

The Earth Security Index 2015



Managing global resource risks and resilience in the 21st century



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The Earth Security Group

The Earth Security Group provides intelligence for navigating sustainability risks in an age of inter-dependence.

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Note

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Introduction

Managing global resource risks and resilience in the 21st century

The opening of 2015 witnesses the effects of falling oil prices on the global economy. It is clear that resource risks have the capacity to rapidly destabilise the global order and that new ways of promoting the convergence of interests in long-term development are urgently needed.

Emerging economies are moving to strengthen their regional spheres of influence, and at the same time searching globally to secure resources to sustain their development. In the process, geo-political relations are becoming ever more inter-dependent. This presents new opportunities for development, but also increases the sustainability pressures that undermine these opportunities.

Local conflicts arising due to water stress, land-use change, food availability and energy instability in many developing countries can trigger political and economic risks that quickly spread to the global economy. Navigating the opposing forces of regionalisation and globalisation, while managing inter-connected resource risks, is key to 21st century market opportunities and sustainable development goals.

The 2015 Earth Security Index provides a strategic analysis of sustainability risks for resources that are of geo-political significance. The report offers a data-driven dashboard for multi-national companies, governments and civil society to navigate a complex web of resource risks.

It also provides seven strategic blueprints that translate complexity into specific actions, aimed at strengthening cross-border cooperation and building resilience. For key commodities, from oil and gas to rice and cocoa, the report's conclusions demonstrate the need for the risk analyses that are routinely conducted by governments and companies to develop a more integrated view of sustainability pressures.

The report's blueprints highlight win-win opportunities for innovation in sustainable technologies, infrastructures, business models and policies. These solutions can help companies and governments build resilience to the political and economic risks associated with resource pressures. However, to realise these opportunities, investors, risk managers, business strategists, and sustainability professionals must work together across corporate silos, and engage externally with policy-makers.

The 2015 Earth Security Index draws on insights and contributions from our unique network of global experts and includes new datasets, sectors and risk analyses. We thank this year's sponsors and hope that the report findings will drive greater focus, urgency and collaboration in addressing some of the world's most complex sustainability challenges in 2015 and beyond.



Alejandro Litovsky
Founder & CEO,
Earth Security Group

“Navigating the opposing forces of regionalisation and globalisation, while managing inter-connected resource risks, is key to 21st century market opportunities and sustainable development goals.”

Executive Summary

Key Point 1

Sustainability pressures in BRICS + MINT economies will amplify global risks but also opportunities for sustainable investment

The 2015 Earth Security Index (ESI 2015) warns that given growing levels of economic inter-dependence, rapidly converging sustainability pressures can trigger instability in the global economy. Sustainability pressures in emerging markets are a source of political and economic risks in the business environment. However, these pressures are also opening market opportunities for companies to invest in sectors that will help countries to build the necessary resilience.

The combined risk profile for Brazil, Russia, India, China, South Africa (BRICS) and Mexico, Indonesia, Nigeria and Turkey (MINT) on the next page highlights four critical issues: the quality and availability of water; land-use change conflicts associated with land tenure and deforestation; the stability of energy supplies in carbon-intensive energy systems; and exposure to extreme weather events that further amplify these pressures. These sustainability pressure points should be considered more centrally in country risk analyses conducted in the private and public sectors, but also help companies and governments consider where sustainable investments are needed to retain long-term competitiveness.

Key Point 2

The security of supply of global commodities requires social and environmental resilience

Global commodities such as rice, soybeans, palm oil, oil and gas, timber and cocoa are increasingly exposed to complex sustainability pressures in producing countries. Conflicts in one country are more likely than ever before to trigger risks across the globe given the growing integration of global supply chains. Global institutions set up to manage these impacts are increasingly in question. For example, sustainability standards, such as commodity certification schemes developed with Western consumers in mind, seem to be losing momentum as global demand for commodities shifts to emerging markets.

Alternative government-led schemes in developing countries are slowed down by weak implementation. In line with these geo-political developments, the ESI 2015 report identifies the business case for multinational companies and governments to build social and environmental resilience in their supply chains as a central focus of their risk management decisions.

Key Point 3

Multinationals can reduce their exposure and geo-political tensions by using business diplomacy to advance sustainability innovation

Multi-national companies have to navigate an increasingly complex web of resource risks, as a result of converging environmental, social and governance pressures that are felt across borders. These risks, such as water scarcity, food insecurity or instability of energy supplies, are beyond the control of individual companies. Mitigating these context risks will require positioning a company to help countries improve their sustainability prospects. Three key areas highlighted in the report are: business model innovations, managing risks through collaboration with local stakeholders, and policy leadership to build resilience to headline pressures.

A company's functions of risk management and government affairs, which have been traditionally more detached from sustainability thinking, must be tasked with driving sustainability innovations. Multinational companies that can anticipate their exposure to emerging sustainability risks across borders, and develop solutions that build resilience in the countries where they operate, will be able to turn these risks into opportunities for market leadership and competitive advantage.

“To build their resilience to resource risks, companies must involve their risk management and government affairs functions, which have been traditionally less exposed to sustainability thinking, to drive sustainability innovations.”

Key Point 4

Regional markets are exposed to transboundary sustainability pressures requiring public-private collaboration across borders

In a world where regionalisation is increasingly important to global market power, the sustainability pressures affecting neighbouring countries or strategic trading partners across the globe can amplify country risks and corporate liabilities. The ESI 2015 report focuses on some of the world's most complex sustainability challenges, identifying key private sector interests, a political rationale for policy-makers, and the incentives that can align the interests of business and government to manage global sustainability risks. Examples include:

South East Asia

As a consequence of the illegal burning of forests and peat lands in Indonesia, a thick blanket of haze causes heavy air pollution in Singapore and Malaysia, straining diplomatic ties in the region. The health risks associated with transboundary haze are increasing the prospects of corporate liabilities resulting from this cross-border challenge. The conglomerates operating land assets in Indonesia are spread across the stock exchanges of its neighbours, highlighting inter-dependence and the need for ASEAN to work with leading companies in the private sector who have most at stake in the complex problem of forest fires.

Europe / Russia / Turkey

Concerns over Europe's energy dependence on Russia have continued to grow, as tension over Ukraine has escalated with no apparent end in sight. However, Russia's vulnerable electricity infrastructure, which dates largely back to the Soviet era, is a key investment market for German energy companies. These companies are essential to Russia's electricity generation and distribution, highlighting the role that business diplomacy can play in improving long-term relations. European energy efficiency investments must also be directed to Turkey. Turkey's role as one of Europe's future energy transit hubs for providing access to gas reserves in Central Asia, the Eastern Mediterranean, Iran and Iraq will depend on the sustainability and efficiency of Turkey's own electricity demand.

Nile Basin

Efforts to revive incentives for water cooperation in the Nile Basin have been strained in recent years. However, Egypt, Sudan and Ethiopia all share underlying concerns with their food security. They see their agriculture sectors, which consume over 80% of the region's water, as drivers of employment and future growth for their cash-strapped economies. Gulf investors from water-stressed countries such as the United Arab Emirates and Saudi Arabia are also investing in the region's agriculture, highlighting the inter-dependence of two regions within the broader Arab world. However, there is not enough water in the Nile to meet all these demands unless investors and host countries focus on intra-basin food production and cooperation based on a premise of financing socially inclusive and sustainable agriculture models in the region.

China / South America

The growing inter-dependence on food supplies between China and South America will be a defining factor in the latter's exposure to deforestation and social conflicts. Soybean is a case in point, where sustainability issues are associated with political and reputational risks for global agriculture players operating across borders. Brazil has made considerable progress in addressing sustainability in soybean production. However, logistical bottlenecks, a growing demand from China, and comparative advantages in neighbouring countries have incentivised production to expand across borders, shifting the deforestation and land conflict frontier to Paraguay and Argentina. This increases the risk to multinationals that have made public pledges to 'zero deforestation' and Chinese companies concerned with the long-term security of supplies. The private sector has an intrinsic interest in supporting forest governance on a transboundary scale in South America.

Population

Demographic Pressure

The country's population growth rate and density.

Unemployment

The levels of unemployment and youth unemployment in the country.

Education Gap

The extent and equity of education.

Governance

Government Effectiveness

The quality and independence of the public service and the effectiveness of policy implementation.

Accountability

The level of transparency and accountability of government decisions.

Rule of Law

The quality of contract enforcement, property rights, the police, the courts, and the likelihood of crime and violence.

Resource Governance

The quality, transparency and accountability of governance in the oil, gas and mining sectors.

Energy

Domestic Supply

The ability of the domestic energy system to meet energy demand not accounting for energy imports.

Lack of Access

The proportion of the population without access to electricity.

Carbon Intensity

Carbon emissions from electricity generation and industry.

Fiscal

Instability

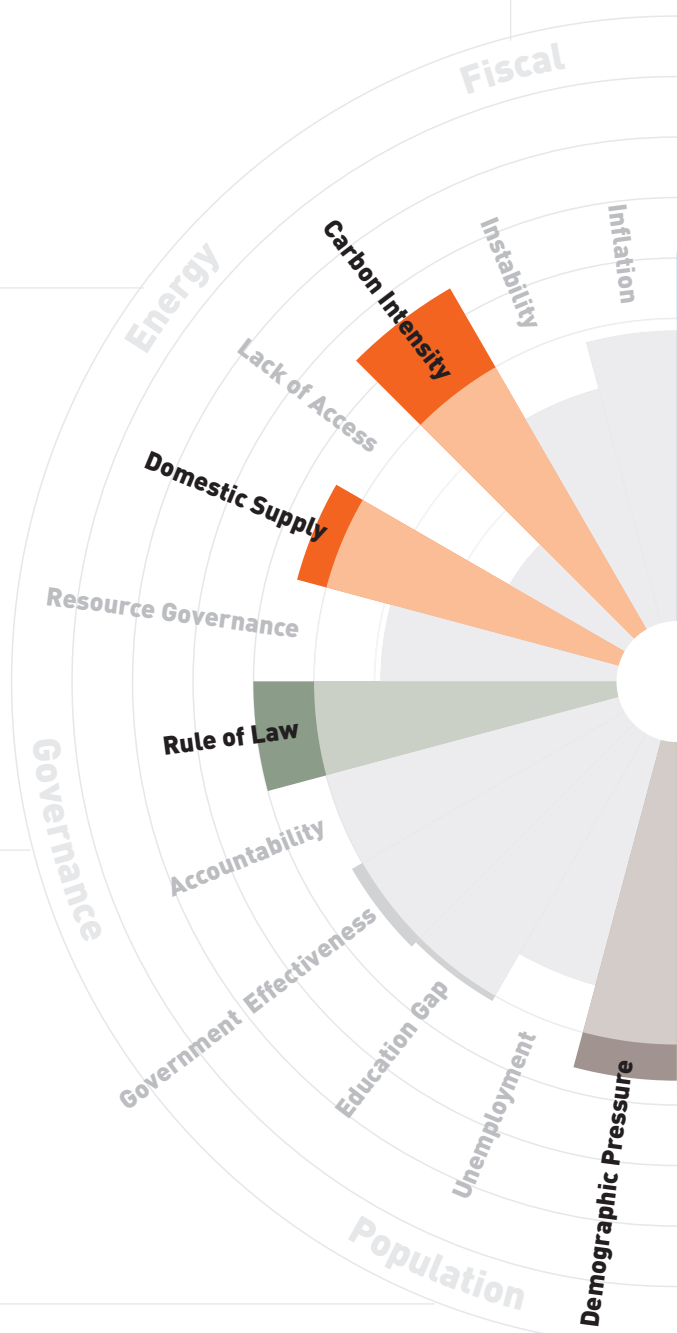
The sustainability of the public debt and likelihood of a sovereign debt crisis.

Inflation

The increase in consumer prices and decline in the purchasing value of money.

The Earth Security Index Diagram

The ESI radial diagram is a visual form that brings analytical simplicity to a complex set of pressures associated with a country's resource security. It is used as a tool to support multi-dimensional risk assessments at country, regional and global levels. The diagram displays scores from 0–100 in each of the 24 dimensions (listed above). It is constructed using publically available datasets, with higher scores representing worse performance. A visual benchmark highlights those scores that exceed values of 50%.



Water

Water Scarcity

The availability of water in the country throughout the year.

Pollution

The percentage of wastewater in the country that is treated.

Virtual Imports

Water that is imported by being embedded in commodities and products.

Climate

Infrastructure Risk

The vulnerability of cities and infrastructure to adverse climate impacts.

Exposure to Extremes

The level of exposure of a country to extreme weather events measured in human and economic losses.

Land

Tenure Insecurity

The lack of security that a person's land rights will be recognized and protected.

Degradation

The reduction or loss of land ecosystem services and the land's productivity, including drivers like soil erosion, salinity and deforestation.

Deforestation

The loss of forest cover of a country's territory.

Food

Food Scarcity

The availability of food to meet the needs of the population, through domestic production and imports.

Unaffordability

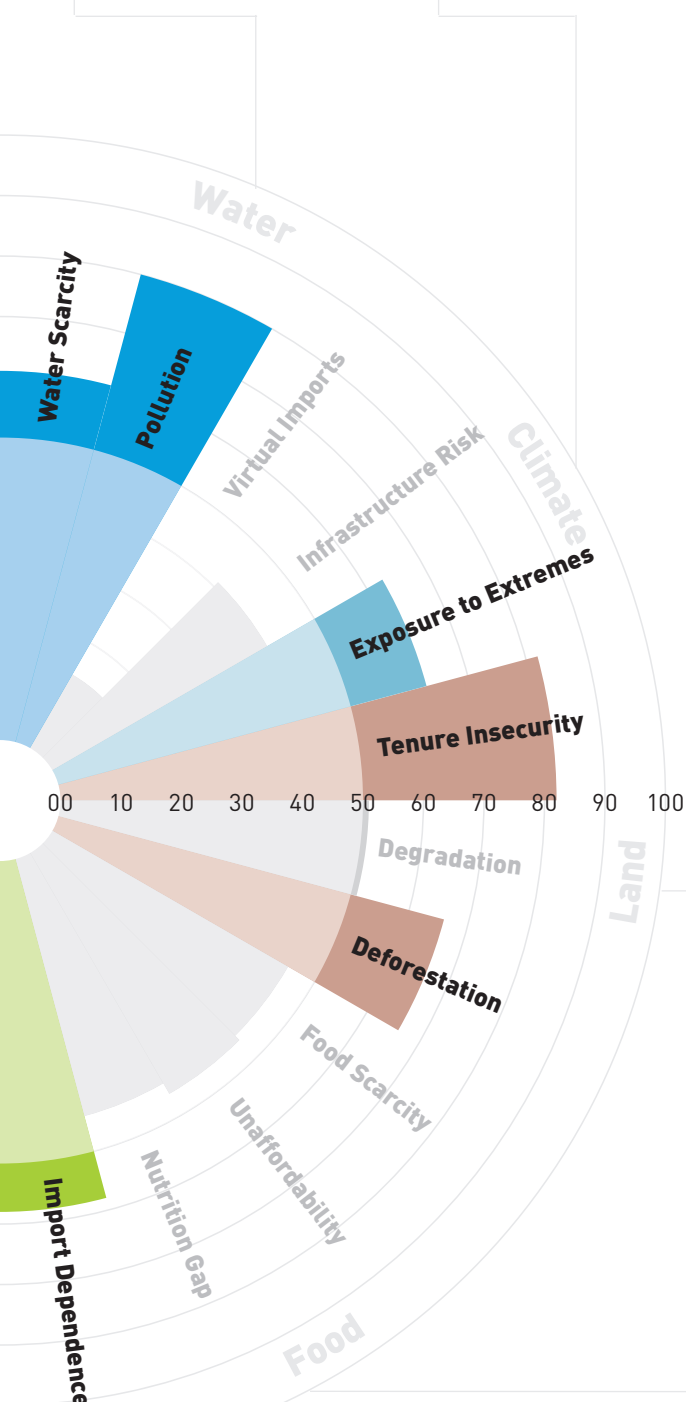
The ability of poor households to purchase the food they need.

