

White Paper

# Greening Commodity Supply Chains in Emerging Markets: Challenges and Opportunities

January 2018



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This white paper was prepared by AlphaBeta on behalf of the Secretariat of the Tropical Forest Alliance 2020 and published by the World Economic Forum as a contribution to the mission of the Tropical Forest Alliance 2020. The findings, interpretations and conclusions expressed herein are a result of a collaborative process facilitated and endorsed by the Secretariat of the Tropical Forest Alliance 2020, hosted at the World Economic Forum, but whose results do not necessarily represent the views of the World Economic Forum, nor the entirety of its Members, Partners or other stakeholders, nor those of the partners of the Tropical Forest Alliance 2020.

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# Foreword

The Tropical Forest Alliance 2020 (TFA 2020) is a global partnership that brings together governments, private-sector and civil-society organizations to reduce tropical deforestation associated with sourcing commodities such as palm oil, soy, beef and paper and pulp.

The movement to end tropical deforestation is at a critical juncture. On the positive side, the Paris Climate Conference COP21 led to a number of ambitious forest-related pledges from governments, donors and private-sector companies. The 2016 New York Declaration on Forests (NYDF) Progress Assessment Report notes that efforts to eliminate deforestation from agricultural supply chains are increasing (although the report notes that very few companies commit to zero deforestation across their operations), and the membership of the Tropical Forest Alliance 2020 continues to grow. AlphaBeta's past work with TFA 2020 also demonstrates that several subnational governments have begun to develop ambitious programmes to reduce deforestation across their jurisdiction.<sup>1</sup> The research identified 61 such programmes, which are fairly evenly distributed across Africa, Latin America and Asia. More than half (34) of these jurisdictions are potentially relevant to the mandate of TFA 2020, as they are operating in tropical forest regions and produce relevant commodities such as palm oil, pulp, cattle, soy, cocoa and coffee.

While all this is encouraging, it will not be sufficient to reduce deforestation significantly unless major emerging markets are engaged in eliminating deforestation from commodity supply chains. This includes both major importers, such as China and India, and also major producers who are also significant consumers, such as Brazil and Indonesia. A strong fact base to inspire robust action on greening supply chains in emerging markets is still missing. This research aims to contribute to filling this gap by assessing (a) the importance of emerging markets for reducing deforestation based on their current and future commodity demand; (b) the commodity trade flows of major emerging markets (including both importers and producers); and (c) the degree to which we are starting to see increasing awareness of the need for sustainability and concerns over deforestation in these markets.

This document is a briefing document prepared for the World Economic Forum in Davos in 2018. The full report will expand on the findings presented in this paper by taking a detailed look at the situation in China. In particular, it will examine the links between tropical deforestation and China's current and future demand for certain commodities. It will also outline opportunities and potential actions to reduce supply chain-related deforestation in the country.

We are grateful for the advice and input of many experts in academia, government, not-for-profit organizations and industry. They all provided invaluable guidance, suggestions and advice. AlphaBeta is responsible for the conclusions and recommendations arising from the research.

# Findings at a Glance

Emerging markets, with their rapidly growing consumer class, play a crucial role in the global effort to remove deforestation from palm oil, beef, soy and pulp and paper. The fight against tropical deforestation would gain significant momentum if major emerging market importers such as India and China, and major emerging market producer-consumers such as Indonesia and Brazil, were to buy more commodities from sustainable sources. This brief document presents new, compelling estimates on how the current and future demand for commodities in emerging markets might spur deforestation. The results reinforce the importance of engaging these countries to achieve change. This paper provides fresh facts, but it also offers a silver lining. It shows that the sustainability awareness of consumers, producers and governments in emerging countries is growing, albeit from a low level.

- Major emerging market importers (China and India) and major emerging market producer-consumers (Brazil and Indonesia) together account for around 40% of global demand for four deforestation-linked commodities (soy, beef, palm oil and wood products), and their share is set to increase further by 2025.
- **Three main trends** will influence future commodity demand from emerging markets: growth in the consuming class, limitations on domestic production and government regulation, including tariffs and dietary guidelines.
- A “business-as-usual” (BAU) approach to commodity sourcing in emerging markets could lead to significant deforestation. While there is significant uncertainty associated with deforestation rates linked to these commodities, it is estimated that deforestation linked to China and India’s imports of these four commodities, and the domestic consumption of Indonesia and Brazil, could increase by approximately **11%** from today’s levels. This is a conservative estimate (as it only accounts for immediate post-conversion deforestation), and represents the equivalent land area of **Nigeria** being deforested annually.
- This deforestation could also lead to food security concerns in emerging markets (with rising dependence on food imports) and risks to firm competitiveness which could potentially undermine major projects such as the Belt and Road Initiative.
- There is anecdotal evidence suggesting that governments, consumers and producers in emerging markets are increasingly interested in sustainably sourced products. For example, the official translation of China’s Five-Year Plan 2016–2020 includes **three times** as many sustainability-related terms as the

previous five-year plan – an increase from 27 to 81. A large-scale global survey reveals that **34%** of Brazilian consumers, **44%** of Chinese consumers and **50%** of Indian consumers surveyed “actively look for information on product sustainability”.

- However, without a stronger concerted effort this shift may not be rapid enough to prevent significant future deforestation.

# The role of emerging market demand

## Tackling the tropical deforestation challenge requires engaging emerging markets

The rise of middle-class consumers is set to ratchet up demand for commodities in emerging markets. In China, consumer spending as a share of the country's total GDP is expected to surge from around 36% in the years since 2008 (in real terms) to 49% by 2030, and around 70% of that consumption growth could come from just ten large city clusters, including Shanghai and Beijing.<sup>2</sup> Meanwhile in India, the food market could double in size from 2014 to 2020, fuelled by rapid urban population growth.<sup>3</sup> It took nearly 40 years, from 1971 to 2008, for India's urban population to rise by nearly 230 million. However, it will take only half the time to add the next 250 million, with 590 million people projected to live in cities in India by 2030.<sup>4</sup> By 2025, India could be the second-largest consumer market in the world, behind China.<sup>5</sup> Indonesia also has a rapidly growing consuming class,<sup>6</sup> with growth to 2030 in the consuming class only expected to be surpassed by China and India.<sup>7</sup> As in India, much of the growth will come from small middleweight cities, defined as having between 150,000 and 2 million inhabitants, which are forecast to increase their share of GDP to 37% in 2030 (from 31% in

