



Agricultural Supply Chains as a Driver of Financial Risks

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This revised edition features new content on approaches to risk classification. Definitions and examples of risk are clarified to reflect advancements in, as well as hallmarks of, risk literature. Recommendations from the Task Force on Climate-related Financial Disclosures are also a new addition.



I. Introduction

In an era of climate change, commodity sourcing is an increasingly challenging business function for food and agribusiness companies. Erratic weather patterns, widespread groundwater depletion, and soil erosion are compromising agricultural productivity and increasing procurement costs. In short, secure access to a reliable and low-cost agricultural supply base is increasingly in jeopardy.

These environmental and social issues translate to risks within the supply chain that can negatively impact the bottom lines for food and agribusinesses. Whether these risks are exposed by campaign groups or by supply chain disruptions that impede a company's ability to meet demand, they should be understood, disclosed and addressed before preventable damage to company financials.

Consider, for example:

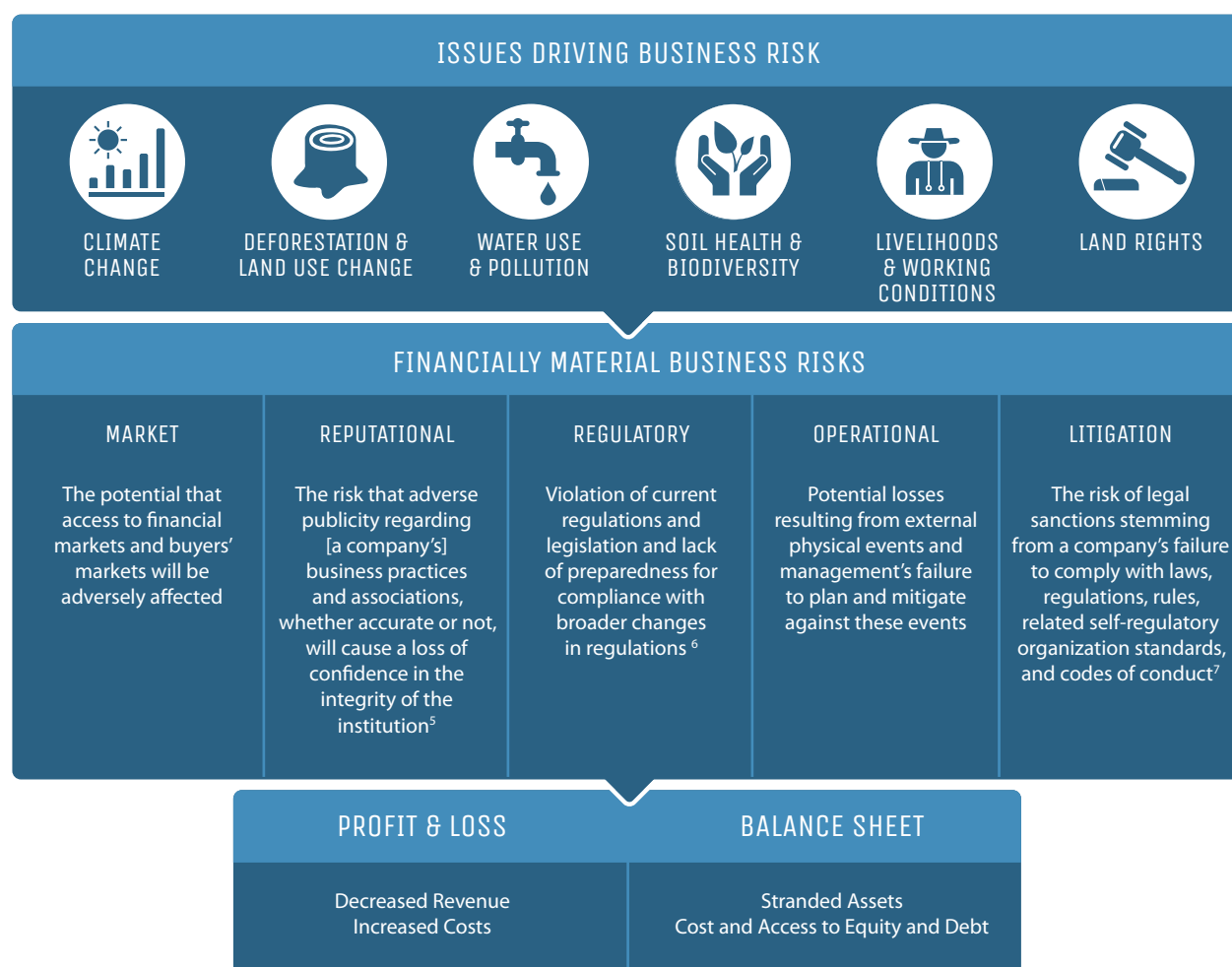
- IOI Group's share price dropped 18 percent after its certification from the Roundtable on Sustainable Palm Oil (RSPO) was suspended in April 2016 following RSPO's ruling that it was not meeting the certificate's standards and was failing to adequately protect peat areas and forests.¹ This led several major brands including Unilever, Kellogg and Nestlé to cut supplies sourced from the IOI Group, and Moody's to consider downgrading the company in May 2016².
- Uncontrolled burning to clear forestland for palm oil production in Indonesia generates the equivalent amount of CO₂ pollution produced by the U.S. economy daily. It produces other air pollutants as well that in 2015 caused an estimated \$47 billion in economic losses, 500,000 respiratory illnesses and a projected 100,000 premature deaths.³
- In 2016 Brazil's largest grocery chain, Pão de Açúcar, promised to stop buying beef produced by workers living in slave-like conditions in response to NGO and consumer pressure to improve its sourcing practices.⁴