Nutrition Gap

The population's access to safe and nutritious food.

Import Dependence

The country's reliance on food imports.



Emerging Economies in 2015

This diagram shows the aggregate scores for Brazil, Russia, India, China, South Africa (BRICS) and Mexico, Indonesia, Nigeria, Turkey (MINT). The diagram provides an integrated picture of the most significant resource pressures (listed below) likely to dominate the development and risk management agendas in emerging markets. These are also shaping opportunities for sustainable investments to support long-term competitiveness.

Dimensions		Score
Population	Demographic Pressure	56.11
Governance	Rule of Law	59.56
Energy	Domestic Supply	54.84
	Carbon intensity	64.74
Water	Scarcity	60.89
	Pollution	80.33
Climate	Exposure to Extremes	63.41
Land	Tenure Insecurity	82.22
	Deforestation	66.31
Food	Import Dependence	57.63

Blueprint 1

China's soybean demand and South America's deforestation

China will be constrained in its ability to produce food due to diminishing arable land availability, water scarcity and pollution. A greater reliance on global markets to secure agricultural supplies is increasingly inevitable. In order to gain greater control over global sourcing prices and decisions, China is moving to compete directly with global commodity trading companies by investing in their competitors.

Soybean illustrates the complex sustainability challenges that lie ahead. Brazil's progress towards sustainable soy in the last decade has been remarkable. Yet increasing global demand and logistical bottlenecks in Brazil have created spill over deforestation pressures into Paraguay and Argentina, where production costs are lower and social and environmental regulations weaker.

In the short term, this regional expansion will help multinationals to meet the global demand for high volumes of soybean. However, the resulting social and environmental conflicts will be an increasing liability. Companies operating across borders, from commodity traders to retailers that have made public commitments to zero deforestation targets in their supply chains are exposed. They must be more explicit in their response to governance deficits in sourcing countries, mindful that corporate compliance strategies that are adequate in high-governance settings are often less effective in low-governance ones.

Strategic Opportunity 1

For international companies in the soybean value chain

Review the company's sourcing policies and commitments to sustainability, to ensure that they address the differing governance gaps in Paraguay and Argentina. Consider opportunities to improve regional governance beyond national borders. Going beyond compliance will be essential, and will require working with new coalitions of non-profits and government agencies to implement the type of voluntary monitoring systems currently in place in Brazil.

Strategic Opportunity 2

For the governments of Paraguay and Argentina

Make a public and political commitment to strengthening law enforcement, land tenure security, smallholder capacity building and halting deforestation. The Brazilian government must be a regional leader and use political coordination platforms like MERCOSUR to help build the capacity of its neighbours. Governments must seek the input of private sector companies when identifying gaps in their law enforcement, especially those that have made public commitments and therefore have an interest seeing improved forest governance in the business environment.

Why South America's soybean frontier is expanding

Between 2000 and 2010, soybean exports from Brazil to China grew over tenfold to roughly 19 million tonnes (MT) per year, worth more than \$7 billion annually.¹ By 2009, China was importing over half of all soy exported globally.² In 2001-2011, the areas of harvested soybean grew by 63% in Argentina, 53% in Brazil and 94% in Paraguay.³ The land area planted with soybean in Brazil is expected to expand by 8.8 million hectares (MHa) in the next 10 years. Improvements to the Brazilian legal framework for forest conservation and a greater emphasis on legal compliance from industry have increasingly driven soybean expansion in Brazil in a more responsible way. Soybean has not been considered a major driver of deforestation in the Brazilian Amazon since 2006.⁴

While Brazil holds great potential to expand agricultural production sustainably, infrastructure costs and bottlenecks are a growing barrier. In March 2013, the line of trucks waiting to unload soybeans at Brazil's busiest port surged to a record 15 miles long, while a total of 212 vessels awaited loading. Bunge's Chief Executive Alberto Weisser stated that 'the biggest concern is inland logistics trucking.'⁵ For the Chinese crushing company Shandong Chenxi Group Co., the boom is not materialising after 8 of 10 shipments failed in early 2013. Chenxi has considered redirecting soybean orders to Argentina and planned to cancel about 2 Mt of purchases from Brazil.

Trading companies are spending \$2.5 billion on docks, barge fleets, and terminals along the Amazon River and its tributaries to boost Brazil's shipping capacity.⁶ Argentina's easier access to ports means lower production costs than in Brazil.⁷ In Paraguay, soy production has rapidly expanded to 80% of cultivated land, grown mostly in large plantations. No country is able to capture the full value of the supply chain, but in a more regionalised production environment, multinational corporations can distribute and leverage their assets according to a country's comparative advantage: Brazil produces meal and beans for feed use, Argentina specialises in oil and Paraguay in raw bean for processing.⁸

Cargill's new Puerto Unión port opened in 2011, consolidating the company's position as Paraguay's biggest exporter, commercialising an annual 1.4 MT of soy, 30% of the country's harvest. Since then, Archer Daniels Midland (ADM) and Bunge have opened new soybean crushing plants, more than doubling the country's processing capacity.⁹ Brazilian companies own roughly 64% of Paraguay's soy cultivated area nationwide, and up to 80% in some districts along border areas. The extension of Brazilian interests into Paraguay is occurring rapidly, driven by lower production costs and more permissive rules.¹⁰

Environmental and social conflicts

In Argentina and Paraguay, governance weaknesses are the root cause of social and environmental conflicts:

Social conflict

In 2012 the President of Paraguay was ousted from office in a political crisis triggered by a land tenure dispute and a deadly confrontation between peasants and the police.¹¹ The social risks associated with the sector are worse where land tenure insecurity, food security, and health and safety reinforce one other. During the first 15 years of democracy in Paraguay (between 1990 and 2004) there were 895 land conflicts, 571 demonstrations, 370 occupations of agricultural estates, with 357 violent evictions and at least 7,296 farmers arrested.¹² Paraguay is the only Latin American country in which soy producers do not pay export tax. The potential for tax revenue is large: a 6% export tax would raise \$90 million, which is more than the average annual public investment in small-scale family farming during 2005-2009.¹³

Strategic Opportunity 3

For the Chinese government, state-owned and private companies

Consider that China's long-term dependence on South America's supplies will be more secure under sustainable conditions. Anticipate and avoid an anti-Chinese backlash that could block investment deals and jeopardise soybean supplies, by publicly demanding soybean that has been produced in compliance with local laws. A commitment to sustainability should be seen by China as central risk management aspect of its 'Go Global' strategy, as well as a competitive factor as China acquires stakes in Western-based global commodity trading companies.

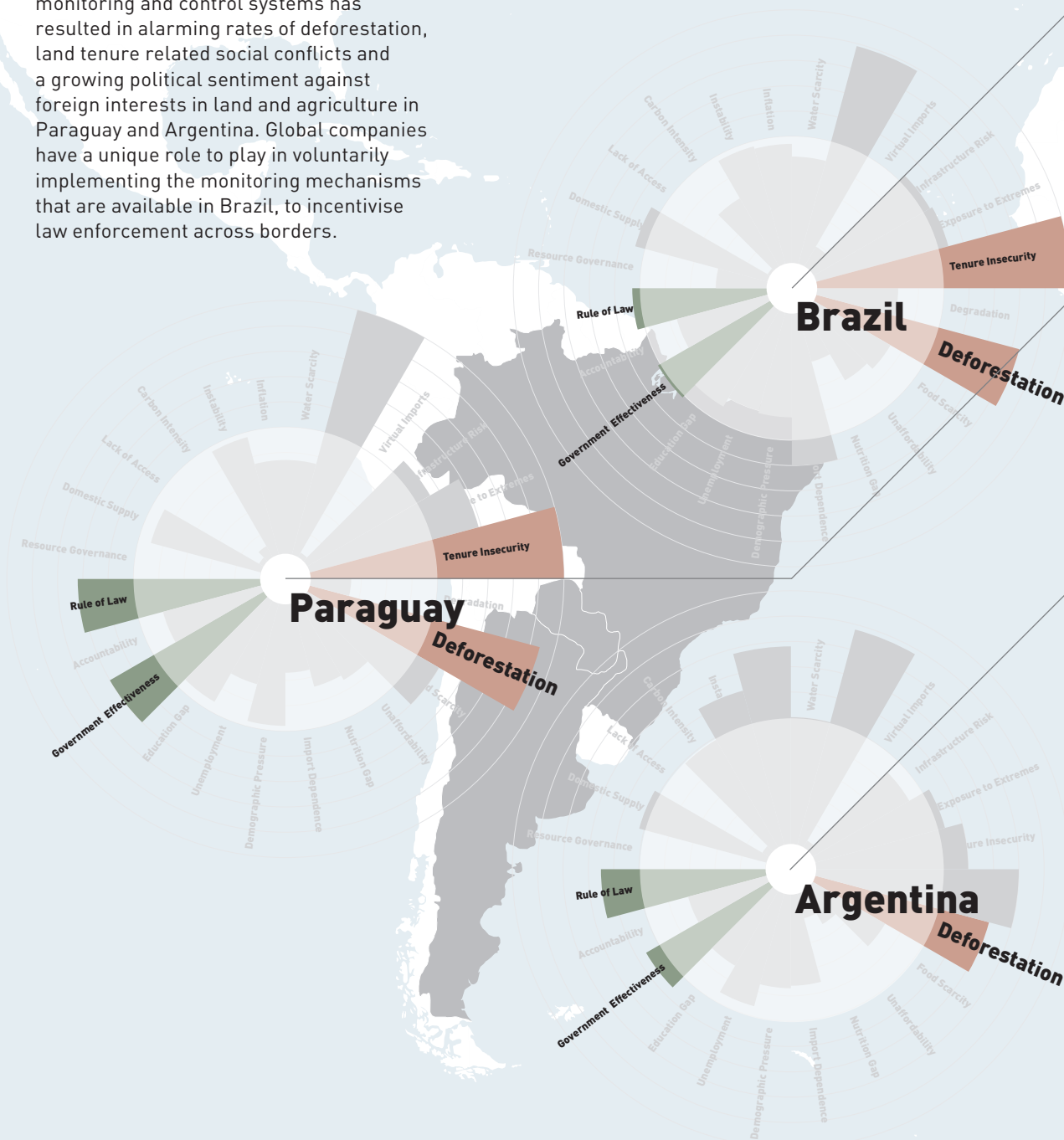
Blueprint 1

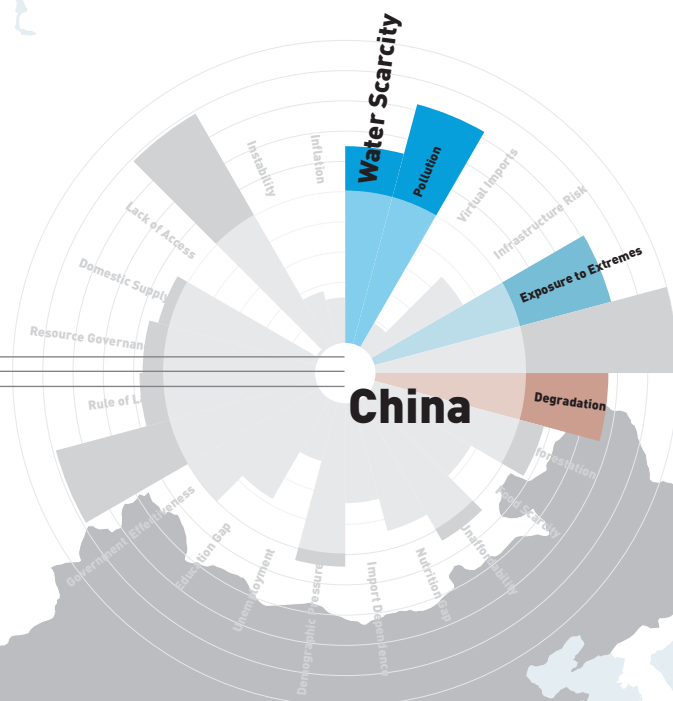
China's water security crises will accelerate its reliance on outsourcing the production of water-intensive crops such as soybeans. South America's strategic position as one of China's suppliers and the rapid expansion of production across borders, means that deforestation pressures are a risk to companies operating across Brazil, Argentina and Paraguay.

Argentina / Brazil / Paraguay

Deforestation and governance risks beyond Brazil require a regional approach

Paraguay and Argentina lag behind Brazil's drive to improve the legal oversight of soybean production. A lack of government capacity and incentives to implement monitoring and control systems has resulted in alarming rates of deforestation, land tenure related social conflicts and a growing political sentiment against foreign interests in land and agriculture in Paraguay and Argentina. Global companies have a unique role to play in voluntarily implementing the monitoring mechanisms that are available in Brazil, to incentivise law enforcement across borders.





China

China's water and land are constraints to food production

Almost 20% of China's arable land is reportedly polluted, in many cases with heavy metals that are known by-products of mining and heavy industry.¹⁴ 11 out of 31 provinces in China are acutely water stressed, while 40% of China's total agricultural output is produced in water scarce regions.¹⁵ The North China Plain, which extends over much of the water-stressed provinces of Henan, Hebei and Shandong, generates half of the country's wheat, corn, and cotton and is central to China's projected growth in grain output.¹⁶ The region has only one-fifth of the country's naturally available fresh water but two-thirds of the farmland.¹⁷ By 2030 it is estimated that China will face a water deficit of 200 billion m³, equivalent to 25% of China's total water demand.¹⁸

Top 10 Soybean Importers in China 2013

Source: Solidaridad Network, China

Name	Nationality	Ownership	Volume (tonnes)	% of National Total
Shandong Chenxi	China	Private	7,750,000	12.20%
Jiu San Group	China	State-owned	7,460,000	11.80%
Wilmar	Singapore	Private	5,860,000	9.20%
COFCO	China	State-owned	5,590,000	8.80%
Shandong Bohai	China	Private	3,960,000	6.20%
United Food	Singapore	Private	2,910,000	4.60%
Sinograins	China	State-owned	2,900,000	4.60%
Huifu Group	China	Private	2,130,000	3.40%
Shandong Changhua	China	Private	1,810,000	2.90%
Cargill	USA	Private	1,480,000	2.30%

Deforestation beyond Brazil

A number of multinational companies, from Cargill to Nestlé, have made ambitious commitments to 'zero-deforestation' in their global supply chains.¹⁹ In Northern Argentina's Chaco region, 2.7 MHa were deforested from 1972 to 2011, 56% of which occurred after 2002, strongly correlated with the beginning of soy expansion.²⁰ In the Paraguayan portion of the Chaco, 914 square miles of forest were lost in 2013. During the first 5 months of 2014, deforestation continued at a pace of 1.6 square miles per day.²¹

In Argentina, a comprehensive Forest Law is not being properly implemented and is caught up in the political intricacies of federal and provincial authorities. In Paraguay, non-compliance with the law is driven by a lack of government capacity for monitoring and enforcement. In both countries, short-term windfall revenues create a disincentive for governments to drive the implementation of laws at a faster pace. The situation is also exacerbated by the fact that many soy-crushing plants use timber to power their grain drying chambers, much of which comes from primary forest.