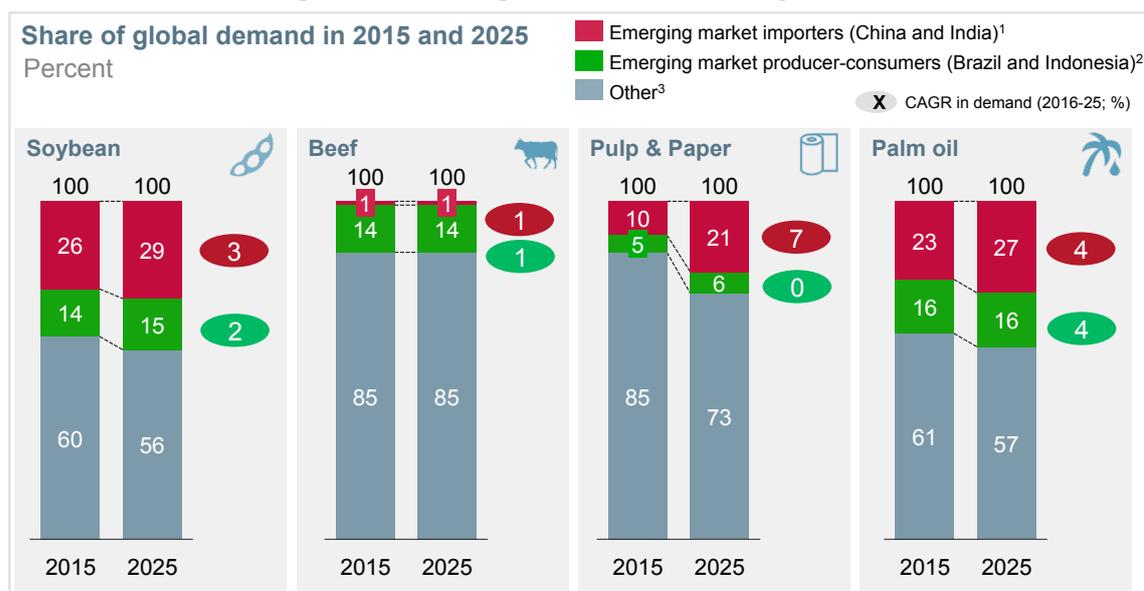
2012). Food and beverage expenditure is forecast to grow at a rapid 5.2% to 2030.

Four commodities – soy, beef, palm oil and wood products – are important drivers of tropical deforestation, and emerging markets are a significant source of demand for these commodities.<sup>8</sup> Major emerging market importers (China and India)<sup>9</sup> and major emerging market producer-consumers (Brazil and Indonesia) together account for around 40% of global demand for some of these commodities, and their share will increase further by 2025 (see Figure 1). If the focus is just on imported demand (as opposed to total commodity demand), then China's and India's importance to global supply chains becomes even more apparent. For example, in the decade to 2025 the share of global raw soybean imports that end up in China and India is expected to increase from 62% to 67% (see Figure 2).

In absolute terms, China's and India's imports, combined with Brazil's and Indonesia's domestic consumption of deforestation-related commodities, could rise by 43% to 264 million metric tons in the decade through 2025 (see Figure 3).

Figure 1

## Major emerging market importers and producer-consumers account for a large share of global commodity demand



<sup>1</sup> Developing countries who import a large share of globally produced commodities to meet domestic demand. This is limited to China and India as the two biggest emerging market importers across the four commodities. This includes only their imported demand (i.e. excludes domestic demand satisfied by local production).

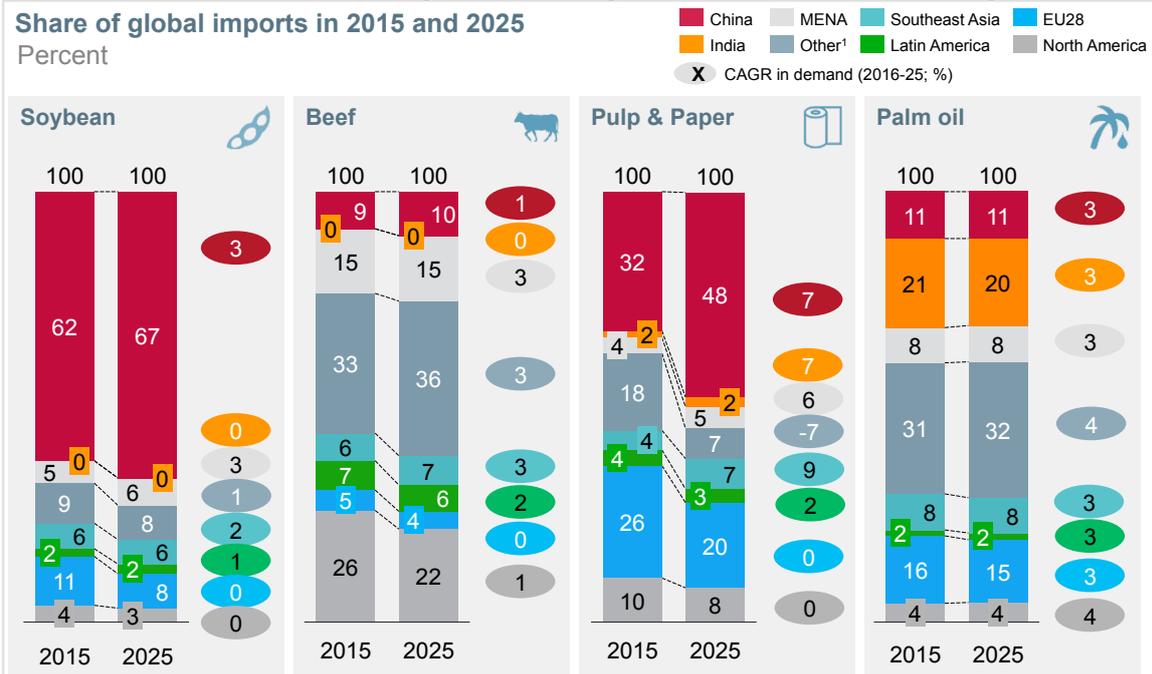
<sup>2</sup> Developing countries who are a major exporters of key commodities in the global supply chain which also have strong domestic demand for the same commodities they export. This is limited to Brazil and Indonesia as two of the major emerging producer-consumer markets across the four commodities, focusing on their domestic demand volumes (excluding domestic demand satisfied by imports).

<sup>3</sup> Other is the remaining volume of commodity demand coming from other countries (and including the local production of China and India).