To maintain growth and profitability in this new, more challenging landscape, food companies must develop agricultural sourcing strategies that are climate resilient and fundamentally decoupled from environmental degradation and adverse human impacts. While the severity of environmental and social impacts vary by commodity, region and company, these collective trends are producing tangible business risks that are increasingly affecting company bottom lines (see Exhibit 1).

II. Translating Agricultural Supply Chain Issues to Material Risk

Given the reach of the agricultural supply chain, the conditions that present risks impact an array of stakeholders. Environmental challenges that most prominently create risk for food and agriculture companies are climate change, deforestation & land use change, water use & pollution and soil health & biodiversity; while social challenges that pose risk include livelihoods, working conditions, and land rights.

EXHIBIT 1. TRANSLATING FOOD & AGRICULTURAL ISSUES TO MATERIAL RISKS & FINANCIAL STATEMENTS



Like materiality interpretations, classifications of risk depend on context. Broadly, actual risks vary across industries, though many risk management professionals classify risks based on traditional typologies found within academic, industry or financial agency publications. A more specific context for risk is climate change. The Task Force for Climate-Related Financial Disclosure (TCFD) divides climate-related risk into two categories: 1. transition risks, meaning business risks that arise during the shift to a low carbon economy and 2. risks resulting from the physical impacts of climate change⁸. Blending the context of the risk with traditional risk management language is another approach to classifying risks, like that seen in Natural Capital Declaration's paper on soft commodities.⁹

The Engage the Chain approach to risk classification reflects a comprehensive scan of climate-related risk publications across agencies, academia and NGOs. The five main risks—Market, Reputation, Regulatory, Operational, and Litigation—share commonalities with these reference organizations. At the same time, the risk classification approach uses guiding definitions that may be applied to all sectors while the examples are tailored to agricultural holdings. This approach smooths the translation of environmental and social issues into common risk terms and underscores the importance of proper disclosure.

EXHIBIT 2: DEFINITIONS OF FINANCIALLY MATERIAL RISKS & EXAMPLES WITHIN AGRICULTURAL SUPPLY CHAINS

	GUIDING DEFINITION	EXAMPLE
Market	The potential that access to financial markets and buyers' markets will be adversely affected	<ul style="list-style-type: none"> • Credit ratings of agricultural suppliers may decline with failure to implement risk mitigation processes, resulting in higher financing costs • Price increases or price volatility of agricultural inputs/commodities • Loss of contracts due to environmental or human rights impacts • Decreased sales due to shifting consumer tastes
Reputational	The risk that adverse publicity regarding [a company's] business practices and associations, whether accurate or not, will cause a loss of confidence in the integrity of the institution ¹⁰	<ul style="list-style-type: none"> • Brand equity impacts from negative publicity, consumer concerns or advocacy campaigns • Damage to brand equity due to conflicts over scarce resources or environmental or social issues highlighted in advocacy campaigns
Regulatory	Violation of current regulations and legislation and lack of preparedness for compliance with broader changes in regulations ¹¹	<ul style="list-style-type: none"> • Penalties or fines due to violations of regulations within supply chain • Failure to anticipate future government action such as import bans and export restrictions • Compliance costs due to violations of environmental guidelines
Operational	Potential losses resulting from external physical events and management's failure to plan and mitigate against these events	<ul style="list-style-type: none"> • Reduced primary crop or livestock production • Higher transport costs to haul imports longer distances • Stranded assets due to shifting production zones
Litigation	The risk of legal sanctions stemming from a company's failure to comply with laws, regulations, rules, related self-regulatory organization standards, and codes of conduct ¹²	Legal actions or sanctions for failure to address negative environmental or human rights impacts