"The Paraguayan and Brazilian governments have different policies in this respect, which makes it harder — it's harder for a company to operate, to influence what's happening in agriculture if the government is going in completely the opposite direction."

Ruth Rawling

Vice President for
Global Issues Management,
Cargill.²²

China's global & vertical integration

For 11 consecutive years, the Central Committee of the Communist Party has focused its main policy document on agriculture. Since the 1950's China has maintained a goal of self-sufficiency, reinforcing just how strategic food security is to China's stability.²³ In 2014 China's leadership signalled the end of this policy, reducing requirements of 'basic grain self-sufficiency' and increasing its reliance on overseas markets.²⁴ This shift responds to domestic constraints, but has driven a change in China's strategy for participation in global markets. China's international engagement is driven by:

Resource constraints on food production

From 2000 to 2012, China's cereal imports rose from 3 to 14 MT, and soybean imports rose from 13 to 59 MT.²⁵ From 2003 to 2012, China's meat production rose from 64.43 MT to 84 MT, while milk production increased from 18 MT to 37 MT. As production of animal-based food products has surged, so too has the consumption of grain-based animal feed.²⁶ In April 2014, a government report on China's soil pollution, previously classified as a state secret, revealed that 16% of the country's soil and 19% of its arable land were polluted.²⁷ Nearly half of the water in China's main rivers has been found to be unfit for human consumption.²⁸ China's scarcity of arable land, acute water stress in agricultural regions, and widespread water and soil pollution constrains the production of basic grains like wheat and rice, and reinforces its strategy to import non-vital and water-intensive grains like soybeans.²⁹

China's global corporate strategy

Driven by concern for security of supplies, China is seeking greater control over the prices at which it buys commodities from global traders, as well as the terms of sourcing conditions. It has started consolidating its fragmented food industry to create large agricultural corporations that can compete with global traders like ADM, Bunge, Cargill, and Louis Dreyfus. China's largest food processor and grain trader Cofco (formerly China National Cereals, Oils and Foodstuffs Corporation), has set a 5-year plan to invest \$10 billion in overseas mergers and acquisitions by 2015. Cofco have bought controlling stakes in global commodities companies Nidera and Noble Group. The investments bring access to port terminals and processing facilities for soybean, wheat, and corn in Argentina and Brazil. China's Ministry of Finance has provided low-cost loans to help stronger agricultural enterprises such as Cofco make acquisitions abroad. In March 2014 it stated that 'we will encourage agriculture to go global and actively use foreign resources.'³⁰

A stronger upstream integration of Chinese interests in South America involves long-term purchasing contracts and infrastructure investments in South America, which in the short-to-medium term raises the risk exposure of Chinese companies to social, environmental and political risks associated with unsustainable production. China's Sanhe Hopeful Grain and Oil announced plans in April 2012 to put \$7.5 billion into soybean processing facilities in the state of Goias, in exchange for an annual supply of 6 Mt of soybeans from Brazil; a deal that reportedly includes building a railroad to move products out of the facility. Chinese agricultural giant Helionjiang Beidahuang, the China National Agricultural Development Group Corp. and Chongqing Grain Group have made clear their intention to buy Brazilian land in coming years.³¹

Blueprint 2

The impact of Germany's energy revolution on Russia and Turkey

Germany's energy transition towards efficiency and renewables – its *energiewende* – can help Europe improve its long-term leverage over Russia while strengthening energy transit hubs such as Turkey, which are strategic to Europe's energy future.

Russia

In early 2015, the collapse of the Russian ruble due to European sanctions and low oil prices seems inevitable. The vulnerability of Russia's domestic electricity sector however, provides Europe with long-term leverage. Energy blackouts, like the one that paralysed Moscow in 2005, will be more likely due to Russia's exposure to weather extremes. Its domestic energy infrastructure, which largely dates back to Soviet times, loses over 10% of electricity through distribution alone and has a carbon-intensity 3 times that of Europe. In the long-run Russia is a key market for Germany's technology, enhancing the soft power role of business diplomacy.

Strategic Opportunity

German companies like E.ON and Siemens are established players in Russia's energy market and are key to its modernisation. As Russia seeks to access European technology by investing and integrating with European energy companies, Europe should retain its comparative technological advantage and increase its view of market opportunities. By investing in Russia's improved infrastructure, Europe will grow its influence over Russia's energy security.

Turkey

Turkey is a future transit hub for Europe to access gas in Central Asia, Iraq, the Eastern Mediterranean and Iran. However, it is also acutely energy import-dependent, with Russia supplying approximately 60% of its gas imports. Because of its external dependence, the efficiency of Turkish energy consumption is vital to its future position as a reliable transit partner. Turkey's energy demand is set to grow at 6% over the next decade. The government's bold commitment to renewable energy targets and efficiency provide a unique opportunity for extending the presence of technology-intensive European energy companies in the Turkish energy market.

Strategic Opportunity

European companies currently compete with other regions for a place in Turkey's growing energy market. The EU at large should encourage energy companies to invest in Turkey. Renewables, efficiency, storage and distribution are areas that will help create the domestic stability Turkey needs to be a strong transit partner to Europe. Turkey is set to build its first nuclear plant with Russia's Rosatom. Europe's nuclear safety expertise should be part of its broader energy market agenda.

Russia's domestic energy security gap

European sanctions on Russia following its military proxy war in Ukraine, combined with low oil prices, have begun to undermine Russia's capital market and public resources. Russia's future looks bleak. Domestically, a crumbling electricity sector is in urgent need of modernisation and has the potential to affect domestic stability. The risk of instability is illustrated by the electricity blackout that hit Moscow in 2005. The crisis left tens of thousands of people stranded in the underground system and elevators, with railways out of action from stalled rail signal systems and government organisations left paralysed. The event was the result of a combination of inter-dependent factors: worn out equipment and absence of power backups for an ageing infrastructure largely dating from the times of the Soviet Union and high temperatures above 30°C endured in the city.³²

Critical vulnerabilities in Russia's electricity network combined with its exposure to extreme weather events create significant risks for Russia. An imperative energy modernisation will require the type of technology in which Germany is a world leader. On the other hand, Germany is an export-driven economy and Russia is one of its vital growth markets. Russian-German trade and investment has been on the rise for more than a decade in areas like energy, steel making and the automobile sector. There are more than 6,000 German companies active in Russia today, creating 120,000 jobs and generating turnover of €40 billion.³⁴

Leading German companies, that are themselves adapting to Germany's vision of renewable and decentralised energy, are also those that are helping Russia to modernise its energy sector:

- **E.ON** is the largest foreign investor in Russia's energy market, and has been in Russia for over 40 years. E.ON now operates 5 power stations generating 6% of Russia's total capacity and ranking among Russia's top power producers. E.ON's energy business in Russia is entirely upstream, operating large power stations and selling bulk power to the wholesale market. As part of its climate change strategy E.ON is investing €2.8 billion to modernise its Russian generation portfolio, seeking to reduce its carbon intensity. The technologically advanced gas-fired capacity it introduced in 2010 cut 4 million tonnes (MT) of CO₂ by 2012. As a result of Germany's energy market transition, however, E.ON recently announced plans to leave the centralised power business in order to focus exclusively on distributed energy and customer-centric business models that rely more on renewables. E.ON's conventional power assets will be consolidated in another yet-unnamed company and completed by 2016.³⁶ This move is likely to see E.ON looking to expand its focus on efficiency in the Russian market.
- **Siemens** marked 160 years in Russia with several large contracts ranging from turbines to diagnostics equipment in 2013. Sales to customers in Russia amounted to some €2.17 billion, with new orders totalling €2.04 billion in 2013. Siemens has expanded its partnership with Russian railways, providing high-speed trains for rail lines between St. Petersburg, Moscow and Nizhny Novgorod. The company's energy efficiency programs aim to support Russia in achieving energy savings of between 44% and 79% of the country's primary energy consumption.³⁷

Russian access to European technology

Russian investors are actively interested in acquiring European technology assets. Russia's state-owned Gazprom and Germany's Wintershall, a subsidiary of the chemicals firm BASF, have agreed on a significant exchange of shares, giving Gazprom access to gas storage and extra trading capacity and Wintershall shares in Siberian gas fields. In March 2014 RWE AG, Germany's No. 2 utility by market value agreed to sell its upstream oil and gas unit – RWE Dea – for around €4.5 billion to the investment fund L1 Energy, owned by Russian billionaire Mikhail Fridman.³⁸

Both Wintershall and Dea will be instrumental in helping Russia develop its shale gas reserves.³⁹ European Union policy-makers authorising such investments should make decisions informed by a longer-term strategy of Europe's leverage over Russian energy markets and be clear on how to maintain Europe's position of influence over Russia's modernisation.

Inefficiency undermines Ukraine's reliability as a transit country

From an energy perspective, the Ukraine's vulnerabilities demonstrate the need for transit countries to be efficient domestic energy markets. Germany and Europe as a whole, import over 30% of their oil and gas needs from Russia, with half of that transiting through Ukraine. The vulnerabilities that threaten Ukraine's reliability as a transit hub include: structural financial losses of up to \$2.5 billion annually in the district heating sector due to low prices paid for expensive imported gas; disincentives to upstream investment as regulated prices established by Naftogaz are too low to encourage new investment; and, finally, declines in domestic production. Estimates for the investment required to modernise Ukraine's gas transit system vary widely from \$3.2 billion (European Union estimate) to \$9 billion (Gazprom's estimate).⁴⁰

Turkey's energy market stability is key for Europe

Turkey is located in a strategic position between Europe and Central Asia, Iraq and Iran, which together hold a large share of the world's proven gas reserves. Turkey is well placed to become one of Europe's long-term energy transit partners. The Turkish electricity market is one of the fastest growing in the world, with electricity consumption expected to grow annually by 6% in the next decade.⁴¹

Energy policy-makers in Turkey plan to support private sector efforts to increase energy generation, develop renewable energy sources, improve energy efficiency and mitigate the impacts of climate change.⁴² Turkey has set the ambitious target of meeting one-third of its electricity demand through renewable energy by 2023, projecting a rapid growth in wind, solar and geo-thermal capacity.

A process of liberalisation and privatisation is making the energy sector more vibrant and competitive. The entry of major international players into the Turkish energy sector highlights the growing market opportunities for foreign companies and investors.⁴³

Turkey-Russia nuclear cooperation

Nuclear energy will be soon a feature of Turkey's energy mix. The country's first nuclear energy plant, to be based in Akkuyu, will be built and operated by a Turkish subsidiary of Rosatom, Russia's state-run nuclear company, for which Russia has advanced Turkey \$1.39 billion.⁴⁴ Long delays in the project's initial stages have been attributed to difficulties in finding an eligible company to review and assess Rosatom's reactor plans against safety standards.⁴⁵ Europe can position itself as a long-term partner supporting the safety of Turkey's nuclear future by increasing cooperation to share know-how, technology and risk management systems. In that respect, Turkey has voluntarily accepted to join the EU stress tests program for nuclear power plants during their construction and operation in Turkey.

Foreign participation in Turkey's energy sector deals 2012

Source Deloitte & Investment Support and Promotion Agency of Turkey, November 2013

Acquirer	Origin	Target	Stake
Goldman Sachs	USA	Aksa Enerji	13.3%
Aquila Capital	Germany	KArasular Enerji	100%
Tiway Oil	Norway	Petrol Ofisi Exploration	100%
E.ON	Germany	Enerjisa	50%
Inter RAO	Russia	AEI Enerji Holding	100%
Oteko Group	Russia	BP Turkey; LPG Bottle & Tank Filling; Wholesale & Autogas Businesses	100%
Samsung	Korea	ACWA Elektrik	N/D
BR Energy	UK	Hayat Enerji	25%
SOCAR	Azerbaijan	Petkim	100%

Blueprint 2

Russia and Turkey must strengthen their domestic electricity infrastructure in order to modernise. These are key investment markets for Germany's energy technology companies, which can play a role in strengthening the region's long-term strategic relations.

Germany

Domestic Energy Supply

Russia is Germany's largest energy supplier, accounting for 25% of its energy needs: 38% of natural gas, 35% oil and 25% coal.⁴⁶

Exposure to Extremes

Two floods in 2002 and 2013 were both categorised as '1 in 100 year' events. The increase in frequency and severity of extremes in Europe will increase the exposure of its energy systems.

A direct risk to Germany's electricity network is not determined, but decentralised renewables are expected to increase resilience to shocks.

Ukraine

Rule of Law

The rule of law in the Ukraine is 24% weaker than the BRICS average.

Domestic Energy Supply

Ukraine uses 0.47kg of oil equivalent to produce one unit of GDP, 4 times more than the EU average.

Carbon Intensity

Ukraine emits 0.69kg CO₂ per unit of industrial value added; almost 4 times more than the EU average.

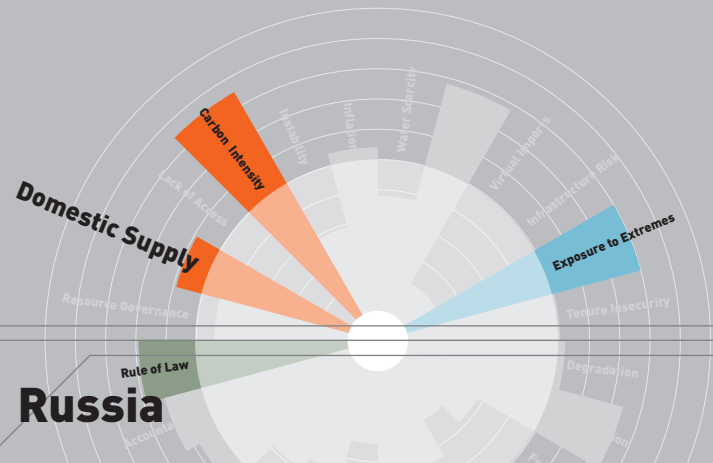
Fiscal Instability

High probability of sovereign debt default and country credit rating downgrading.

Turkey

Domestic Energy Supply

- 60% of gas imports from Russia.
- Loses over 10% of its electricity in transmission and distribution.
- Electricity demand will grow at 6% per year over the next decade.



Russia

Rule of Law

Rule of law in Russia is 20% weaker than the BRICS average.

Domestic Energy Supply

Russia loses 10% of its electricity output through inefficient transmission and distribution systems.

Carbon Intensity

Russia emits 0.5kg CO₂ per unit of industrial value added; almost 3 times more than the EU average.

Exposure to Extremes

Russia's exposure to extreme weather events such as heat waves creates critical vulnerabilities for an outdated electricity network.

