability to hold companies accountable for failure to comply with their ZDCs. Our analysis also reveals that most sampled companies do not explicitly account for the socially detrimental externalities that their ZDCs threaten to produce. Where this is acknowledged, it is acknowledged implicitly through standing commitments to full voluntary certification, especially in the wood and oil palm sector. As a result, issues related to free, prior and informed consent (FPIC) and protection of high conservation value (HVC) ecosystems are comparatively well addressed by adopters, but challenges faced by smallholders, food security risks, and indirect land use change issues are only minimally accounted for. Our results suggest that for ZDCs to contribute meaningfully to inclusive and sustainable development potential, complementarities between private and public regulatory initiatives need to be better leveraged.

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