SOURCE: USDA; FAO; AlphaBeta analysis

Figure 2

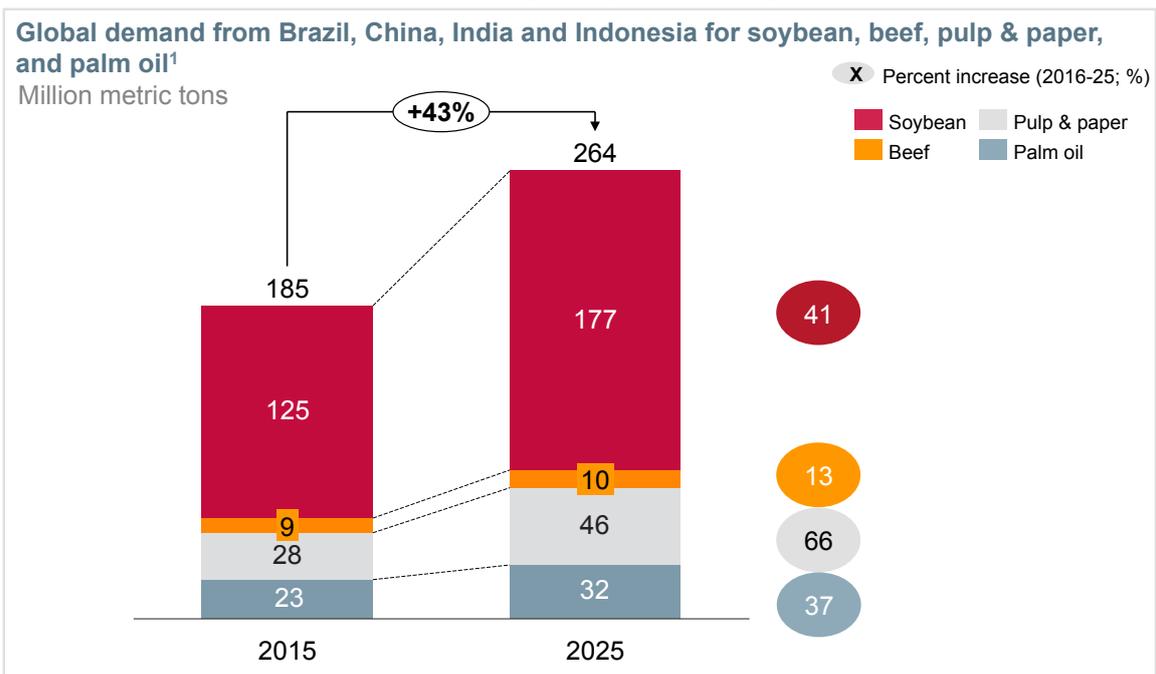
## China and India represent around 67 percent of global trade in some commodities today, and likely to increase further by 2025



<sup>1</sup> The "other" category includes regions such as Japan, Russia, Korea, Africa, and various Eastern European countries (among others). Japan, Korea, and Russia have particularly high share of imported beef demand; Russia and Bangladesh have higher shares of imported palm oil demand.  
SOURCE: USDA; FAO; AlphaBeta analysis

Figure 3

## Demand from four key emerging markets for deforestation-linked commodities could increase by 43 percent by 2025



<sup>1</sup> Global demand from these four key emerging markets is calculated by adding China and India's import demand together with Brazil and Indonesia's domestic demand (excl. imports)

SOURCE: USDA; FAO; AlphaBeta analysis

To understand the drivers of this demand better, it is useful to trace the destinations of major production in the four deforestation-linked commodities (Figure 4):<sup>10</sup>

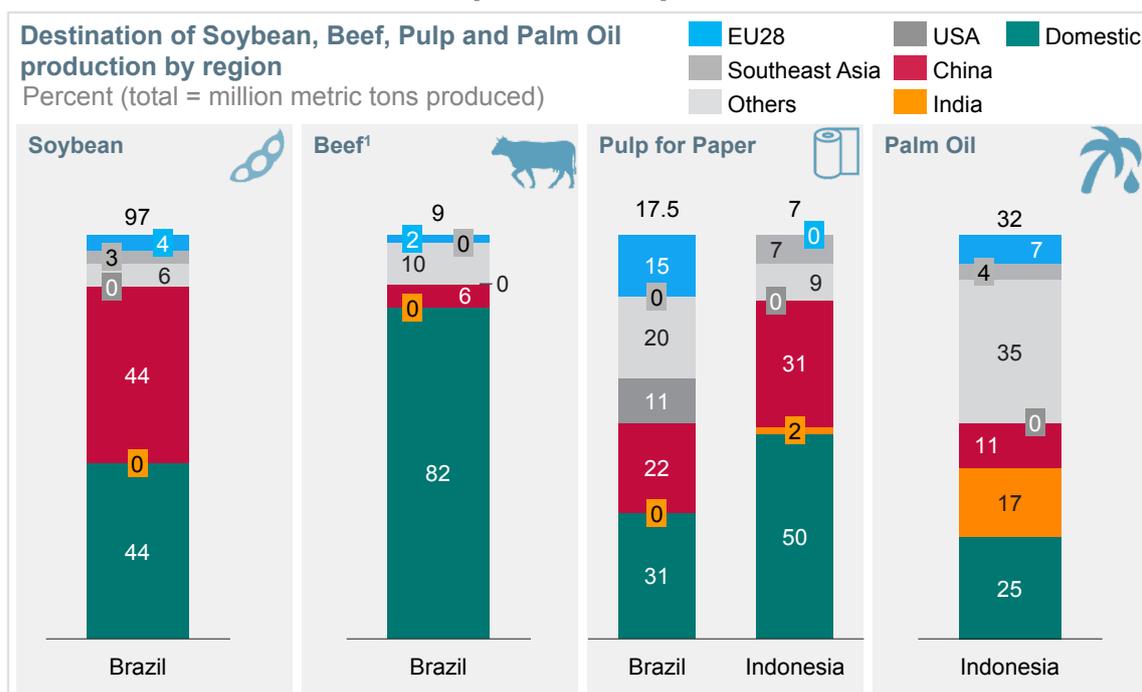
- **Soy.** Brazil is the world’s second largest producer of soy behind the United States, accounting for roughly 31% of global production. Driven by the use of soy as a feedstock for cattle, and also the rising regulatory requirements for blending soy-based biofuels into biodiesel, 44% of Brazilian production is currently dedicated to domestic consumption. China also accounts for 44% of Brazil’s soy demand. China buys over 61% of its raw soybean imports from Brazil and Argentina. In contrast, the total volume of soybean imports to India – around 0.1 million metric tons – is relatively small, as the country prohibits the import of genetically modified soybeans and imposes high tariffs on soybean imports generally.
- **Beef.** Brazil is the world’s second largest producer of beef behind the United States, accounting for 16% of global production. A remarkable 82% of Brazilian beef production is consumed locally, with Brazil having the fifth highest per capita beef consumption in the world. China accounts for a further 6% of Brazil’s beef production. Over the past few years, more than half of China’s beef imports have come from Brazil and Argentina. Their share of beef imports into China may fall in the future after the country recently lifted an import ban on beef from the United States, which has historically dominated the beef trade with China. China’s overall import volume of beef remains small – less than 0.1 million metric tons in 2015 – due