Energy efficiency investments required in Russia & potential savings by sector by 2030

Source

Mckinsey & Company⁴⁷

Russian Sector	Investment required in energy efficiency	Annual energy savings as of 2030	% of total energy consumption in 2030	Potential CO ₂ emissions saved as of 2030	% of total emissions in 2030	Savings over 20 years
Buildings & Construction	€70 billion	180 MTCE	13%	205 MTCO ₂ E	7%	€190 billion
Fuel & Energy	€20 billion	80 MTCE	6%	160 MTCO ₂ E	5%	€60 billion
Industry & Transport	€60 billion	50 MTCE	4%	200 MTCO ₂ E	7%	€80 billion

MTCE
Million tonnes of coal equivalent

MTCO₂E
Million tonnes of carbon dioxide equivalent

Blueprint 3

India and Nigeria's rice business as a driver of their food security

“The out-grower model, which supports 3,000 local farmers and will reach 16,000 farmers by 2018, shows a way forward for the role that business can play as a driver of Nigeria's development and food security.”

Mukul Mathur

Country Head

Olam Nigeria Ltd.

Rice is a vital crop for food security that is grown by producing countries for domestic consumption. Only 7% of the world's rice production is traded globally. When the Indian government banned rice exports in the wake of the global food crisis of 2008, import dependent countries like Nigeria were driven to reconsider their dependence. Nigeria adopted the ambitious goal of achieving self-sufficiency by 2015, setting import tariffs to stimulate the growth of its domestic agriculture sector.

India has tripled its grain stocks since the food crisis of 2008. However, half of Indian children are still malnourished and food security remains top of the agenda amid rampant food inflation. Farmer subsidies and an inefficient state-owned post-harvest system will continue to drive inflationary pressures. Throughout 2015, the Indian government will focus on controlling food inflation. The focus should be on releasing grain stocks, and improving the efficiency and productivity of farmers, rather than turning to export bans as a superficial fix for domestic pressures.

Meanwhile, Nigeria has prioritised agriculture as the sector with the highest potential to create jobs, drive investment and reduce the burden of rice imports on the government budget. The recalibration of import-tariffs has not proven sufficient to stimulate a vibrant domestic market and an ambitious government programme has been set up to stimulate investment. However, the illegal smuggling of over 1 million tonnes (MT) of rice across Nigeria's borders restricts government efforts to build up local production capacity. Following the presidential elections of 2015, the government must take a more targeted approach to combat smuggling and stimulate public-private partnerships to build the capacity of smallholder farmers and develop essential infrastructure.

Strategic Opportunity 1

Corporate sustainability programs in India must focus on productivity and post-harvest efficiency

The government will need to work more closely with companies whose sustainability strategies can improve resource efficiency and productivity, and consider the opportunities for companies to play a more active role in the post-harvest system comprising transport, storage and distribution.

Strategic Opportunity 2

Nigeria must foster a sustainable business environment and curb illegal rice smuggling

Controlling corruption, improving customs management and coordinating with neighbouring countries is vital to control illegal smuggling. This should be a key priority for Nigeria's Agricultural Transformation Agenda (ATA), and could be a flagship initiative of the Presidential Committee on Trade Malpractices in 2015.

India's food security

Concern over food security in 2013 drove the Government of India to increase the quantities of rice bought from farmers at subsidised prices and the volumes they would keep in stock.⁴⁸ The government's Minimum Price Support (MPS) sets a price for the purchase of rice and wheat. It is central to India's food security strategy, but the distortion reinforces the supply problem if it does not also support farmers to improve their productivity and use resources efficiently.

The MSP for paddy rice has more than doubled in the last decade, amplifying food inflation. While government stocks have tripled since 2008, reluctance to release excess stock has kept prices at artificially high levels. Offloading excess supplies at such times to lower inflation and promoting export opportunities would be possible if farmers were protected from inflationary pressures through greater resource efficiency and productivity.⁴⁹

Two areas where companies can support long-term food security while strengthening their market share are:

Focusing on sustainability as productivity

Rice is a water-intensive crop. The use of flooding methods for irrigation aggravates India's chronic water problem and depletes water tables. Rice cultivation is still dependent on the monsoon rains to replenish reservoirs and ground water. The growing exposure of India to extreme weather further aggravates uncertainty in the sector.⁵⁰ The inefficient use of fertilisers exacerbates water pollution and soil degradation, posing risks to human health.

Corporate sustainability programmes that provide solutions to some of India's resource inefficiency and food security bottlenecks can work with government agencies to use public funds to leverage private investment and support the business case for sustainability. For example, efficient irrigation technologies can reduce the electricity needed to power water pumps, improve yields and soil management and build greater resilience to extreme weather. For example, Netafim, the leader in drip irrigation, partnered with the State Government of Andhra Pradesh to help 190,000 farmers adopt drip irrigation, improving crop productivity by 2.5 times with no additional water.⁵¹

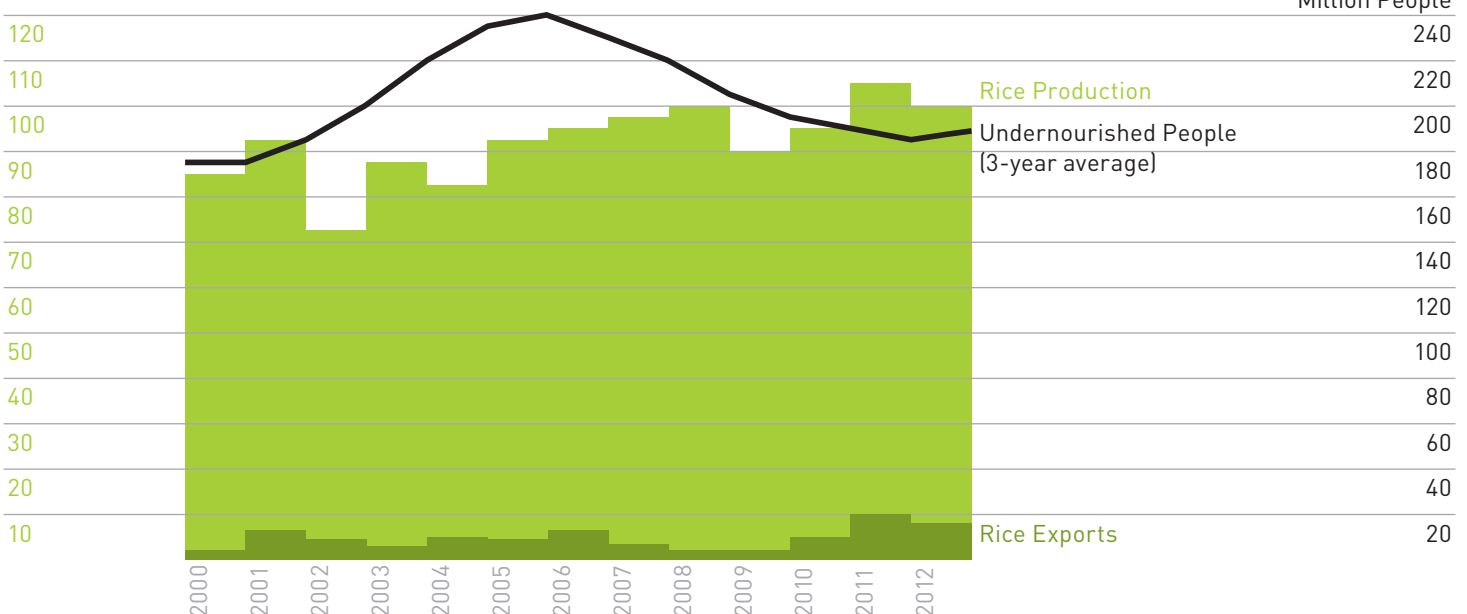
Proposing models to improve post-harvest efficiency

By some estimates, 20–30% of India's rice production is lost before it reaches the Indian consumer.⁵² The Food Corporation of India (FCI), a state-owned enterprise, holds a monopoly over the post-harvest system, controlling procurement, storage and distribution. The system is riddled with inefficiencies at all stages, encouraged by middlemen and corruption. In 2010, it was reported that 70% of the \$12 billion rice subsidy budget had been wasted, stolen or absorbed by bureaucratic and transportation costs.⁵³ By some estimates, only 41% of the rice that is picked up by Indian states from federal warehouses for state-level distribution reaches Indian homes.⁵⁴ Poor storage facilities lead to further losses due to pests and grains left rotting in open-air storage.⁵⁵ Further inefficiencies in the distribution system create bottlenecks. A senior railway official in India estimated that the FCI takes 40 to 60 hours to unload a train, which is much longer than other goods, as compared to only 9 hours to unload the same cargo of cement.⁵⁶

When the FCI system is eventually unbundled, it will offer new business opportunities for companies to participate and improve the post-harvest process. The government of India currently procures around 25 MT of rice from farmers. A company tasked with managing 0.5–1 MT could potentially carry a profit margin before tax of \$4–5 million.⁵⁷

India's rice production, exports and food security

Million Tonnes



Source International Rice Research Institute; and UN Food and Agriculture Organisation

Million People

Blueprint 3

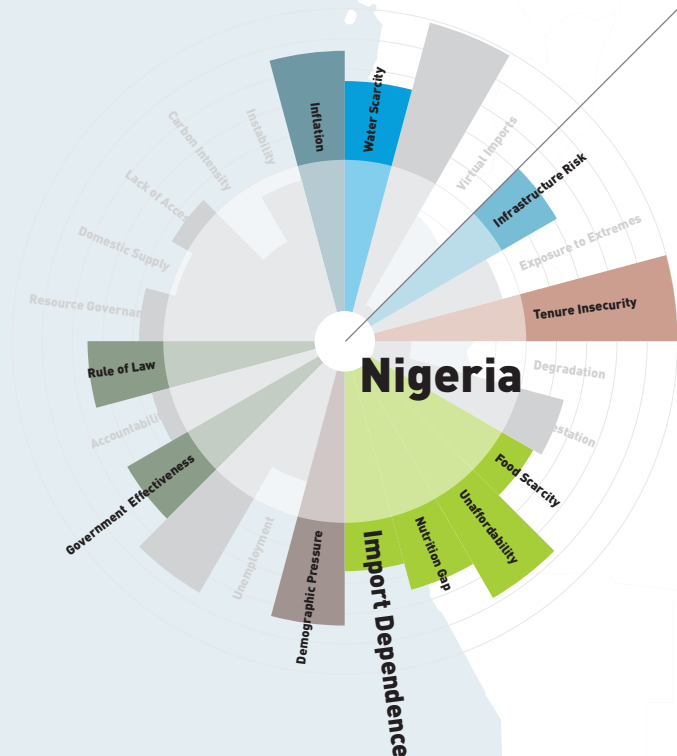
India's food unaffordability and inflation amplifies the likelihood of a decision to ban rice exports. Nigeria's interest in building a vibrant domestic rice production market to manage its import-dependence requires fighting rice smuggling across borders.

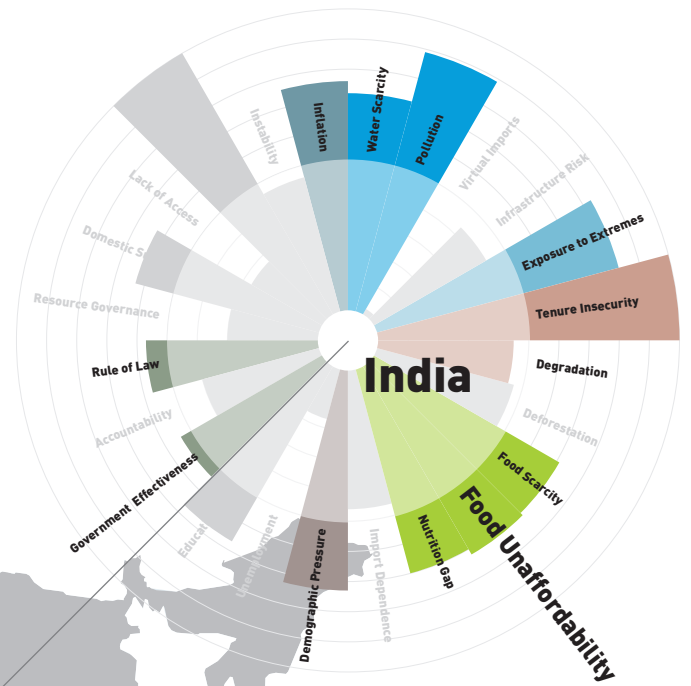
Nigeria

Removing the barriers to Nigeria's domestic rice production

Nigeria is Africa's most populous country and a rising star in the group of emerging economies. However 70% of the population still lives in poverty, and food security and affordability both remain significant constraints, hampered by inflation. Nigeria's agriculture sector has been identified as the biggest opportunity to create jobs, drive economic growth and lower the dependence on food imports. Increasing rice import-tariffs will not be enough to build a robust domestic agricultural sector.

Nigeria's success will depend on more effective policy implementation and border customs law enforcement to ensure that the potential of corporate partnerships is fully realised. Throughout 2015, Nigeria must focus its ATA on fighting rice smuggling across Nigeria's borders, partnering with the private sector to build the capacity of smallholder farmers and develop critical infrastructure.





India

Improving the efficiency of India's rice production and distribution system

India is expected to cross the threshold of severe water stress before 2025. 40% of groundwater is extracted beyond the rate of replenishment. Irrigation accounts for over 90% of water consumption in India.⁵⁸ 33% of India's large population lives in poverty, spending up to 70% of household expenditure on food. One third of all irrigated land in India is degraded, polluted or waterlogged due to the overuse of fertilisers and irrigation.⁵⁹

By 2030, water demand in India is projected to outstrip supply by 750 billion m³, a deficit equal to 50% of total demand, equivalent to the water demand for rice, wheat and sugar.⁶⁰ Indian Government agencies must work with corporate sustainability programmes to encourage sustainable rice practices that can help farmers to improve their productivity. As the Indian government considers the unbundling of an inefficient state-controlled post-harvest system, greater efficiencies will target the root cause of food price inflation.

Nigeria's agricultural transformation

Rice is Nigeria's main food staple. Half of the 6 MT of rice consumed in the country per year have to be imported. The government's ATA has set the goal of self-sufficiency in rice by 2015; an ambitious timeframe for an agricultural sector in need of infrastructure investments and flooded with smuggled rice. Bridging these gaps is vital for Nigeria's agricultural sector, which offers the biggest opportunity to create jobs, improve food security and accelerate the country's economic development.

Nigeria has made significant progress in improving the efficiency of the system and fighting corruption. For example, it has targeted 4 decades of endemic corruption in the fertiliser sector by replacing the direct procurement and distribution of fertilizers and seeds with a system that relies on farmers' mobile phones and a national farmer database that now contains over 10 million farmers.⁶¹ However the various government schemes set up to promote productivity, credit and risk management still lack sufficient government implementation capacity, thus delaying the translation of the government's vision on the ground. This is an area where the private sector can play a supporting role.⁶²

For example, Olam International, the second largest distributor of rice in the world, is one of Nigeria's main rice importers, but is also developing Nigeria's domestic rice production market. In the Nasarawa State, a new 10,000-hectare farm has been linked to an out-grower programme with smallholder farmers and will initially provide 36,000 tonnes of milled rice per year to the domestic market.