III. Disclosing Risk in the Agricultural Supply Chain

The natural next step for food and agricultural companies to take after identifying material risk is disclosure in public-facing documents. Ceres expects companies to provide consistent disclosure of material sustainability issues and impacts across disclosure vehicles, including sustainability reports, financial filings and other forums. While there are several risk disclosure frameworks that companies may adopt, Ceres expects that companies will disclose all relevant sustainability information using the Global Reporting Initiative (GRI) guidelines as well as additional sector-relevant indicators. For climate risk disclosure, the TCFD has emerged with a best-in-class approach for public financial filings, and recommends that companies across all sectors disclose climate-related risks around four thematic areas: Governance, Strategy, Risk Management and Metrics and Targets. The TCFD disclosure framework, outlined in the table below, is aligned with leading disclosure frameworks aimed at voluntary disclosure and financial filings.¹³

EXHIBIT 3: TCFD DISCLOSURE GUIDANCE FOR ALL SECTORS¹⁴

Governance	Disclose the organization's governance around climate-related risks and opportunities.
Strategy	Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning, where such information is material.
Risk Management	Disclose how the organization identifies, assesses, and manages climate-related risks.
Metrics & Targets	Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.

SUPPLY CHAIN TRACEABILITY CHALLENGES AND BUSINESS RISK

The way that companies source agricultural inputs—directly from farmers, through co-ops and wholesalers, or through multiple levels of intermediaries or commodities markets—can vary enormously. In addition, many agricultural supply chains are highly complex, making it very challenging to trace a particular input back to its geographic or farm origin. Some meat and agricultural products companies are vertically integrated, but many processed food companies are three to four links away from the agricultural producer. Some commodities such as corn and palm oil are aggregated at the silo or mill level, at which point tracing back to the original farm is lost. Companies may have a wide variety of sourcing structures for different divisions, products and manufacturing facilities.

The structure of a company's supply chain drives not only the business risk but also the strategies employed to manage these risks. For these reasons, it is important for investors to seek information from companies on the nature of their agricultural supply chains and their ability to trace inputs back to the farm level.



IV. Key Issues Facing Agricultural Supply Chains

Agriculture's environmental and social challenges are felt at every stage of food production, typically affecting farmers first, and then rippling across the supply chain to impact traders, distributors, processors and retailers. The challenges are all interrelated, and understanding them requires a system-wide view. Climate change, for example, affects water availability, but land management practices affect water quality and contribute to climate change.

ENVIRONMENTAL CHALLENGES

1. Climate Change



The strong consensus of scientists is that global warming will have major, generally negative impacts on cropland productivity and will alter global patterns of food production. More severe flooding, extreme heat, drought and changing rainfall patterns are just a few of the ways that a warmer planet will adversely affect yields¹⁵ in many parts of the world, including the U.S. Increased disease,

pests and wildfires will also intensify as temperatures rise.¹⁶ A drop in usable cropland is also occurring in some coastal regions as sea levels rise.¹⁷

At the same time, agricultural practices contribute to climate-warming pollution, both directly from agricultural production, such as methane released from livestock and nitrous oxide from fertilizer use, and indirectly as a result of deforestation and other land use changes.