to China’s own sizeable beef production. However, growing consumer demand for meat is expected to outstrip domestic production over the next decade and spur beef imports. India does not import any beef for religious reasons.

- **Pulp and paper.** A large share of pulp and paper production in Brazil and Indonesia is consumed locally. China is the largest foreign demand source for pulp and paper from these countries. China’s share of total pulp and paper imports alone could rise significantly to account for roughly half of the world’s total in 2025. This sharp increase is being driven by a fall in the domestic production of pulp due to government-mandated closures of pulp and paper mills, combined with the high demand of paper products consumed by the online shopping sector in packaging.<sup>11,12</sup>
- **Palm oil.** Indonesia is the world’s largest producer of palm oil, accounting for 54% of global production. About one-quarter of palm oil is consumed locally. India and China account for 17% and 11% of Indonesia’s palm oil demand respectively. Both China and India import all of their palm oil from Indonesia and Malaysia. Together, they account for 30% of all palm oil imports globally. In coming years, Chinese demand for palm oil imports is expected to decrease as other vegetable oils become increasingly available at competitive prices. On the other hand, Indian demand for palm oil is expected to increase. The reason: vegetable oil consumption in the country is growing by 6% per year, and a recent reduction in palm oil tariffs is set to make palm oil cheaper for consumers.

Figure 4

## A large share of deforestation-linked commodities are directed towards domestic consumption or imports to China and India



<sup>1</sup> Does not account re-exports, significant amounts of beef is sent to Hong Kong and Egypt which does not match its domestic consumption  
SOURCE: FAO STAT; UN Comtrade; USDA GAIN reports; AlphaBeta analysis

# Emerging risks and opportunities

## Three main trends influence future commodity demand from emerging markets

To gauge the future emerging market demand for deforestation-related commodities, it is important to understand its drivers. Three vital trends influence how big a share of the demand for soy, palm oil, beef and pulp and paper in coming years will be accounted for by the imports of China and India, and the domestic consumption of Brazil and Indonesia:

- 1. Growth of the consuming class.** The definition of what constitutes a “middle class” or “consuming class” is wide, but regardless of what definition is used, the research is clear: the scale of consumer growth in emerging markets over the next 10–15 years will be unprecedented. McKinsey forecasts the global consuming class will swell to 2.6 billion people by 2025, with 72% of the total coming from emerging markets.<sup>13,14</sup> This growth in the consuming class will fuel demand for more and new types of food. Developing economies – including China, India, other Asian countries and Africa – are projected to account for 35% of future increase in food demand, as population growth in these countries will coincide with a dietary shift to eating more meat and calorie-rich meals.<sup>15</sup>
- 2. Constraints on domestic production.** Rising environmental constraints could curb domestic commodity production (particularly in China and India) and place greater emphasis on imports. For example, more than 40% of arable land in China and India has been degraded due to climate change, pollution or topsoil erosion.<sup>16</sup> The phenomenal growth of cities in developing countries adds to the challenges, consuming an estimated 2 million hectares of arable land per year and making it more difficult to secure food supply from domestic production.<sup>17</sup> Additionally, farms in emerging markets often lack access to the latest technologies and have inadequate agronomic practices, although this has the potential to change quickly given the strong focus in China and India at present on adopting international technology and enhancing farming practices.<sup>18</sup>
- 3. Regulatory interventions.** Regulations, from farming subsidies to import restrictions, can influence commodity imports. Import tariffs can make domestically produced goods more or less competitive; changes in tariff schedules can also influence producers to switch crops.<sup>19</sup> Dietary guidelines can also influence commodity demand. For example, demand for beef and soy (used for animal

feed) could fall in China after the Chinese government launched a public education campaign aimed at reducing meat consumption by up to 50%.<sup>20</sup>

## A ‘business-as-usual’ (BAU) approach to commodity demand in emerging markets could lead to significant deforestation and a range of broader concerns

The forecasted growth in the middle class indicates that if commodity consumption continues as it always has, significant deforestation will follow. There is therefore an urgent need to raise awareness of the deforestation issue in emerging markets and argue for a shift to more sustainable commodity sourcing.

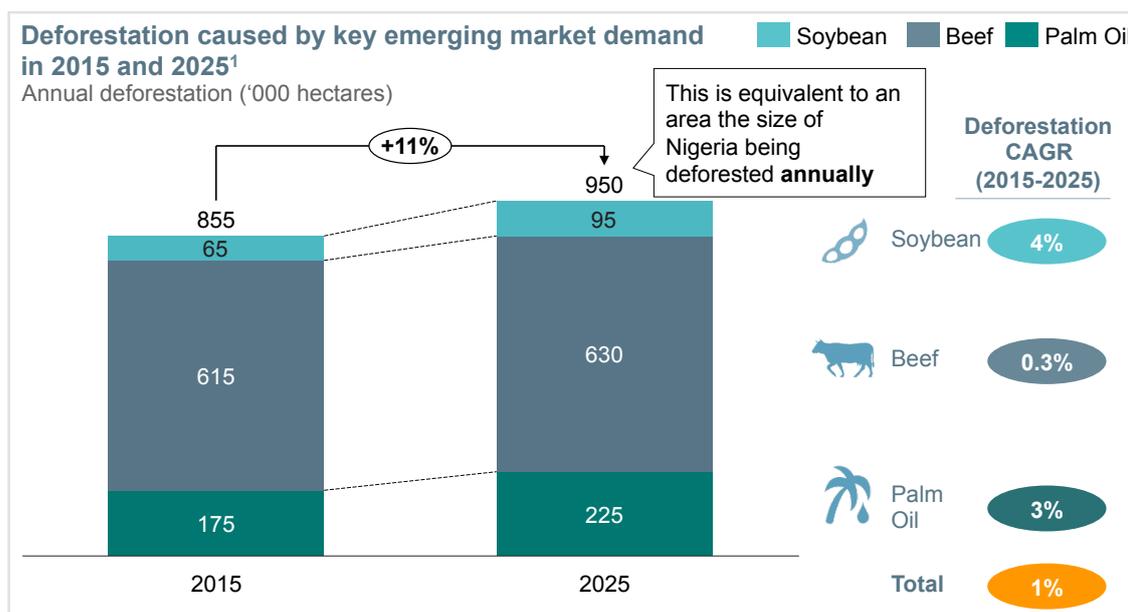
AlphaBeta’s preliminary analysis indicates that current Chinese and Indian import demand for soy, palm oil and beef, combined with domestic consumption from Brazil and Indonesia, contribute to approximately 855,000 hectares of deforestation.<sup>21</sup> This is roughly equivalent to 11% of the estimated 7.6 million hectares of forest area lost annually according to the Food and Agriculture Organization.<sup>22</sup>