The out-grower model supports surrounding rice-growing communities with training, pre-finance, high-yield rice varieties, inputs and market linkages in order to improve their paddy yields, which are then purchased at a market price. The model currently engages 3,000 farmers, with a target of 16,000 farmers by 2018.⁶³ The extension program for rice farmers was awarded the 2011 Africa Business Award for Corporate Social Responsibility and highlighted as a catalyst for innovation in African agriculture by the Rockefeller Foundation in 2013.⁶⁴ The Nigerian government is supporting such win-win models by prioritising 'staple crop processing zones', which are providing a new direction to overcome the 'small-vs.-big' farming discussion that is central to the debate of sustainable agriculture.

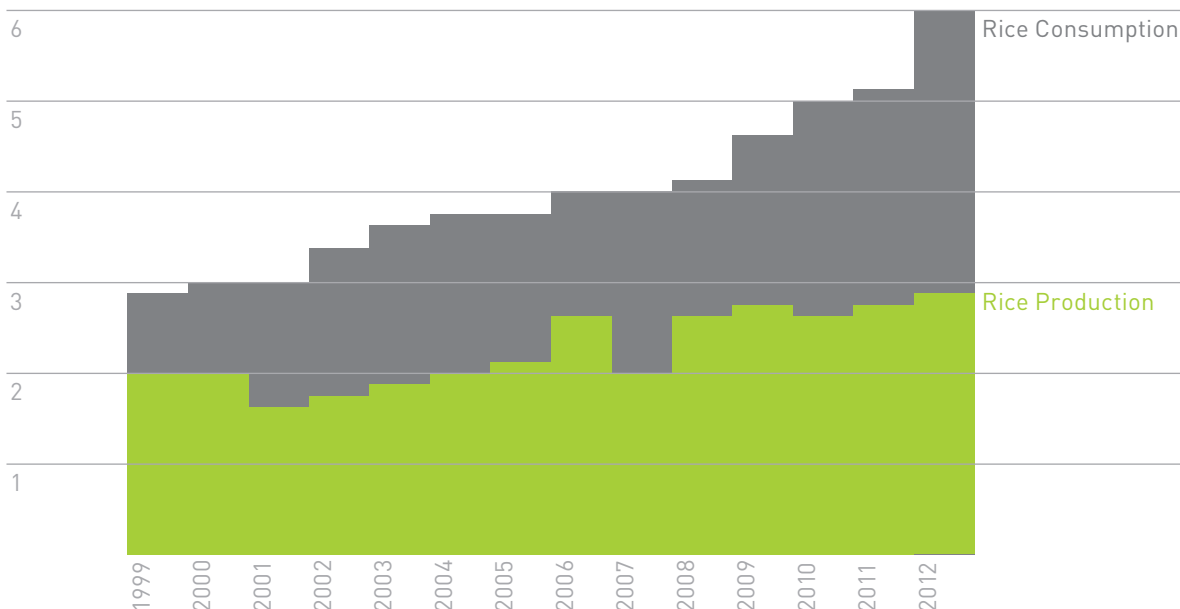
Level the playing field

However, the private sector will be able to play a role only if there is a level playing field for investments. The government must set import tariffs that enable competitive local prices. It must target the illegal smuggling of rice from neighbour countries that undermine investments in Nigeria.⁶⁵ Local production cannot compete with illegally imported rice, which sells for half the price.⁶⁶ In 2014 Nigeria lowered import tariffs in order to remove incentives for smugglers, but in the process negatively affected local producers.⁶⁷ According to The Rice Millers, Importers and Distributors Association of Nigeria, rice smuggling creates losses of N\$36 billion per year to the customs service.⁶⁸

Nigeria's rice production vs. consumption gap

Source US Department of Agriculture

Million Tonnes



Blueprint 4

Switzerland's dependence on West Africa's cocoa

The taste for chocolate in emerging markets will continue to increase the global demand for cocoa. However, supply shortages of this pressured commodity are expected as early as 2020. Ghana and Côte d'Ivoire are the world's largest producers of cocoa, providing 60% of global supplies. Yet most of the hundreds of thousands of smallholder farmers supplying the world's cocoa have never tasted a bar of chocolate and live in poverty under worsening environmental conditions.

Switzerland is a global commodities hub with Swiss chocolate at the heart of its international brand. Multinationals headquartered in or operating out of the country are leaders in the \$9 billion global cocoa industry. Despite its perception of being a largely self-sufficient country, Switzerland imports over half of its grain commodities. The water used to irrigate these crops in producing countries is 'virtually exported' to Switzerland. Most of the country's water footprint lies outside its borders. 16% of Switzerland's total virtual water imported is embedded in cocoa imports.

Ghana and Côte d'Ivoire are Switzerland's top cocoa suppliers; both face production bottlenecks that threaten cocoa exports in the coming years. Swiss-based multinationals must go beyond traditional development and CSR approaches to think more creatively about business model innovations that will help smallholder farmers capture more value from the global chocolate market.

Strategic Opportunity 1

The Swiss government

As an international commodity hub with an interest in its impacts on global sustainability, Switzerland has the opportunity to orient its commodities sector policies and development to help stimulate an innovative response from Swiss companies. Building the capacity of smallholders in Ghana and Côte d'Ivoire must also enable them to capture enough value from global chocolate market so as to remain its sustainable suppliers.

Strategic Opportunity 2

Multinationals in Switzerland's chocolate industry

To lead a response to the supply shortage challenge by orienting innovations in the business models of big chocolate brands and give farmers in Ghana and Côte d'Ivoire a bigger stake in market value creation. As established chocolate brands position their growth in emerging markets they must provide farmers with a more attractive stake in their long-term success.

Switzerland's dependence

Switzerland holds over 25% of global commodity trade and hosts some of the world's largest and most well-known multinationals in the agri-food industry.⁶⁹ The Swiss government is under increasing pressure to take responsibility for environmental and development impacts of global commodities without losing its place as one of the most competitive economies in the world.⁷⁰

Over 80% of Switzerland's water footprint lies outside the country, as imported cotton, livestock products and grains also virtually carries the water embedded in production.^{71/72} 16% of Switzerland's total virtual water footprint is attributed to cocoa bean and product imports, and Ghana and Côte d'Ivoire are the most significant contributors of that embedded water.

Ghana and Côte d'Ivoire

Côte d'Ivoire and Ghana together account for 60% of global cocoa production.⁷³ Together with Nigeria and Cameroon, the four countries supply 70% of the world's cocoa.⁷⁴ Smallholder farmers with an average farm size of 2.9 hectares (Ha) produce 86% of the world's cocoa.⁷⁵ In Côte d'Ivoire production is mainly household-based, with over 600,000 smallholder farms sustaining roughly 20% of the population.⁷⁶ It is also the major economic activity for over 700,000 households in Ghana, representing 30% of the population.⁷⁷ Cocoa represents 70% of Côte d'Ivoire's export earnings and 30% of Ghana's.⁷⁸

Traditional consumer countries still dominate the global market, but in 2011 alone, emerging economies accounted for 55% of global confectionary retail growth. In 5 years, Barry Callebaut the Swiss-based chocolate giant doubled its output capacity in Asia.⁷⁹ Global demand for cocoa is expected to grow by 30% by 2020, while production has plateaued in recent years. A shortfall is expected by 2020.⁸⁰

Ghana's forests are declining by 2% a year, mostly due to cocoa expansion. For several decades now, farmers have encroached onto forests, as existing land under cocoa cultivation is degraded. Five issues undermining long-term supplies are:

Productivity

Cocoa trees in Ghana and Côte d'Ivoire, planted more than 25 years ago, have reached peak productivity, and without large-scale rehabilitation of land and trees production is likely to drop.⁸¹

Profit

Farmers are switching to more lucrative crops like palm oil or rubber; persuading farmers to stay with cocoa is becoming difficult.⁸² If farmers maintain the current rate of production, the output shortage is expected to reach 1 million tonnes (MT) by 2020 or 25% of 2012 global output.⁸³

Climate change

Climate change and unsustainable farming techniques have already decreased the amount of land effectively supporting cocoa crops by 40% in the past 4 decades.⁸⁴ Between 2030 and 2050, suitable land for cocoa production is expected to fall dramatically due to rising temperatures and changing rainfall patterns.⁸⁵

Governance

The cocoa industry in both countries is highly politicised. Low levels of government capacity and corruption allegations are barriers to the needed investments in productivity and logistics. Furthermore, it impairs the ability of companies to implement sustainability commitments along their supply chains.⁸⁶

Poverty

Chronic poverty and poor labour conditions are driving an exodus from cocoa farming, just as a new generation of farmers must take the reins of production.⁸⁷ The average income of West African cocoa farmers and their dependents is far below the level of absolute poverty, reinforcing the drivers of child labour.⁸⁸ Crop diversification will be crucial to improve incomes, living conditions and food security in the cocoa belt.⁸⁹

Switzerland's chocolate business

In 2011, the Swiss market alone produced 176,000 tonnes of chocolate with \$1.7 billion in turnover.⁹⁰ Nestlé and Lindt & Sprüngli, both headquartered in Switzerland, are among the top 10 manufacturers of chocolate in the world by net sales.⁹¹ Barry Callebaut, which is listed on the SIX Swiss Stock Exchange, processes almost one quarter of the world's cocoa beans. Companies such as Cargill, ADM, Olam, Cadbury and Ferrero all have operational or trading bases in Switzerland.

Given the range of these constraints, companies have had to broaden their efforts to promote sustainability, which had in the past focussed mostly on child labour.⁹² The 13 largest companies in the global cocoa industry have spent an estimated combined \$300 million on sustainability programmes, with future commitments of around \$710 million.⁹³ Industry wide initiatives have proliferated, the most recent effort being CocoaAction. This is a new pre-competitive platform led by the World Cocoa Foundation and 12 companies.⁹⁴ In 2014 an agreement was signed with the Government of Côte d'Ivoire to improve the livelihoods of 200,000 Ivorian farmers and communities by 2020.⁹⁵ However, it is widely recognised that the scale of investment and commitment needed from a new generation of cocoa farmers to overcome poverty and inequality far exceeds the capacity of efforts currently underway.

Next generation business models in the chocolate industry: Divine Chocolate Limited

The global chocolate market is projected to grow at a compound annual growth rate of 2.3% from 2014 to 2019.⁹⁶ However, as the European market becomes more saturated, inclusive business model innovations are driving brand differentiation in the luxury chocolate market.⁹⁷ Companies such as Mars have invested in mutually beneficial productivity enhancements with their smallholder suppliers.⁹⁸

However, a new company, Divine Chocolate Limited, has pushed innovation further. Divine set itself up as the only fair-trade chocolate company that is also co-owned by the smallholder farmers. 45% equity in the global company is owned by the Kuapa Kokoo cooperative in Ghana, a model set up to spread the benefits of the global chocolate market more directly to its 65,000 smallholder farmers.⁹⁹

In 1997, Kuapa Kokoo voted at their annual general meeting to launch a mainstream chocolate brand of their own. They were backed by The Body Shop, which was already buying their cocoa butter. The UK's Department for International Development helped them to guarantee a business loan and NatWest bank offered banking facilities.¹⁰⁰

Divine Chocolate Ltd is registered in the United Kingdom. In 2011, the company had a turnover of £8.2 million and its chocolate is now sold throughout Europe and Australia. Sophi Tranchell, Divine's managing director says, "we'd like to be the Cadbury's of the future". She sees Divine as 'the next stage' in the history of the chocolate industry.¹⁰¹ Divine Chocolate has shown that the increased integration of a farmer organisation into the business value creation process can play a significant role in driving change. However, in order to reach the needed scale, similar innovations must be replicated by the larger players in the industry.

Switzerland in the world

Cocoa is a commodity where supply shortages associated with development challenges can enable the Swiss government to engage multinationals to advance development on a more innovative scale.

Swiss government agencies, notably the Swiss Agency for Development and Cooperation (SDC) and the State Secretariat for Economic Affairs (SECO), are already strengthening the cocoa value chain in countries like Ghana, Côte d'Ivoire, Honduras and Indonesia.^{102 / 103}

A greater awareness of Switzerland's inter-dependence with countries like Ghana and Côte d'Ivoire must help catalyse more innovative responses that position Switzerland as a sustainable commodities hub of the 21st century.

In addition to Ghana, the Swiss Government can play an increasingly supportive role in Côte d'Ivoire through bilateral cooperation in support of policies that improve market information, infrastructure, tax incentives and competition in favour of farmers.

Swiss multinationals must enhance development outcomes through business innovation; and move from a notion of 'shared value' to one of 'shared equity' with local communities. The Swiss Government can help to incentivise innovation by supporting the piloting of commercial projects along these lines, and building the capacity of local communities to take a seat at the boardroom table as shareholders.

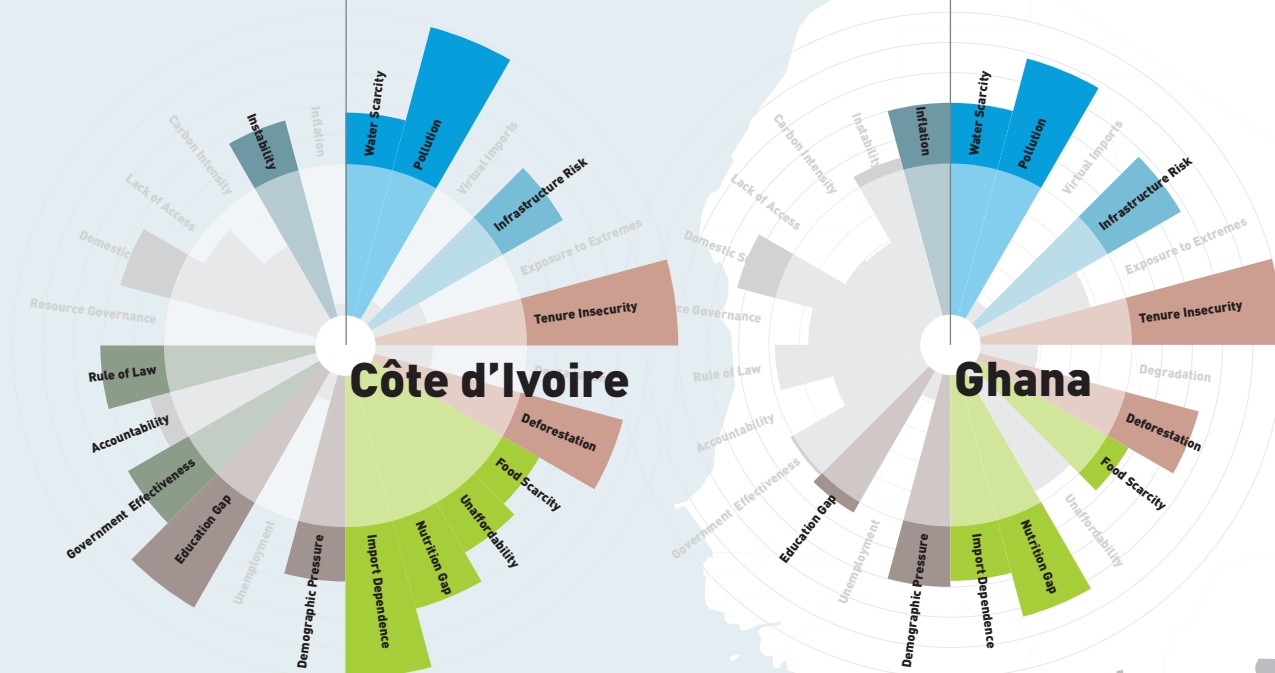
"We'd like to be the Cadbury's of the future."
Sophi Tranchell
Managing Director,
Divine Chocolate Ltd.