BUSINESS RISKS ASSOCIATED WITH CLIMATE CHANGE IMPACTS

RISK CATEGORY	EXAMPLES	IMPACT(S)
Operational	Beginning in 2012, GlaxoSmithKline found that more extreme and variable weather caused by climate change was having a major impact on British blackcurrant harvests. ¹⁸	<ul style="list-style-type: none"> • Reduced agricultural productivity • R&D spending for more resilient varieties
	Campbell's Soup Company has struggled with extreme weather in California, a key growing region for its carrot supplies. In 2014, California's record-setting drought followed by intense rains led to a 28% decline in profits for its carrot division. ¹⁹	
Litigation	In late 2015, a Peruvian farmer filed suit against RWE, a large European energy company, for its alleged contributions to global warming based on its total emissions over two centuries. The complaint claims that global warming is causing glaciers near the farmer's home to melt, which in turn is causing lakes in the area to flood and threaten his property. ²⁰	Legal fees and monetary settlements for violating laws and regulations

ENVIRONMENTAL CHALLENGES

2. Deforestation & Land Use Change



Within 30 years, the global food system will need to feed 3 billion more people. Yet there's limited room to continue the rapid agricultural expansion that has taken place over the past half-century. Croplands and pasture already account for half of the world's vegetated lands.²¹ Converting new land with high conservation value, including grasslands, forests and marshes to food production²² impacts biodiversity and reduces the capacity of natural ecosystems to provide benefits critical to agriculture, including watershed and soil protection, as well as pollination and climate regulation.

One of the most visible examples of unsustainable land use is deforestation.²³ Commercial and subsistence agriculture cause 80 percent of global

deforestation²⁴ and are a key driver of the conversion of peat lands, which store some of the highest quantities of carbon on the planet. Commodities-driven deforestation creates an enormous amount of carbon pollution—roughly 11 percent of total GHGs globally—and ratchets up agriculture's contribution to climate change. Beef production is also a key driver of deforestation, particularly in Latin America, where 71 percent of forest clearing is to create cattle pasture, while 12 percent is for planting commercial crops, including soybeans.²⁵ Deforestation also causes soil erosion, which leads to lower crop yields, less reliable production, and water scarcity. Water scarcity is caused by eroding soils and mud that contaminate waterways and by disruption of the hydrological cycle of the forest.

BUSINESS RISKS ASSOCIATED WITH DEFORESTATION & OTHER LAND USE IMPACTS

RISK	EXAMPLE	IMPACT(S)
Market	IOI Group's revenue fell significantly after its certification from the Roundtable on Sustainable Palm Oil (RSPO) was suspended in April 2016 following RSPO's ruling that it was not meeting the certificate's standards nor adequately protecting peat areas and forests. ²⁶ This led to 27 major purchasers to suspend contracts with the IOI Group, including major brands Unilever, Kellogg and Nestlé. ²⁷	<ul style="list-style-type: none"> • Reduction in revenue due to reduced contracts with buyers • Threat of downgrade by ratings agency
Reputational	Many leading brands have been the focus of campaigns by NGOs such as Greenpeace, Rainforest Action Network, SumOfUs, and Union of Concerned Scientists. In 2012, Greenpeace's mock advertisement linking Nestlé's palm oil sourcing to orangutan deaths was viewed by over 300,000 during its first day on the Internet. Cadbury New Zealand went from number one in brand trust to number 36 after public criticism over irresponsible palm sourcing in 2009. Kellogg Co. was accused of rainforest destruction in over 30 prominent media outlets. ²⁸	Brand equity damaged due to consumer concerns and advocacy campaigns
Litigation	The Government of Indonesia has recently begun prosecuting publicly traded companies associated with air pollution produced by palm oil fires. On August 15, 2016, the Government of Indonesia fined Sampoerna Agro \$81 million for 2014 forest fires on 3,000 hectares on its concessions in Riau Province, Indonesia. The \$81 million fine is slightly less than Sampoerna Agro's revenue in the first six months of 2016. ²⁹	Legal fees and monetary settlements for violating local laws and regulations

ENVIRONMENTAL CHALLENGES

3. Soil Health & Biodiversity



Current soil management practices threaten the productivity and sustainability of food systems. About one-third of soil worldwide is moderately to highly degraded due to erosion, nutrient depletion, acidification, salinization, compaction and chemical pollution.^{30,31} These factors deplete and pollute water resources used to grow and process food, increase operating costs and disrupt overall supply chains due to lower and less dependable crop yields.

Pesticides and herbicides used in agriculture can also negatively impact essential services provided by insects, bats and birds, which pollinate 35 percent of the world’s food crops.³² Struggling bat and bee populations threaten to lower agricultural productivity. Honeybee pollination alone contributes \$15 billion annually to U.S. agricultural production.