There is significant uncertainty associated with deforestation rates linked to these commodities, as these rates vary significantly by commodity and over time, and forecasts depend crucially on estimates of expected yield growth and changes in sourcing patterns. In order to provide an estimate of the future potential deforestation impacts of emerging market demand in these commodities, we have assumed that historical yield growth continues, and that deforestation rates and sourcing destinations remain unchanged from present levels. When these assumptions are combined with the earlier forecasts on commodity demand, AlphaBeta estimates that deforestation could increase by 11% by 2025, meaning a tropical area equivalent to the area of Nigeria would be cleared of trees each year (Figure 5). This is a conservative estimate of the potential deforestation impact as it only focuses on immediate post-conversion land loss, and excludes indirect causes (e.g. forest fires) and continued deforestation of land that had already being converted from rainforest.<sup>23</sup>

The forecast growth in deforestation is slower than the forecasted growth in commodity imports (11% versus 43% – see Figure 3). Apart from different in measurement units (e.g. Figure 3 measures demand in metric tons, which tends to give too much weight to soy and too little to beef relative to their deforestation impact), the reason for this is a general decline in deforestation associated with sourcing these commodities across most markets due to yield improvements.<sup>24</sup> Nonetheless, the deforestation impact from this BAU scenario is still very significant.

Figure 5

## Increased emerging market demand could result in approximately 950,000 hectares in annual deforestation in 2025 alone ESTIMATE



<sup>1</sup> Deforestation was based on three factors: (1) Import demand for the product from China and India; domestic demand (excl. imports) for the product from Brazil and Indonesia (2) Improvements in yield rates per crop (based on historical data) to calculate the forecasted deforestation; and (3) The current deforestation rates associated with land production requirements in a given crop in a given country. The analysis only examines the immediate post-conversion land use change and not the indirect effects (i.e., land that is already cleared that is then converted to agricultural production).  
SOURCE: Gibbs et. al.(2015); FAO STAT; OECD-FAS; USDA GAIN reports; AlphaBeta analysis

Continuing to do “business as usual” also risks undermining the security of food supply, the competitiveness of firms in emerging countries and other geopolitical and economic priorities of emerging markets, such as the Belt and Road Initiative:

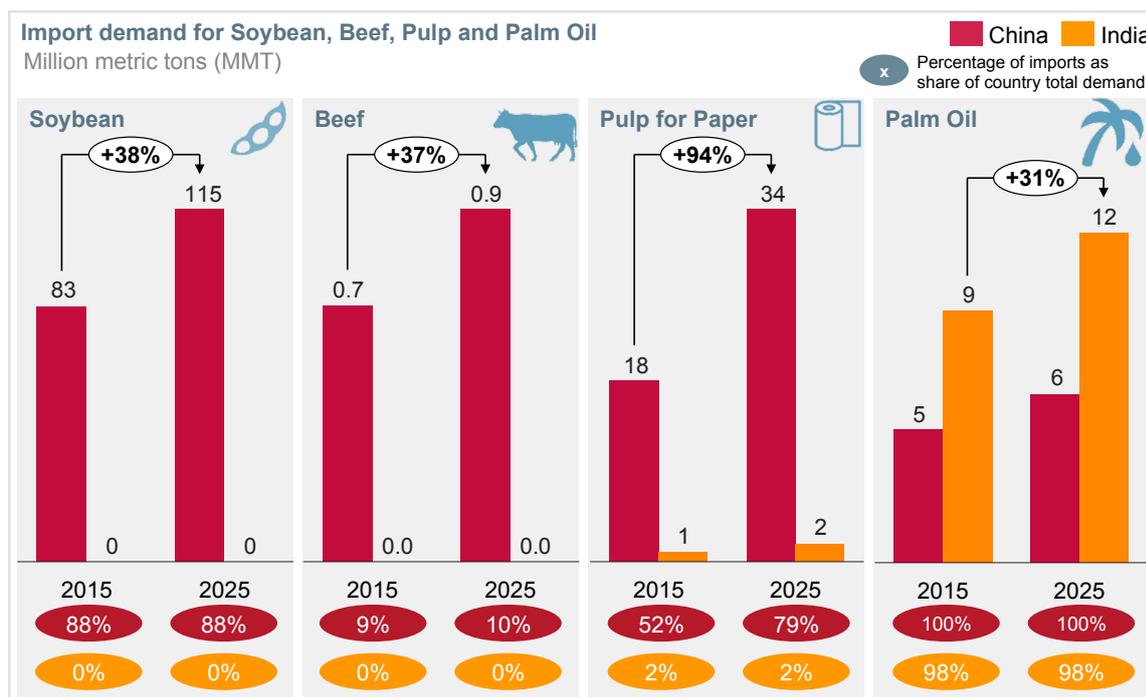
- **Risks to food security.** Relying heavily on agricultural imports is risky, as any disruption in trade could threaten the food supply. For example, China already covers around 90% of its soy demand and almost all of its palm oil demand with imports.<sup>25</sup> And the dependency could increase even further, AlphaBeta research shows. By 2025, imports for soy, beef and palm oil in India and China could expand by up to 94% (Figure 6). Research from the China Council for International Cooperation on Environment and Development (CCICED) suggests that long-term access to resources depends on how sustainably those resources are managed, and with the Chinese government outlining binding targets on land use, productivity and the ecological impact of these lands, the burden of meeting the domestic demand of vital commodities shifts on to international supply chains, making the challenge of ensuring food security through sustainable supply chains an issue of national importance.<sup>25,26</sup>
- **Risks for the competitiveness of firms.** Companies are under scrutiny as consumers in emerging markets, and globally, are increasingly demanding sustainably sourced products. In addition, governments are introducing new sustainability standards and technology is improving the traceability and