Top ten global confectionery companies and their headquarters	Location of Headquarters	Net Sales 2013 US\$ Millions
Mars Inc	USA	17,640
Mondelez International Inc	USA	14,862
Nestlé SA	Switzerland	11,760
Meiji Holdings Co Ltd	Japan	11,742
Ferrero Group	Italy	10,900
Hershey Foods Corp	USA	7,043
Arcor	Argentina	3,700
Chocoladenfabriken Lindt & Sprüngli AG	Switzerland	3,149
Ezaki Glico Co Ltd	Japan	3,018
Yildiz Holding	Turkey	2,500

Source ICCO Statistics, International Cocoa Organisation, 2013

Blueprint 4

Switzerland's virtual water imports highlight its dependence on water and food crops from developing countries. Ghana and Côte d'Ivoire provide most of the world's cocoa. A global supply shortage is expected as soon as 2020 driven by poverty and environmental stress. Swiss chocolate multinationals must rethink how business innovation can help overcome these complex development challenges.

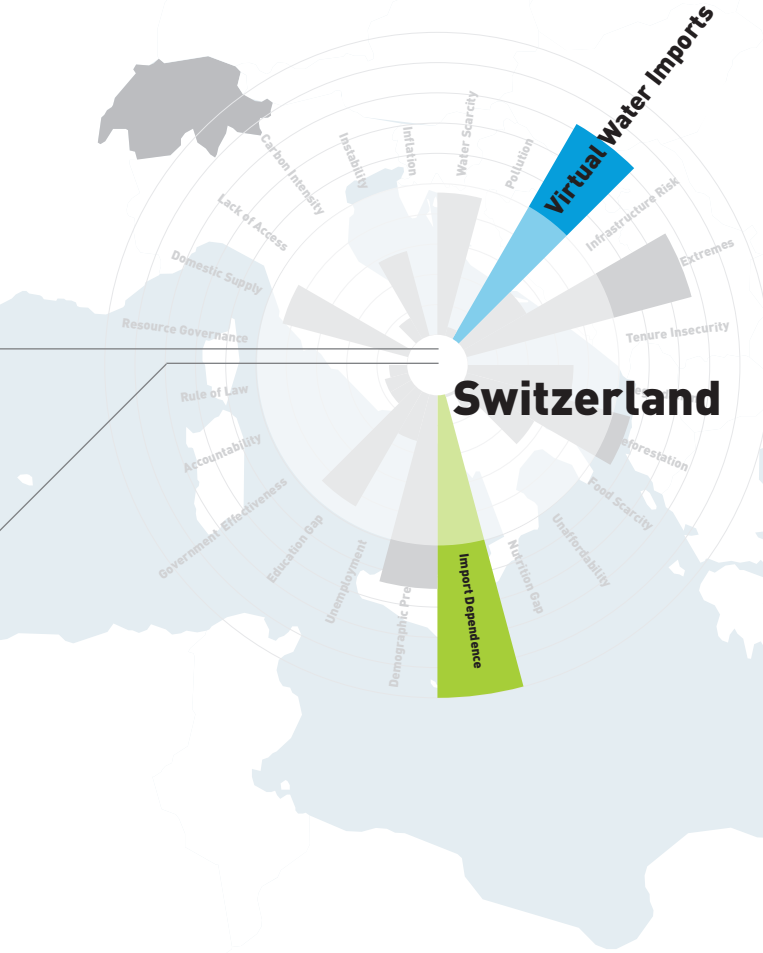


Côte d'Ivoire / Ghana

Development conditions in producer countries to constrain cocoa supplies

The combination of resource, demographic and governance pressures in Ghana and Côte d'Ivoire will induce a shortage of global cocoa supplies as early as 2020.

Business model innovations by large companies in the chocolate market must help farmers to capture the value of the global market in order to unlock the development, citizenship and environmental outcomes that are needed.



Switzerland

Switzerland's external dependence

Over 80% of Switzerland's water footprint lies outside the country as its imports of cotton, livestock products and grains carry the embedded water of sourcing countries where they were irrigated, 16% is attributed to cocoa imports. Ghana and Côte d'Ivoire contribute the most significant embedded water in total cocoa imports.¹⁰⁴

Contribution of the major cocoa producing countries to Switzerland virtual water footprint

Country	% of cocoa-related virtual water imports of Switzerland
Ghana	27%
Côte d'Ivoire	25%
Ecuador	11%
Cameroon	10%
Nigeria	6%
Brazil	3%
Indonesia	2%
Unknown	16%

Source 'National water footprint accounts: the green, blue and grey water footprint of production and consumption', Mekonnen, M.M., and Hoekstra, A.Y., Value of Water Research Report Series (50), UNESCO-IHE, 2011.

Blueprint 5

South East Asia's transboundary haze: health risk liabilities

Air pollution from haze is a serious public health concern in Singapore. The haze primarily originates in Indonesia's forest fires that are used to clear land for agriculture. Singapore will be increasingly pressured to act to reduce air pollution as health risks undermine the quality of life of its population and its ambition to be a leading global commodities hub. Indonesia's new president Joko Widodo has made poverty-reduction the centrepiece of his term's vision. Forest fires affect the health of Indonesian rural communities and undercut his presidential pledge, resulting in his recent pronouncement against mono-crop corporate agriculture.

Adding to the complexity is the contestation of land tenure in Indonesia, a major obstacle to clarifying responsibility for forest fires. The future position of companies listed in Singapore and Malaysia is threatened, particularly given Indonesia's desire to limit foreign land ownership. In this web of political complexity, concession permits for large palm oil, paper and timber companies in Indonesia will be increasingly scrutinised, despite over 50% of fire alerts originating outside concessions. Companies that have made public commitments to 'zero burning' and 'zero deforestation' have the most at stake, as they will not be able to deliver on their commitments without decisive government action.

Strategic Opportunity 1

For companies with land concessions in Indonesia

Companies that have made public commitments to zero deforestation and burning, to help fill the gap that exists for robust and uniform transparency, disclosure and the development of a land monitoring system for use by public policy makers' and the private sector.

Strategic Opportunity 2

For the government of Indonesia

Encourage Indonesia's own legal schemes for sustainable palm oil and wood products The Indonesian Sustainable Palm Oil (ISPO) system, and the Indonesian Timber Legality Assurance System (SVLK) to directly address the haze issue through coordinated independent verification of certified plantations for compliance with no-burning policies.

The hidden costs of haze: health and business disruption

Since the 1980s the severe smoke haze originating from Indonesia's illegal forest fires has smothered cities from Sumatra to Singapore creating health and economic costs for millions of people.^{105 / 106} An acute haze episode in 1997 was estimated to cost \$6 billion when the combined health costs, disruptions to air travel and other business impacts from employee illness were considered.¹⁰⁷ In October 2006 alone, the costs of haze on Singapore's economy were estimated to be \$50 million, affecting the country's reputation as a business and tourism destination in the region.¹⁰⁸ In June 2013, pollution reached a record 'hazardous level' in Singapore, while over 50,000 Indonesians in closest proximity to the fires suffered from heart and respiratory illnesses.¹⁰⁹

South East Asian nations can expect a worsening of haze conditions due to climate change.¹¹⁰ The most acute episodes of haze pollution have occurred during years of drought associated with El Niño climatic conditions in the Pacific. In a changing climate, haze events are now occurring during wetter years as well. Forest fires also erode Indonesia's efforts to achieve a 26% emissions reduction by 2020. In a 2013 haze spike, it is estimated that the fires released the equivalent of 10% of Indonesia's annual greenhouse gas (GHG) emissions for 2000–2005.¹¹¹

A shift in liabilities and exposure to class action

The 2013 haze event led to a crisis point with strained diplomatic ties between the two countries, forcing an early meeting of the Ministerial Steering Committee on Transboundary Haze Pollution in Southeast Asia.¹¹² Despite pointing to the responsibility of Malaysian and Singaporean companies involved in Indonesia's plantation industry, former Indonesian President Yudhoyono made a formal apology for the haze and the Indonesian parliament finally ratified the ASEAN Agreement on Transboundary Haze Pollution in September 2014, 12 years after the initial signature.^{113 / 114} A greater backlash in Indonesia against foreign ownership of land could see the interests of companies listed in Singapore and Malaysia severely impaired if perceived to be drivers of Indonesia's problems.

In Singapore, the 2014 Transboundary Haze Pollution Act now allows for both civil and criminal prosecutions of companies and individuals responsible for fires in neighbouring countries, even for foreign companies without any assets in Singapore.^{115 / 116} These laws are compromised by the weak enforcement of anti-burning laws in Indonesia, overlapping land concessions and the limits of Singapore's extra-territorial reach.^{117 / 118} A Haze Monitoring System has been endorsed but not fully implemented as part of the ASEAN agreement.¹¹⁹

The introduction of civil liability in the Singaporean Act and the allowance of non-official maps to be provided as incriminatory evidence, are both unprecedented steps in this agenda.

This sets the stage for a range of satellite monitoring systems driven by civil society groups to have a direct impact on class action litigation. The trajectory of these developments exposes agribusinesses to civil action from companies in affected sectors, or potentially even class actions from affected citizens, while the evidential burden is placed on the defendants.¹²⁰ An expert panel has been appointed to advise Singapore on this issue, from both diplomatic and legal standpoints.¹²¹

Corporate commitments face complexity

Many large palm oil, timber and pulp and paper companies based across Singapore, Jakarta and Kuala Lumpur have sizeable land assets and subsidiary operations in Indonesian provinces. The palm oil sector in particular has been the focus of haze concerns due to its rapid growth. Indonesia and Malaysia together account for 80% of palm oil supplies globally, a market expected to grow 32% to 60 million tonnes (MT) by 2020.¹²²

Strategic Opportunity 3

For the governments of Singapore and Malaysia

Quantify the economic and health costs that forest fires in order to make more informed political decisions about its impacts. Accelerate the development and implementation of disclosure and transparency guidelines for companies listed in their stock exchanges or privately held in their jurisdictions that operate large land assets in Indonesia.

Strategic Opportunity 4

For ASEAN policy-makers

ASEAN has the goal to strengthen regional economic integration in 2015. The existing ASEAN Business Advisory Council has a role to play in driving the effectiveness of the ASEAN Agreement on Transboundary Haze Pollution. The creation of an 'ASEAN Business Working Group on Transboundary Haze' is an opportunity to consolidate the business voice across these countries regarding policy priorities and implementation.

Malaysian and Singaporean companies reportedly hold concessions to more than two-thirds of Indonesia's total plantation area.¹²³ While most companies have long-standing commitments to practicing 'zero-burning' techniques, recently a number of companies have made public commitments to 'zero-deforestation' production practices, including Asia Pulp and Paper (APP), Golden Agri-Resources (GAR) and Wilmar, which alone controls 45% of the global palm oil market.¹²⁴

Despite the market dominance of large Asian multinationals, smaller and medium-sized companies operating within weak local governance contexts usually resort to fire as a quick and cheap way to clear forests.¹²⁵ According to NASA, 51% of fire alerts in March 2014 were identified as being outside of pulpwood (acacia), palm oil and logging concessions.¹²⁶ Haze has also been linked to burning by farmers in conflict with companies over land claims.¹²⁷ The implementation of corporate commitments therefore lies beyond the control of large companies and the cause of fires sometimes difficult to identify. Fulfilling these commitments depends on the ability of large companies to control their land concessions and subsidiary operations, and governments to improve local monitoring, law enforcement and broader rural development progress.¹²⁸

Reconciling data and information

The regional disclosure of land-related information is a sensitive issue for countries concerned with national sovereignty. However it is a necessary part of deepening regional integration and cooperation, and an area where ASEAN's integration strategy could play a role if coordinated with consolidated business input.

Currently, fragmented interests within producing countries are not conducive to fulfil corporate commitments. In Malaysia for example, the Sarawak Oil Palm Association allegedly blocked Willmar's own 'No Deforestation, No Peat, No Exploitation' policy, over concerns it could derail the government's plan to have 3 million hectares (MHa) of palm oil.¹²⁹ Other companies that have released their sustainable forest management policies, like Singapore based APRIL and Jakarta based APP, have been directly associated with the clearance and drainage of peatlands in Indonesia, a direct driver of fires.¹³⁰

A major limitation so far has been the reconciling of public and private data on land ownership, concessions and land classifications.¹³¹ Public data between state and federal levels is also not properly reconciled, particularly licensing. Global and national monitoring networks, such as NASA's active fire maps, Global Forest Watch by the World Resources Institute and Indonesia's own 'One Map' led by the Government's REDD+ Task Force, are enhancing transparency of fire hot spots, but have limited uptake in regional policy-making.

Key strategic tasks for global companies will be to provide more decisive support to these public tools and to build convergence of information for monitoring systems to work more effectively.

Sustainability requirements in the stock exchanges

Global progress towards embedding sustainability in stock exchanges has been a slow process, and South East Asia is no exception. The Indonesian Stock Exchange was the first ASEAN country to issue a sustainability index, although it has not issued voluntary or mandatory reporting guidelines.¹³² Since 2007, Bursa Malaysia has required listed companies to disclose their CSR activities or make a statement that none are conducted.¹³³ Finally, in 2011, the Singapore Stock Exchange (SGX) began to publish a Sustainability Reporting Guide, currently a voluntary exercise.¹³⁴ SGX has indicated that in 2015 it will drive mandatory reporting or a 'report-or-explain' approach.¹³⁵ While up-take has been slow, maintaining and accelerating efforts to work on sustainability criteria across these stock exchanges in relation to land-assets in the region should be an increasingly important area of work in the ASEAN region.

ASEAN's agreement: a foundation for trans-boundary cooperation

The Agreement on Transboundary Haze Pollution is a regional treaty signed by 10 ASEAN countries (Brunei, Cambodia, Laos, Malaysia, Myanmar, Singapore, Thailand, Vietnam and Indonesia) that came into force in 2003.¹³⁶ Indonesia only ratified the treaty on 16 September 2014.¹³⁷ The agreement requires parties to develop and implement prevention, monitoring and mitigation measures, respond to information requests made by affected states, and take legal or other measures to implement obligations under the agreement.¹³⁸

ASEAN cannot sanction parties that fail to comply with its provisions and parties have significant leeway in how to meet their obligations.¹³⁹ Greater transparency and exchange of technical information, such as concession maps, is essential,¹⁴⁰ but Indonesia argues that the disclosure of concession maps is in contravention with its laws.¹⁴¹ Intergovernmental cooperation has been limited to Ministries of the Environment, with weak coordination with other ministries responsible for key areas of the economy, finance and industry or with other strategic areas of ASEAN's agenda on economic integration, food security and agriculture.

Companies listed or domiciled in Singapore, Malaysia and Indonesia with largest oil palm, pulpwood and timber plantations in Indonesia

Source Earth Security Group, compiled from Bloomberg, Maybank Malaysia and company annual reports.