BUSINESS RISKS ASSOCIATED WITH SOIL HEALTH & BIODIVERSITY

RISK	EXAMPLE	IMPACT(S)
Market	In October of 2011, Coleman Natural Foods terminated its contracts with six poultry growers in Pennsylvania. Performance standards and failure to comply with Coleman’s organic and pesticide-free regulations were cited as the cause for the dropped contracts. ³³	Loss of contracts due to environmental impacts.
Litigation	In January of 2017, Ecuador’s Esmeraldas Provincial Court ruled against the company Los Andes and Palesema Oil Palm in the matter of planting oil palms trees in the place of indigenous plants. Los Andes was forced to pay restitution to local villages and to adopt planting restrictions in the future. ³⁴	<ul style="list-style-type: none">• Legal action resulting from compromised biodiversity.• Monetary compensation to parties affected by biodiversity loss.



4. Water Use & Pollution



Growing competition for water supplies, combined with climate change and water pollution, threaten the food sector's water security and contribute to a water availability threat that the World Economic Forum recently ranked as the world's "top global risk."

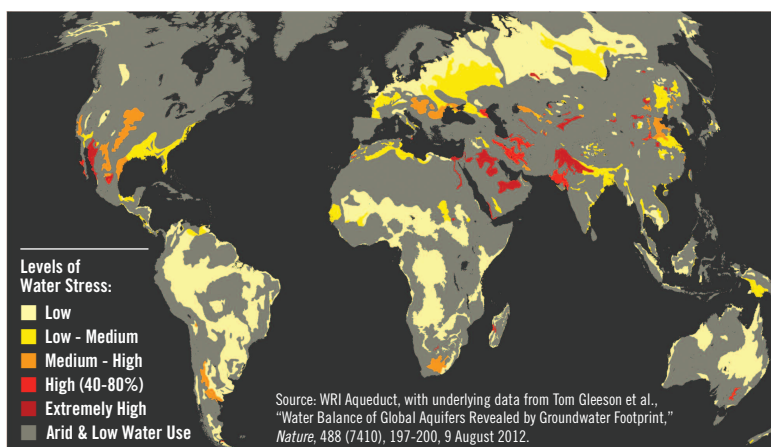
Water Use: Agricultural production is the most water intensive activity,³⁵ consuming roughly 70 percent of the world's freshwater.³⁶ Moreover, one-third of the world's food is produced in areas of high or extremely high "water stress" or competition.³⁷

- About 21 percent of rainfed production and 56 percent of the world's irrigated crop production takes place in high stress regions.³⁸
- An estimated 20 percent of the Earth's groundwater basins are being over-exploited, many of them in regions of significant agricultural importance,

including California and the Midwest's Ogallala Aquifer. (Exhibit 4).

Water Pollution: Fertilizer, manure and pesticide runoff from farm fields is a major source of water pollution in most regions of the world.³⁹ Global chemical fertilizer use, which hit 180 million tons in 2012, has increased 500 percent over the past 50 years, with nitrogen use alone growing by 800 percent. Much of this fertilizer runs off into waterways, polluting rivers, groundwater and oceans. The number of hypoxic "dead zones" linked to fertilizer runoff (also called nutrient pollution) has increased exponentially since the 1960s, affecting more than 400 aquatic ecosystems worldwide, including the Gulf of Mexico and South China Sea. Nutrient pollution is the most significant water quality challenge in the United States, according to the EPA, which spends an estimated \$4.8 billion annually treating nitrogen pollution.

EXHIBIT 4: GROUND WATER DEPLETION MAP



SINISS RISKS ASSOCIATED WITH SOIL WATER USE & POLLUTION

RISK	EXAMPLE	IMPACT(S)
Reputational	The Coca-Cola Company decided not to move forward on the development of an \$81 million bottling plant in southern India in April 2015 due to resistance from local farmers who cited concerns about strains on local groundwater supplies. ⁴⁰	<ul style="list-style-type: none"> • Damages to brand equity from public criticism by advocacy groups and failure to meet local needs • Monetary costs of abandoning part of a strategic plan
Regulatory	Molson Coors was fined \$124,000 in 2016 after pleading guilty to two offenses in the U.K.: causing an illegal water discharge activity and breaching its environmental permit per the England and Wales 2010 Environmental Permitting Regulations. ⁴¹	Legal fees and monetary settlements for violating laws and regulations
Operational	Illovo, the South African sugar producer, temporarily shut down a large sugar mill in early 2015 as drought was predicted to destroy \$81 million in local production. ⁴²	Revenue decline resulting from decreased production

SOCIAL CHALLENGES

1. Livelihoods & Working Conditions



Smallholder farmers⁴³ in the developing world play a critical role in key commodity supply chains, from palm oil to cocoa beans.