transparency of supply chains. All these trends could create operational, regulatory and reputational risks for companies whose performance on sustainability is perceived as weak. Companies with a poor sustainability record already face the risk of being shut out of market opportunities, particularly as companies in other regions take active steps to improve their sustainability credentials. For example, the Norwegian Pension Fund has begun to divest shares in companies associated with unsustainable palm oil production, and has introduced new guidelines to exclude investment in companies whose activities entail unacceptable greenhouse gas emissions.<sup>27</sup> In another example, 81% of companies in agricultural production globally and 41% in the food retailing sector surveyed by CDP (formerly the Carbon Disclosure Project) said the effects of deforestation had “generated a substantive change in operations, revenue or expenditure” in regard to sustainability risk within commodity supply chains over the last five years through 2016.<sup>28</sup>

- **Risks to broader government interests.** China, India, Brazil and Indonesia are all publicly supporting a new global sustainability agenda, for example by signing the Sustainable Development Goals (SDGs) and the Paris Agreement. Their support for these initiatives has bolstered their “soft power” at a time when the United States announced it would withdraw from the Paris climate accord. A lack of commitment could erode their “soft power”. For example, China consumed about 20% of non-renewable energy resources, 23% of major agricultural crops and 40% of base metals in 2010; a lack of effort on their part could undermine

Figure 6

## China and India's dependency on imports for soybean, beef, pulp, and palm oil for meeting local demand could increase further by 2025



SOURCE: FAO STAT; OECD-FAS; USDA GAIN reports; AlphaBeta analysis

their influence on the subject.<sup>29</sup> Additionally, lack of sustainable production could jeopardize other major projects in these countries, including the the Belt and Road Initiative that aims to build value chains to serve 60% of the world's population.

### Emerging markets are increasingly interested in sustainably sourced products

There is anecdotal evidence suggesting that governments, consumers and producers in emerging markets are increasingly interested in sustainably sourced products. For example, the official translation of China's Five-Year Plan 2016–2020 includes three times as many sustainability-related terms as the previous five-year plan – an increase from 27 to 81 (Figure 7). There has also been a rise in the number of sustainability-related conferences in emerging markets – in China, 11 such events have been confirmed for 2018, and 7 in India.<sup>30</sup> A large-scale global survey from 2014 revealed that 34% of Brazilian consumers, 44% of Chinese consumers and 50% of Indian consumers surveyed “actively look for information on product sustainability”.<sup>31</sup>

Governments in emerging markets have taken strong steps towards improving implementation and oversight of sustainable development. China, for instance, has established 43 government departments to speed up the implementation of the SDGs by 2030.<sup>32</sup> Promising efforts are under way to support the development of sustainable supply chains in commodity-producing countries, including

the Sustainable Soy Trade Platform and the Chinese Sustainable Meat Declaration:

- **Sustainable Soy Trade Platform.** The Paulson Institute, the Nature Conservancy (TNC), Solidaridad-China and the World Wildlife Fund (WWF) are working with the Chinese government and businesses to promote legal, environmentally sustainable production of soy in South America. The partners have launched a website with information about sustainable production and responsible procurement.<sup>33</sup>
- **Chinese Sustainable Meat Declaration.** The World Wildlife Fund, the Chinese Meat Association (CMA) and Chinese businesses have committed to promote sustainable meat production, trade and consumption. They have pledged to ensure livestock is a net positive contributor to humanity and maintains a healthy planet able to meet the needs of future generations.<sup>34</sup>

In addition, AlphaBeta's past work with TFA 2020 also demonstrates that several subnational governments in emerging countries have begun to develop ambitious programmes to reduce deforestation across their areas of jurisdiction.<sup>35</sup> The research identified 61 such programmes, fairly evenly distributed across Africa, Latin America and Asia. Almost half (26) of these areas of jurisdiction are in tropical-forest regions and produce palm oil, pulp and paper or cattle.

Despite this progress, sustainability concerns do not yet play a major role in decision-making by consumers and producers in major emerging markets. Were sustainability requirements to become more important, meeting demand would be likely to become a challenge given the scale of forecasted consumption in these markets.

For example, in a recent survey in India, only 23% of companies said they provide their suppliers with specific targets to reduce their carbon footprint. Only 24% of the

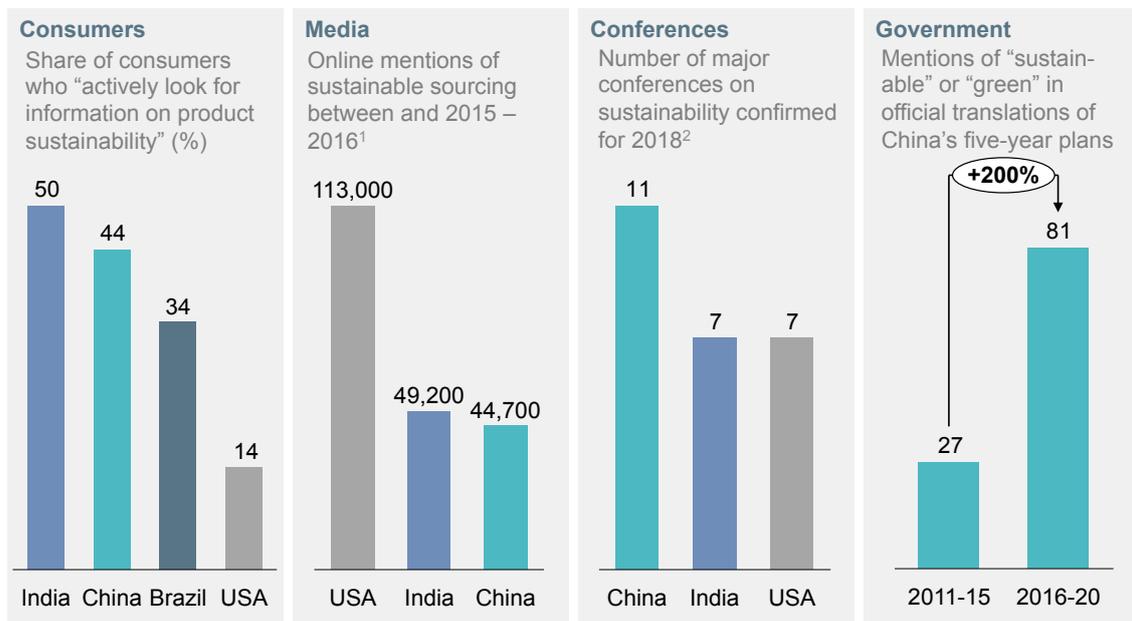
companies surveyed said they conducted environmental audits before contracting new suppliers or ran periodic audits on the environmental impact of existing suppliers.<sup>36</sup>