Companies	Roundtable Sustainable Palm Oil	Zero Burning	Zero Deforestation	Market Cap (US\$ billion)	Listing / Ownership	Indonesia Planting (Ha)	Plasma Planting (Ha)
Singapore							
Wilmar International	RSPO	ZB	ZD	20	SGX	171,144	41,037
Golden Agri-Resources	RSPO	ZB	ZD	5.2	SGX	471,100	99,998
First Resources	RSPO	ZB	—	3	SGX	170,596	21,869
Bumitama Agri Ltd	RSPO	ZB	—	1.4	SGX	149,683	34,731
Indofood Agri Resources Holdings Ltd	RSPO	ZB	—	1.2	SGX	239,921	90,214
Kencana Agri Ltd	RSPO	ZB	—	0.24	SGX	52,135	13,949
Global Palm Resources	RSPO	ZB	—	0.058	SGX	10,403	3,118
Musim Mas	RSPO	ZB	—	—	Private	122,572	—
Asia Pacific Resources International (APRIL)	—	—	—	—	Private	357,851	—
Malaysia							
Sime Darby Berhad	RSPO	ZB	—	17.5	KLSE	204,466	4,1415
Kuala Lumpur Kepong	RSPO	ZB	—	7.3	KLSE	137,483	—
Felda Global Ventures Holdings Berhad	RSPO	ZB	—	3.8	KLSE	56,422	—
United Plantations Berhad	—	ZB	—	1.5	KLSE	9,815	—
IJM Plantations Berhad	RSPO	ZB	—	1	KLSE	27,491	—
Samling Group	—	—	—	—	Private	6,085	—
Indonesia							
Indofood	RSPO	ZB	—	4.8	IDX	230,000	83,000
Astra Agro Lestari Terbuka	—	ZB	—	2.6	IDX	281,378	61,357
Asia Pulp and Paper	—	ZB	ZD	2.38	IDX	2,600,000	—
PT Sinar Mas Agro Resources and Technology Tbk	RSPO	ZB	—	1.8	IDX	138,914	30,968
PP London Sumatra Indonesia	RSPO	ZB	—	1.1	IDX	89,845	—
PT SIMP	RSPO	ZB	—	0.9	IDX	239,921	90,214
Bakrie Sumatera Plantations	RSPO	ZB	—	0.06	IDX	122,024	13,882
PT Sampoerna Agro	RSPO	ZB	—	0.3	IDX	120,225	49,513
Darmex Agro Group	—	—	—	—	Private	155,000	—
Royal Golden Eagle International	—	ZB	—	—	Private	100,000	60,000

RSPO

Indicates that the company is a member of the Roundtable for Sustainable Palm Oil, which requires certified growers to commit to responsible environmental and social standards, including the conservation of natural resources and biodiversity.

Zero Burning

Indicates that the company has a policy which requires it to ensure that any land clearance activities (including the clearance of forests) would be conducted without the use of forest or peat fires.

Zero Deforestation

Indicates that the company has moved beyond having a 'sustainable forest management policy' to making a specific public commitment to 'zero deforestation' across their production chain, including their subsidiaries or suppliers.

Plasma Scheme

The Indonesian government's Plasma Scheme supports the development of oil palm plantations for smallholders, committing developers to purchase their produce.

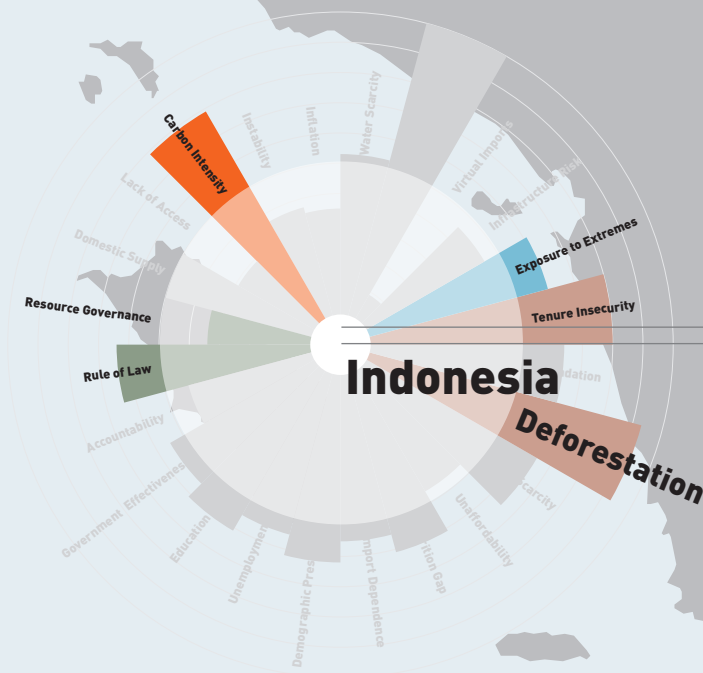
Blueprint 5

Indonesia's forest fires create a haze that moves across boundaries and pollute the air in Singapore and Malaysia. Fires are rooted in insecure land tenure combining with commercial pressures from the palm oil, paper and timber industries. The health risks to these populations are a game-changer to the corporate liabilities faced by multinationals in these sectors; a new incentive to consider a public-private cooperation strategy on a regional level.

Indonesia

Forest fires undermine the government's rural development goals

In 2013, Indonesia ranked as the top producer of palm oil in the world (28.4 MT) as well as the largest global consumer of palm oil, accounting for 23% of global consumption.¹⁴² Top importers of Indonesian palm oil are India (28%), China (15%) and Malaysia (8%), reducing the effectiveness of western market led sustainability certifications.¹⁴³ Globally, Indonesia is the 10th largest paper and paperboard producer and home to APP, the largest company in the global market.¹⁴⁴ Illegal burning for oil-palm and pulpwood plantations has had devastating effects domestically, where haze has caused hundreds of schools and local airports to close, and respiratory infections in thousands of people.¹⁴⁵



Malaysia

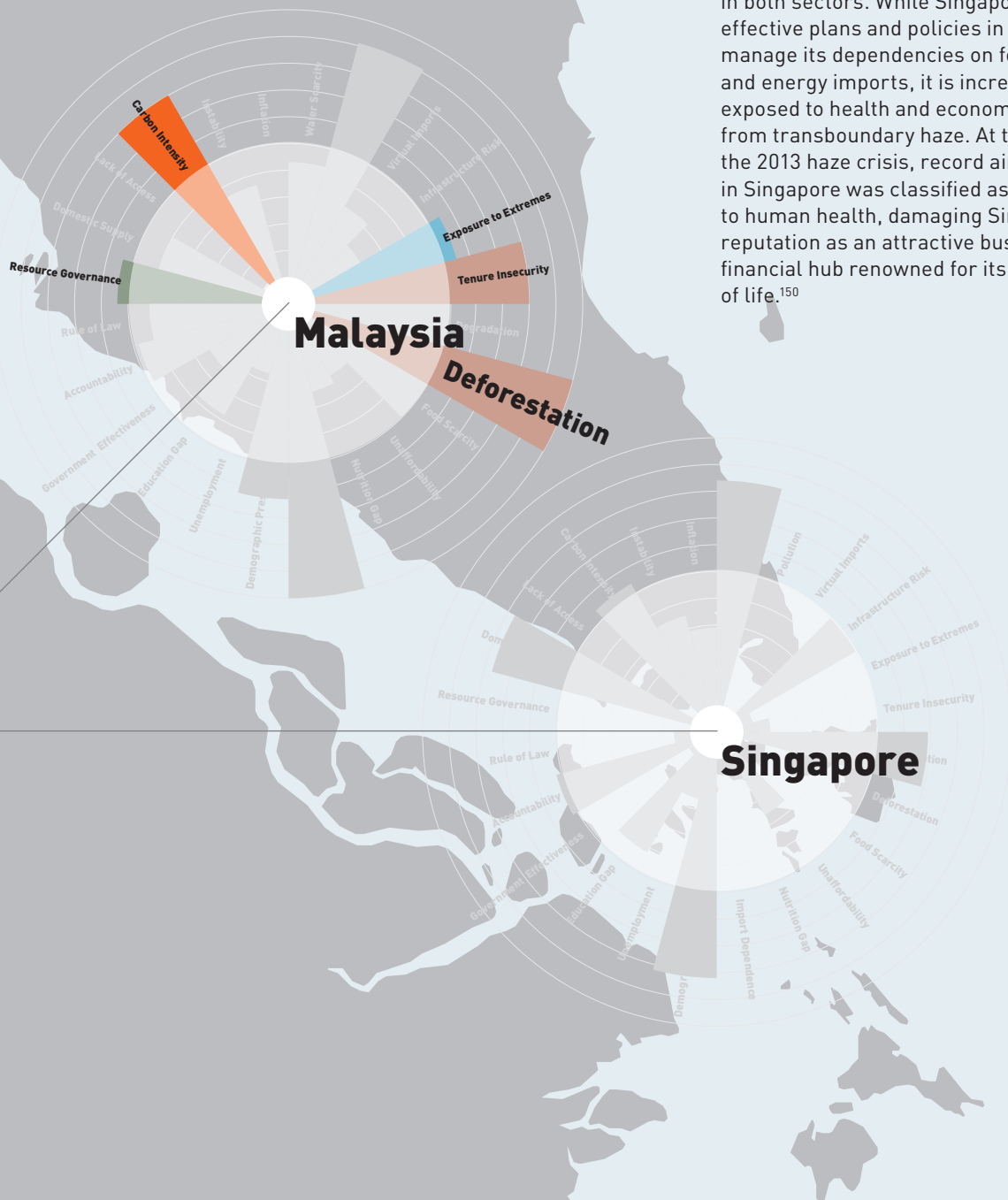
Malaysia chairs ASEAN in 2015

Malaysia holds the chair of ASEAN in 2015: Malaysia is now the second largest producer of palm oil (19.2 MT in 2013) after Indonesia and the 5th largest consumer of palm oil.¹⁴⁶ Primary importers of Malaysian palm oil are China (19%), India (15%), and Pakistan (8%).¹⁴⁷ While Malaysia is not currently a significant player in the global market for pulp and paper, the sector is poised to expand.¹⁴⁸ Malaysia is itself responsible for some haze episodes, but it is the prevailing westward winds carrying the haze pollution from Indonesia as far north as Kuala Lumpur that can push air pollution above the level considered hazardous. In 2013, Malaysia's Air Pollutant Index (API) reached 'hazardous' levels around the capital, closing airports and schools, and a state of emergency was called in Johor State.¹⁴⁹

Singapore

Health and business disruption costs in a global commodities hub

Many of the region's most significant palm oil, pulp and paper and timber companies are domiciled or listed in Singapore, an increasingly significant global commodities hub that supports trade and financing in both sectors. While Singapore has effective plans and policies in place to manage its dependencies on food, water and energy imports, it is increasingly exposed to health and economic impacts from transboundary haze. At the height of the 2013 haze crisis, record air pollution in Singapore was classified as hazardous to human health, damaging Singapore's reputation as an attractive business and financial hub renowned for its high quality of life.¹⁵⁰



Blueprint 6

Converging interests in the Nile Basin around food security

There is not enough water in the Nile to ensure water and food security for the growing populations of Egypt, Ethiopia, and Sudan unless they improve water cooperation. Ethiopia's mega-plans to develop hydropower to meet its energy needs and Egypt's colonial-era claim for water rights and veto power over the basin's development have resulted in deadlock in negotiations over a cooperation agreement.

Food security undermines hydro-diplomacy, as agriculture in these countries consumes more than 80% of their water and underpins social stability. Egypt, Ethiopia and Sudan face enormous challenges to ensure their food supplies. Egypt is running out of fertile land and is acutely food import-dependent; Ethiopia's agriculture is vulnerable to the changing climate; but Sudan stands out as having some of the largest fertile land endowments on the African continent.

Sudan aims to attract foreign investment to become one of Africa's emerging agricultural hubs. Investor countries like the United Arab Emirates (UAE) and Saudi Arabia see the region's agricultural potential as a key to their own food security. Sudan and Egypt are part of the Arab world and agricultural cooperation ties go back decades. However, the influx of capital to develop export-oriented agriculture sectors will amplify pressure on the Nile Basin's water, food and land. If these investments are not aligned to sustainable development and support the smallholder base of these countries, they will undermine any prospects of resolving the water issue.

Proven business models for more inclusive agriculture need to be at the centre of investment promotion frameworks in the basin. Orienting capital investments towards sustainability is critical to the future of the region.

"A sustainable approach to agriculture is vital to the future of Egypt and the region. We can build up the quality of the soil, improve water use and build stronger community relationships, but a sustainable way of financing these new models is also a priority."

Helmy Abouleish

CEO, SEKEM Group, Egypt.

Food bottlenecks in the Eastern Nile

Egypt's land is 95% desert

Egypt faces critically low levels of arable land per person and a growing population heavily concentrated in the Nile Valley and Delta. 40% of Egypt's workforce is employed in the agriculture sector.¹⁵¹ 4 million small-scale farms in the Nile Delta produce the bulk of the sector. These farms make up 60% of total cultivated area and are predominantly flood-irrigated, taking the lion's share of Egypt's water resources.^{152 / 153} Egypt is already facing water scarcity and is predicted to be in water deficit by 2017.¹⁵⁴

Water pollution is constraining production, with raw and partially treated wastewater polluting agricultural land and water resources.¹⁵⁵ 35% of agricultural land suffers from salinity,¹⁵⁶ an increasingly pervasive problem as fossil groundwater is exploited unsustainably. Egypt's strategy has been to tap fossil groundwater to establish and promote large-scale commercial farms on reclaimed desert land. Due to the return on investment required however, these farms are largely oriented to produce export-oriented cash crops, such as nectarines, that are both water intensive and neither address food security nor provide employment opportunities for low-skilled labour.¹⁵⁷

Sudan wants to be Africa's agricultural hub

Sudan has an estimated 150 million hectares (MHa) of arable land, but simply not enough water to irrigate them all beyond a few MHa.¹⁵⁸ The country is a net importer of food and over 6 million people rely on food aid despite the agriculture sector employing 80% of the population.¹⁵⁹ While Sudan produces quantities of sorghum and millet at levels to attain self-sufficiency, a lack of access to food means the country remains food insecure. Civil conflict, low agricultural productivity and droughts have exacerbated this insecurity. Poor management, insecure land tenure, desertification, land degradation, water pollution and deforestation constrain the potential of Sudan's population and drive social conflict.¹⁶⁰ 1.9 MHa equipped for irrigation is in need of rehabilitation, requiring an estimated total investment of \$2.17 billion.¹⁶¹

A 50-year civil war and the emergence of the oil industry in the 1990s have held back the development of Sudan's agriculture sector.¹⁶² After the loss of its oil revenues in 2011 as a result of the creation of South Sudan, Sudan has now turned towards agriculture as an engine of economic growth.¹⁶³

In 2012, Sudan's agricultural investment promotion began to implement tax exemptions for foreign investors¹⁶⁴ and other incentives such as allowing up to 70% of crops to be exported.¹⁶⁵ Its vision to become a regional agricultural hub will place a heavy, unrealistic and perhaps catastrophic burden on water use in the basin.