Yet they typically face high levels of poverty and debt. Accessing credit and high-quality seeds and inputs is a challenge for many, which limits their ability to invest in more sustainable practices that often have higher upfront costs,⁴⁴ but also increase their productivity. Smallholder farmers often have limited power in contract negotiations and are subject to middlemen who pay them below market prices, and are especially vulnerable to the impacts of climate change. Inattention to these impacts can lower both the quality and quantity of supply for agribusinesses.

Agricultural wagedworkers as a group worldwide are among the poorest and, ironically, the most food insecure. In the United States, 23 percent of all hired farm workers had family incomes below the poverty guidelines.⁴⁵ Reduced opportunities prompt many rural workers to move to cities to seek better paying jobs, reducing the pool of skilled agricultural workers.

An estimated 3.5 million people work in forced labor situations globally in agriculture, fishery and forestry.⁴⁶ In many countries, including the U.S., agricultural workers are exempt under most national labor laws, and may have few social protections that other workers enjoy, particularly regarding wages, overtime pay,⁴⁷ freedom of association and collective bargaining.⁴⁸ Furthermore, the

sector is plagued by illegal and unethical employment practices. Food and agriculture companies face considerable exposure to labor rights violations among suppliers, many of whom are based in countries lacking basic worker protections.⁴⁹ Migrant agricultural workers are at risk for exploitation by labor brokers who may employ unethical practices such as high recruitment fees, passport retention, and contract fraud to lure them into forced labor schemes, and use threats of deportation to keep them from reporting abuses.⁵⁰

Agriculture employs a high number of children—more than 98 million children in 2012—particularly for commodities such as cocoa, coffee, tobacco, sugarcane, cotton and rice.^{51 52 53} Forced and child labor in food company supply chains can cause reputational damage when “bad actors” tarnish the image of an entire industry or sector and subject companies to lawsuits. In addition, social conflict cause disruptions in agricultural supply chains.

Even with widespread underreporting⁵⁴ of farmworker deaths, injuries and diseases, agriculture is still one of the most hazardous work sectors due to fatalities, injuries and work-related sicknesses. At least 170,000 agriculture workers are killed on the job each year globally, and millions more are seriously injured in workplace accidents involving agricultural machinery or poisoned by pesticides and other agrochemicals.

BUSINESS RISKS ASSOCIATED WITH LIVELIHOODS & WORKING CONDITIONS IMPACTS

RISK	EXAMPLE	IMPACT(S)
Market	In 2016, the Consumer Goods Forum (CGF) passed the Social Resolution on Forced Labour, a commitment to fight forced labor throughout its global supply chains. ⁵⁵ Nestlé, a signatory to the resolution, implemented an internal monitoring system to investigate human rights abuses. ⁵⁶	Costs of complying with human rights and labor certifications, including costs to implement internal monitoring policies
Reputational	A line of Hershey's chocolate was dropped by Whole Foods ⁵⁷ and the company agreed to more aggressive human rights and labor certification in its supply chain in 2012 after NGOs (International Labor Rights Forum, Green America) campaigned against the company, including threatening to run a Super Bowl ad on the issue of abuses in the coca supply chain. The company agreed to improvements (which have been further strengthened since) and the ad was dropped. A May 2016 Oxfam report on the appalling working conditions of poultry plant workers in the United States generated intense media scrutiny and pressure on the companies named to respond to the allegations, including Tyson Foods Inc., Pilgrim's Pride Corp., Perdue Farms Inc. and Sanderson Farms Inc.	<ul style="list-style-type: none"> • Brand equity damaged due to consumer concerns and advocacy campaigns • Costs of complying with human rights and labor certifications
Litigation	In 2015, the consumer rights law firm Hagens Berman filed separate class action lawsuits against US food companies Mars and Hershey and Swiss Nestlé for failing to report the use of child labour in their cocoa production. ⁵⁸	Legal fees and monetary settlements for violating laws and regulations