Nearly 60% of the 167 major Chinese brands surveyed by the Corporate Information Transparency Index, a system for evaluating a brand's green supply chain practices, were found to have made no substantive progress towards addressing pollution problems in their supply chains.<sup>37</sup>

Figure 7

## Sustainability awareness in emerging markets is gaining traction

SELECTED EXAMPLES



<sup>1</sup> Online mentions include phrases such as: "sustainability", "sourcing", and "environment"

<sup>2</sup> Major conferences include those with global attendance, public- and private sector participation, and at least one session on sustainable land use and development

SOURCE: Accenture & United Nations Global Compact; Google; Conference Alerts; national government sources; AlphaBeta analysis

# Conclusions

## **Shifting towards sustainable demand in emerging markets**

This briefing document has highlighted the crucial role of emerging markets in a global effort to eliminate deforestation from supply chains. A detailed analysis of future commodity demand from China, India, Brazil and Indonesia shows that business-as-usual trajectories carry a significant risk for the health of tropical forests around the world.

Our research contains a warning: if current patterns of sourcing soybeans, palm oil, beef and pulp and paper in emerging countries persist, the clearing of tropical forests is likely to accelerate. Resisting the shift towards a more sustainable commodity supply carries further risks, potentially undermining food security, weakening corporate competitiveness and eroding recent gains in soft power in emerging countries such as China and India. On a positive note, consumers, producers and governments in emerging markets appear increasingly concerned with sustainability issues. However, without a stronger concerted effort this shift may not be rapid enough to prevent significant future deforestation.

The full report (to be published later this year) will take a closer look at China. It will examine the country's potential to shift towards deforestation-free supply chains, and assess what needs to be done to get there.

Some vital questions that need to be discussed include:

- What will be the main factors to convince Chinese and Indian companies to switch to sustainable sourcing of products?
- What are the obstacles to implementing sustainable sourcing in emerging markets?
- What are the critical actions required to overcome these obstacles?

# Methodology overview

## Historic trade data

To provide an accurate view on the historic country demand and trade volumes in the world, a range of datasets and reports from the USDA, FAO and UN Comtrade were used to produce the information and double-check the facts.

## Forecasted trade data

To forecast demand and traded volumes of each commodity to 2025, the OECD-FAO agriculture model was used to estimate future growth rates, together with historical data (from the above-mentioned sources). For simplicity and given the uncertainty of future projections, the trade flows (i.e. the import source for each country and import volume as a share of total imports) were held constant at the 2015 level.

## Calculation of historic and forecasted deforestation

Historical annual deforestation data for each commodity in each country was taken from a report by the USDA.<sup>38</sup> The study only measured the immediate post-conversion change (i.e. lands being deforested for conversion into pastures or farmland) in land use, attributable to each product by remote sensing (i.e. satellite- or aircraft-based sensor technologies) or other direct study. Indirect causes (e.g. forest fires) and continued deforestation of land that had already being converted from rainforest were not included in the analysis.

Forecasted deforestation was calculated by taking the proportion of import demand for a specific crop from the relevant country, divided by the average area that would be required to harvest it and multiplied by the likelihood that the area will be deforested. As a “sanity check” of the bottom-up calculations on deforestation attributed to commodity supply, a top-down calculation was also conducted, based on understanding total deforestation rates globally, then estimating the share coming from countries in which India and China receive their commodity imports (as well as Brazil and Indonesia’s deforestation driven by domestic demand), and finally adjusting for the deforestation linked to these commodities that represented new expansion (i.e. outside existing concession areas). This top-down method produced a similar but slightly higher (5% higher) deforestation estimate. The detailed set of assumptions used in this research will be contained in the final report.

# Endnotes

<sup>1</sup> TFA 2020, *Jurisdictional Approaches to Deforestation-free Production Offer a Significant Opportunity for the TFA 2020 Agenda*, in TFA 2020 Annual Report 2017.

<sup>2</sup> McKinsey Global Institute (June 2016), *Capturing China's \$5 Trillion Productivity Opportunity*.

<sup>3</sup> Boston Consulting Group (December 2015), *Re-imagining FMCG in India*, Boston Consulting Group.

<sup>4</sup> McKinsey Global Institute (April 2010), *India's Urban Awakening: Building Inclusive Cities, Sustaining Economic Growth*.

<sup>5</sup> McKinsey Global Institute (April 2016), *India's Ascent: Five Opportunities for Growth and Transformation*.

<sup>6</sup> Consuming class defined as individuals with an annual net income of above \$3,600 at 2005 purchasing power parity (PPP).

<sup>7</sup> *The Archipelago Economy: Unleashing Indonesia's Potential*, McKinsey Global Institute, September 2012.

<sup>8</sup> Based on World Bank income classifications: "low-income" economies are defined as those with a GNI per capita, of \$1,005 or less in 2016; "lower middle-income" economies are those with a GNI per capita between \$1,006 and \$3,955; "upper middle-income" economies are those with a GNI per capita between \$3,956 and \$12,235; "high-income" economies are those with a GNI per capita of \$12,236 or more.

<sup>9</sup> Note: This is just the imported share of China and India's demand in these commodities. It excludes domestic demand satisfied by local production.

<sup>10</sup> Note: a lack of supply chain information means that we are unable to show the sourcing patterns for pulp and paper by country.

<sup>11</sup> RISI (2011), *China Mandates Mill Closures to Improve Pollution*. Available at: <https://technology.risiinfo.com/environment/asia-pacific/china-mandates-mill-closures-improve-pollution>

<sup>12</sup> South China Morning Post (2017), *Paper Price Rally to Extend Into 2017 Amid Limited Capacity and Surging Costs*. Available at: <http://www.scmp.com/business/money/money-news/article/2076462/paper-price-rally-extend-2017-amid-limited-capacity-and>

<sup>13</sup> Based on a definition that anyone who spends \$10 or more daily at 2005 PPP levels is part of the "global consuming class". McKinsey Global Institute (2012), *Urban World: Cities and the Rise of the Consuming Class*. Available at: <https://www.mckinsey.com/global-themes/urbanization/urban-world-cities-and-the-rise-of-the-consuming-class>

<sup>14</sup> Other forecasts echo the analysis forecasting a large growth in the middle class, notably the OECD forecasting an increase of 3 billion people in the middle class, and the Asian Development Bank forecasting a growth of 1 billion more middle-class people in Asia. Available at: <https://www.oecd.org/dev/44457738.pdf> and <https://www.adb.org/publications/key-indicators-asia-and-pacific-2010> respectively.