SOCIAL CHALLENGES

2. Land Rights



Inadequate and insecure land rights are leading to conflicts over land, environmental degradation and overall exploitation of farmers.⁵⁹ International land acquisitions are also increasing, with governments and private firms investing in or purchasing large tracts of land in other countries, sometimes in situations where local land rights are ignored.⁶⁰ About two-thirds of agricultural land deals by foreign investors between 2000 and 2010 were in countries with serious food security problems, and two-thirds of foreign land investors in developing countries plan to export everything they produce.⁶¹ Farmers that lack land tenure are reluctant to make long term investments in their farms (or may be unable to access credit), which can result in higher price volatility⁶² and lower productivity.⁶³ These trends can cause wide-ranging

social disruption, including loss of land titles which limits farmers’ ability to pledge land as collateral and reinvest in their farms to raise productivity over time.

In regions where land rights of indigenous or local communities are not documented or recognized, local people are at risk of being evicted or wrongfully displaced during the acquisition of land or conversion of forests to make way for commercial agriculture operations. The livelihoods of forest-dependent communities are further disrupted when natural forests are replaced with managed tree plantations, which provide a much narrower range of services (such as food, fuel, medicine and wildlife habitat) than the original forest. Companies that do not respect the land rights of local people may face financial and reputational risks stemming from protests, work stoppages or damaging social campaigns.⁶⁴

BUSINESS RISKS ASSOCIATED WITH LAND RIGHTS IMPACTS

RISK	EXAMPLE	IMPACT(S)
Reputational	Nestlé report highlights that legal and other, often violent, disputes on rights to land and natural resources are increasing in some countries. The report confirms that companies must recognize and clarify rights to land and natural resources, through an inclusive and equitable process, to further sustainable agricultural development. ⁶⁵	<ul style="list-style-type: none">• Brand equity damaged due to consumer concerns and advocacy campaigns• Costs of complying with human rights and labor certifications
Litigation	A federal prosecutor in Brazil told Bunge in 2011 to stop sourcing sugarcane from Jatayvary, because of a land rights dispute with an indigenous community. The company insists that it will only consider breaking its contracts once the land is fully demarcated, and officially signed by the President. ⁶⁶	Legal fees and monetary settlements for violating local laws and regulations



V. Sustainable Sourcing: The Opportunity for Food Companies

On the flip side of risk is an abundance of opportunity for investors among food and agricultural companies that adopt innovative processes. Many companies are finding ways to help growers shift to practices that build healthy soils, conserve water supplies, respect the rights of workers and support biodiversity. Some are offering technical assistance and incentives, either directly to growers in their supply chains or through intermediaries, such as agribusiness retailers or input suppliers. Others are developing practices and policies that improve farm communities and protect the rights of workers, or are working collaboratively through pre-competitive multi-stakeholder initiatives, such as the Consumer Goods Forum or Field to Market. For example:

- To address the long-term risks of climate change, **General Mills** has made a science-based commitment to reduce absolute greenhouse gas (GHG) emissions by 28 percent across its full value chain by 2025. Since

nearly two-thirds of its total value chain GHG emissions occur in agriculture, a key focus of the company's climate strategy is advancing sustainable agriculture practices through multi-stakeholder collaborations. By working hand in hand with suppliers, farmers, NGOs and industry peers, the company hopes to catalyze action and scale solutions to address climate risks and opportunities within its business and across the food industry as a whole.⁶⁷

- **Unilever** is creating added value throughout its supply chain by helping hundreds of thousands of smallholder farmers improve agricultural practices, enabling them to double or even triple their yields. This increased productivity improves both farmer livelihoods and the quality and security of key commodity supplies which in turn reduces volatility and uncertainty for Unilever by ensuring sustainable supplies of ingredients that will support the company's long-term growth plans.^{68,69}

SUSTAINABLE SOURCING

- **Builds and protects brand identity** by showing consumers, shareholders and commercial customers that the business is managing its supply chain sustainably and responsibly.
- **Spurs innovation** and delivers bottom line benefits that come from improved resource efficiency, as well as safe and fair working conditions.
- **Provides competitive advantage** by better anticipating and adapting to environmental changes in the supply chain, such as water and resource scarcity and/or reputational risks and conflicts.



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