<sup>15</sup> McKinsey Global Institute (2011), *Resource Revolution: Meeting the World's Energy, Materials, Food and Water Needs*. Available at: <https://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/resource-revolution>

<sup>16</sup> AlphaBeta and BSDC (2016), *Valuing the SDG Prize in Food and Agriculture*. Available at: <http://www.alphabeta.com/valuing-the-sdg-prize-in-food-and-agriculture/>

<sup>17</sup> AlphaBeta and BSDC (2017), *Valuing the SDG Prize in Cities*. Available at: <http://www.alphabeta.com/valuing-the-sdg-prize/>

<sup>18</sup> For instance, China's farm yield averages 1.79 ton per hectare compared to an average farm yield of 2.9 ton/ha in the US. This could leave Chinese farms struggling to keep up with domestic demand, which could spur imports. See: USDA (2017), *China's Robust Demand for Oilseeds Continues to Outpace Growth in Domestic Production*. Available at [https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Oilseeds%20and%20Products%20Annual\\_Beijing\\_China%20-%20Peoples%20Republic%20of\\_3-16-2017.pdf](https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Oilseeds%20and%20Products%20Annual_Beijing_China%20-%20Peoples%20Republic%20of_3-16-2017.pdf)

<sup>19</sup> For example, India encouraged the continued import of palm oil over other oils, when the government raised import tariffs for both crude and refined vegetable oils by 5% in 2015, while lowering the import duty for palm oil by 5% in 2016. USDA (2017), *India: Oilseeds and Products Annual*. Available at: <https://www.fas.usda.gov/data/india-oilseeds-and-products-annual-1>

<sup>20</sup> The Guardian (2016), "China's Plan to Cut Meat Consumption by 50% Cheered by Climate Campaigners". Available at: <https://www.theguardian.com/world/2016/jun/20/chinas-meat-consumption-climate-change>

<sup>21</sup> Deforestation linked to pulp and paper has not been calculated due to lack of available data on deforestation associated with production.

<sup>22</sup> Food and Agriculture Organization of the United Nations (2015). *Global Forest Resources Assessment 2015. How Are the World's Forests Changing?* Second edition.

<sup>23</sup> See the methodology section at the end of this briefing document for further details.

<sup>24</sup> Note: Our BAU scenario freezes the import source countries for China and India and the deforestation associated with additional land requirements in each country/crop to today's levels. Therefore only improvements in yields for each crop influence land requirements and deforestation impacts.

<sup>25</sup> China's Role in Greening Global Value Chains, CCICED, December 2016 (retrieved at: <http://www.cciced.net/cciceden/POLICY/rr/pr/2016/201612/P020161214521503400553.pdf>)

<sup>26</sup> Central Compilation & Translation Press, 2016, *The 13th Five-Year Plan for Economic and Social Development of the People's Republic of China*. Available at: <http://en.ndrc.gov.cn/newsrelease/201612/P020161207645765233498.pdf>

<sup>27</sup> See the NYDF Progress Assessment. Available at: <http://forest-declaration.org/summary/>

<sup>28</sup> Global Forests Report 2016, CDP, December 2016. Retrieved at: <https://www.cdp.net/en/research/global-reports/global-forests-report-2016>

<sup>29</sup> World Trade Organization (2015), *World Trade Report*. Available at: [https://www.wto.org/english/res\\_e/booksp\\_e/wtr15-1\\_e.pdf](https://www.wto.org/english/res_e/booksp_e/wtr15-1_e.pdf)

<sup>30</sup> Sustainability conferences taken into account include those with global attendance, public- and private-sector participation, and at least one session on sustainable land use and development. See Conference Alerts (2017). Available at: <https://conferencealerts.com/topic-listing.php?page=1&ipp=All&topic=sustainable%20development>

<sup>31</sup> Survey undertaken among 30,000 consumers across 20 countries. See: Accenture and United Nations Global Compact (2014), *The Consumer Study: From Marketing to Mattering*. Available at: <https://www.accenture.com/us-en/insight-un-global-compact-consumer-study-marketing-mattering>

<sup>32</sup> Sustainable Development Knowledge Platform (2016), "Executive Summary of China's Actions on the Implementation of the 2030 Agenda for Sustainable Development". Available at: <https://sustainabledevelopment.un.org/memberstates/china>

<sup>33</sup> Retrieved at: <http://www.paulsoninstitute.org/economics-environment/conservation/sustainable-soy-trade/>

<sup>34</sup> World Wildlife Fund (2017), "China Meat Association and its 64 Chinese Company Members Jointly Announce Chinese Sustainable Meat Declaration with WWF". Available at <https://www.wwf.org.br/informacoes/english/?61882/China-Meat-Association-And-Its-64-Chinese-Company-Members-Jointly-Announce-Chinese-Sustainable-Meat-Declaration-with-WWF>

<sup>35</sup> TFA 2020, *Jurisdictional Approaches to Deforestation-free Production Offer a Significant Opportunity for the TFA 2020 Agenda*, in TFA 2020 Annual Report 2017.

<sup>36</sup> The Economic Times (2016), "Are top Indian Companies Interested in Greening the Supply Chain?" Available at: <http://blogs.economictimes.indiatimes.com/ResponsibleFuture/are-top-indian-companies-interested-in-greening-the-supply-chain/>

<sup>37</sup> On a scale of between 0 and 100, these brands scored below 10. See: Institute of Public and Environmental Affairs (IPE) & Natural Resources Defense Council (NRDC) (2014), *Greening the Global Supply Chain: Corporate Information Transparency Index 2015 Annual Evaluation Report*. Available at: [http://114.215.104.68:89/Upload/file/CITI/2015/CITI%20report%202.0-2015\\_EN.pdf](http://114.215.104.68:89/Upload/file/CITI/2015/CITI%20report%202.0-2015_EN.pdf)

<sup>38</sup> USDA (2017), *International Trade and Deforestation*.



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