Ethiopia's agricultural vulnerability

As the upstream country on the Blue Nile, Ethiopia is a central actor in the Nile's hydro-diplomacy due to its large-scale hydropower plans. But food security in Ethiopia is also a major concern. 25 MHa of agricultural land is mostly rain-fed. The country suffers an acute drought at least once every 10 years.¹⁶⁶ The region of the Eastern Nile holds 25% of Ethiopia's population and 40% of cultivated land and cattle stock. The economy is based on agriculture, with 85% of the population relying on subsistence agriculture, insecure in their land tenure rights, which remain under the control of the state.¹⁶⁷ So far Ethiopia has increased its agricultural output through area expansion rather than productivity gains, undermining the resilience of rural populations.^{167 / 168} As the weather becomes more unpredictable, the fragility of its food system raises questions about the viability of agriculture development through export-oriented foreign investments.

Strategic Opportunity 1 For the governments of Egypt, Sudan and Ethiopia

To invest in one another's agricultural sectors through bilateral agreements in order to ensure food security and water stewardship. Developing a vision for how food security concerns could be met through intra-regional investment can revitalise relationships in the region.

Strategic Opportunity 2 For Gulf investors in agriculture

To make water stewardship, local food security, and support for smallholder farmers a key and measurable impact of their agricultural involvement in the Nile Basin. Building the resilience of these countries is vital to long-term stability of their investments. Government bodies in the Gulf that have been set up to support investors abroad should help build the awareness of investors of the proven models for holistic and inclusive agriculture.

Strategic Opportunity 3 For multilateral banks and policy platforms

The development banks and networks such as the Nile Basin Initiative, which focus on improving transboundary water cooperation, must consider supporting a strategic engagement with the investment sector. Private and public investors and companies, within and outside the region, should be encouraged to adopt agricultural and water stewardship practices that have already been developed. Similarly, the investment promotion frameworks of host countries should align their tax incentives to the promotion of these models.

Gulf investments in the Nile

The ties that link Sudan and Egypt's modern agricultural investment to the rest of the Arab world go back decades. Both countries are nominally members of the Arab world, which extends through North Africa and the Middle East, creating deep cultural linkages between the Eastern Nile and neighbouring Arab regions. For example, the Arab Organisation for Agricultural Development, that began operating in 1972, was headquartered in Khartoum, Sudan, due to the recognition of its members of Sudan's endowment in natural resources for agriculture.¹⁷⁰ After the global food crises of 2008, Gulf countries in particular, given their vulnerability to food imports, have accelerated their agriculture investments abroad.

Today, the UAE is the largest Gulf investor in farm projects in Sudan with 283,000 hectares (Ha), accounting for more than half of the estimated 500,000 Ha of farming ventures owned by Gulf investors.¹⁷¹ The gulf nations of Bahrain, Qatar, Kuwait and Saudi Arabia and the UAE are some of the world's most water stressed countries.¹⁷² Water scarcity makes the opportunity cost of subsidising agriculture extremely high. In Saudi Arabia, water put to use in industry produces 300 times more economic value than in agriculture. In the UAE, the most water scarce of all the GCC countries, the difference is over 1,000 times.¹⁷³ As a result, reliance on food imports is high. In 2010, the UAE and Saudi Arabia imported over 80% of their food needs.^{174 / 175} The population of the UAE has doubled 3 times since 1975 to over 8.5 million, placing greater pressure on both water resources and the food import bill.¹⁷⁶ Food commodity prices are highly volatile, subject to global supply shocks and fluctuations driven by speculative trades.¹⁷⁷

In response, the UAE has turned to outsourcing as the most cost efficient way of creating a sustainable agriculture industry, whilst minimising exposure to price shocks and ensuring food security.¹⁷⁸ Governments in the Gulf have increasingly played a role in supporting their private investors through a proactive diplomacy. Saudi Arabia's King Abdullah's Initiative for Saudi Agricultural Investment Abroad (KAISAA) is an investment promotion agency.¹⁷⁹ Now transferred to the Ministry of Agriculture, KAISAA helps to support investment deals through the negotiation of bilateral agreements with host countries.¹⁸⁰

A positive role for Arab investors in the region is possible. A case in point is a project to enhance food security in Arab countries launched in 2011, funded by the Arab Fund for Economic and Social Development; the Kuwait Fund for Arab Economic Development; the Islamic Development Bank and the OPEC Fund for International Development. The project reached more than 25,000 smallholder farmers in the first phase. The results in Egypt show an average of 25% water savings through improved irrigation techniques, 30% increases in wheat yields and a 74% improvement in water use efficiency.¹⁸¹

Intra-regional trade and investment

As water scarcity increases in the region, achieving food security for countries with such fiscal constraints will be increasingly challenging if not impossible. Intra-regional food trade is currently low but could play a greater role as these countries develop and coordinate their resources. Agricultural investment cooperation between Egypt and Sudan has been on the rise. The Egyptian-Sudanese Committee on Agricultural Investment and Animal Production have established a commercial company in Sudan to reclaim 27,000 acres at an estimated cost of \$16.5 million.¹⁸²

The Egyptian Central Agricultural Co-operative Union (CACU) and its Sudanese counterpart entered into agreements in 2013, including the establishment of joint agricultural companies to utilise Egyptian expertise and Sudan's land and water resources.^{183 / 184} Investment agreements like these must be encouraged to consider sustainability criteria. Leveraging the role of business in agricultural investments already crossing boundaries within the basin is needed to revitalise relationships and manage shared water resources.

Multi-sector investment programmes between these countries, such as the co-financing of infrastructure projects, are seen as a way to strengthen cooperation and resilience at a basin level.¹⁸⁵ Irrigation infrastructure investments already feature centrally in the countries' development plans. Investing countries must now ensure that investments are done within parameters of sustainability and efficiency, and consider transboundary implications.¹⁸⁶

Holistic models of agriculture have been proven to work in Egypt. For example, those promoted by the Egyptian agribusiness group SEKEM have demonstrated that agriculture can be developed by responding to multiple factors of soil management, climate change resilience, food security, water stress, youth employment and community development.¹⁸⁷ Other efforts, like the Nile Basin Initiative's Project for the Efficient Use of Water for Agriculture have made important progress on improving the knowledge of best practices.¹⁸⁸ These initiatives must now develop linkages to mainstream investments in order to encourage the commercial sector to support sustainable resource priorities.

"I am convinced that if there is real interest and seriousness by investors in the farming sector, then the whole Arab World needs of cereal, sugar, fodder and other essential foodstuffs could be met by Sudan alone."

Salim Allowzi

Director-General, Arab Organisation for Agricultural Development. ¹⁸⁹

**Selected foreign agricultural investments from
Gulf countries to Egypt, Ethiopia and Sudan 2007-2014**

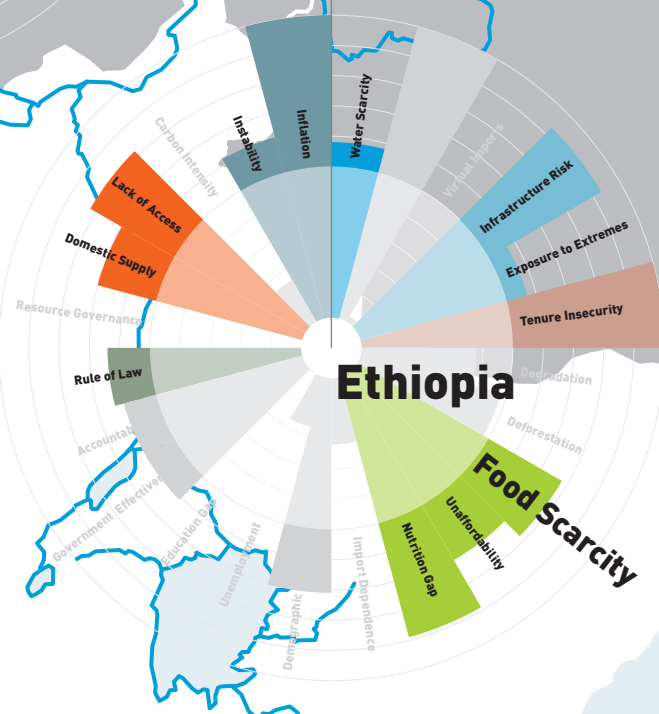
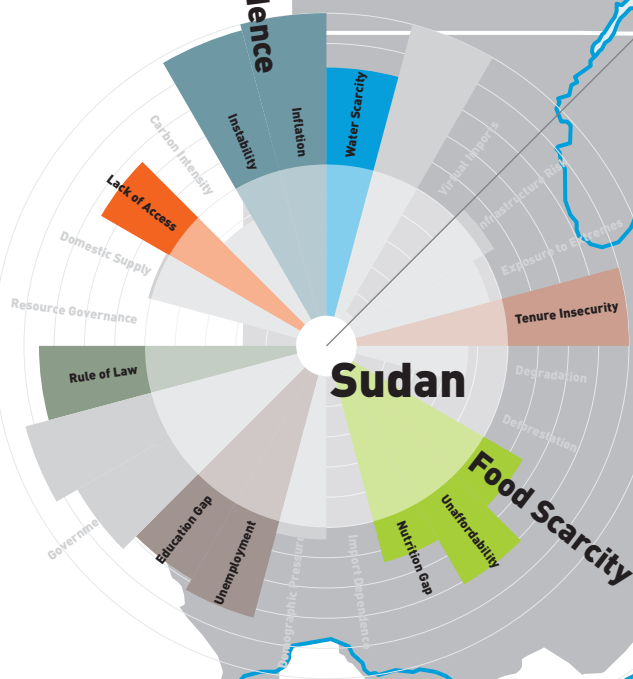
Food and non-food agricultural commodities

Source The Land Matrix,
28 October 2014

Destination Country	Contract size (Hectares)	Investor Organisations	Investor Countries
Egypt	42,000	Al Rajhi Group	Saudi Arabia
	42,000	Janan	United Arab Emirates
	20,000	Jenaan Investment	United Arab Emirates
	10,300	Al Dahra Agricultural Company	United Arab Emirates
	2,520	Janan	United Arab Emirates
Ethiopia	250,000	MIDROC Group Jemal Ahmed	Saudi Arabia Ethiopia
	20,000	MIDROC Group Jemal Ahmed	Saudi Arabia Ethiopia
	10,030	MIDROC Group Ethiopian Government	Saudi Arabia Ethiopia
	10,000	MIDROC Group	Saudi Arabia
	10,000	Saudi Star Agricultural Development Plc	Saudi Arabia
	5,000	Dubai World Africa Services East Africa Agri-business Ltd	United Arab Emirates Ethiopia
	3,000	MIDROC Group	Saudi Arabia
	1,800	MIDROC Group Jemal Ahmed	Saudi Arabia Ethiopia
Sudan	106,680	Citadel Capital	Egypt
	101,172	Hassad Food	Qatar
	60,702	Kuwait Investment Authority (KIA) Government of Sudan Government of Saudi Arabia	Kuwait Sudan Saudi Arabia
	42,000	Nadec	Saudi Arabia
	34,802	Al Dahra Agricultural Company	United Arab Emirates
	30,000	Abu Dhabi Fund for Development	United Arab Emirates
	25,210	Citadel Capital	Egypt
	22,257	Jenaan Investment	United Arab Emirates
	20,492	Al Rajhi Group	Saudi Arabia
	8,888	Hail Agricultural Development Company	Saudi Arabia
	5,210	Qatar Livestock Mawashi	Qatar

Note

The list of investments is not exhaustive; it includes projects with investment agreements that have been concluded and may include projects that have been since abandoned.



Egypt / Sudan / Ethiopia

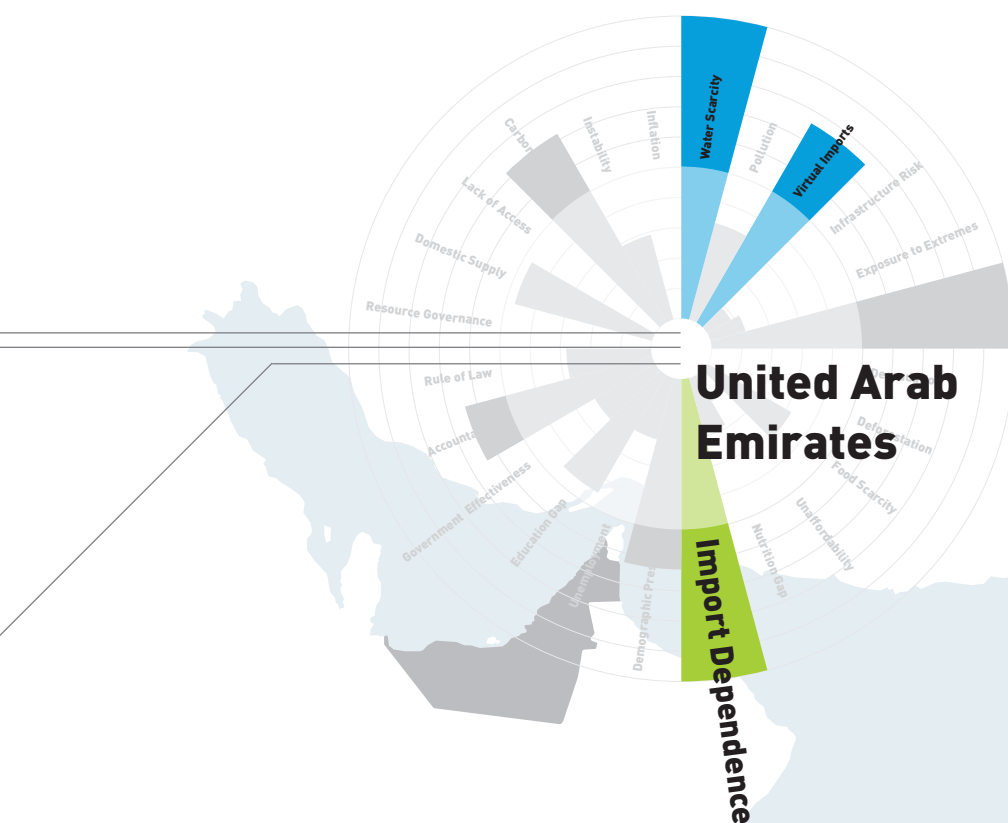
Food bottlenecks in the Eastern Nile

All countries in the Eastern Nile face food security bottlenecks, including high levels of inflation and fiscal constraints. Egypt's food import-dependence, land degradation and demographic growth make agricultural investments in neighbouring countries more attractive. Ethiopia and Sudan must manage critical and competing priorities for water such as food security and access to electricity, whilst facing acute water scarcity and land tenure insecurity problems. Cooperative investments that promote holistic, inclusive and sustainable business models for agriculture and energy must be supported, particularly as players outside the basin are increasingly attracted to the region's resources.

United Arab Emirates

Food import-dependence and water security in the Gulf

Countries in the Gulf are among the most water stressed in the world. As a result, reliance on food imports is very high. In 2010, the UAE and Saudi Arabia imported over 80% of their food needs, the figure for Qatar is close to 95%. The volatility of global grain markets has encouraged Gulf governments and private investors to outsource agricultural production through investments in resource rich countries, increasing the import of food and embedded water.



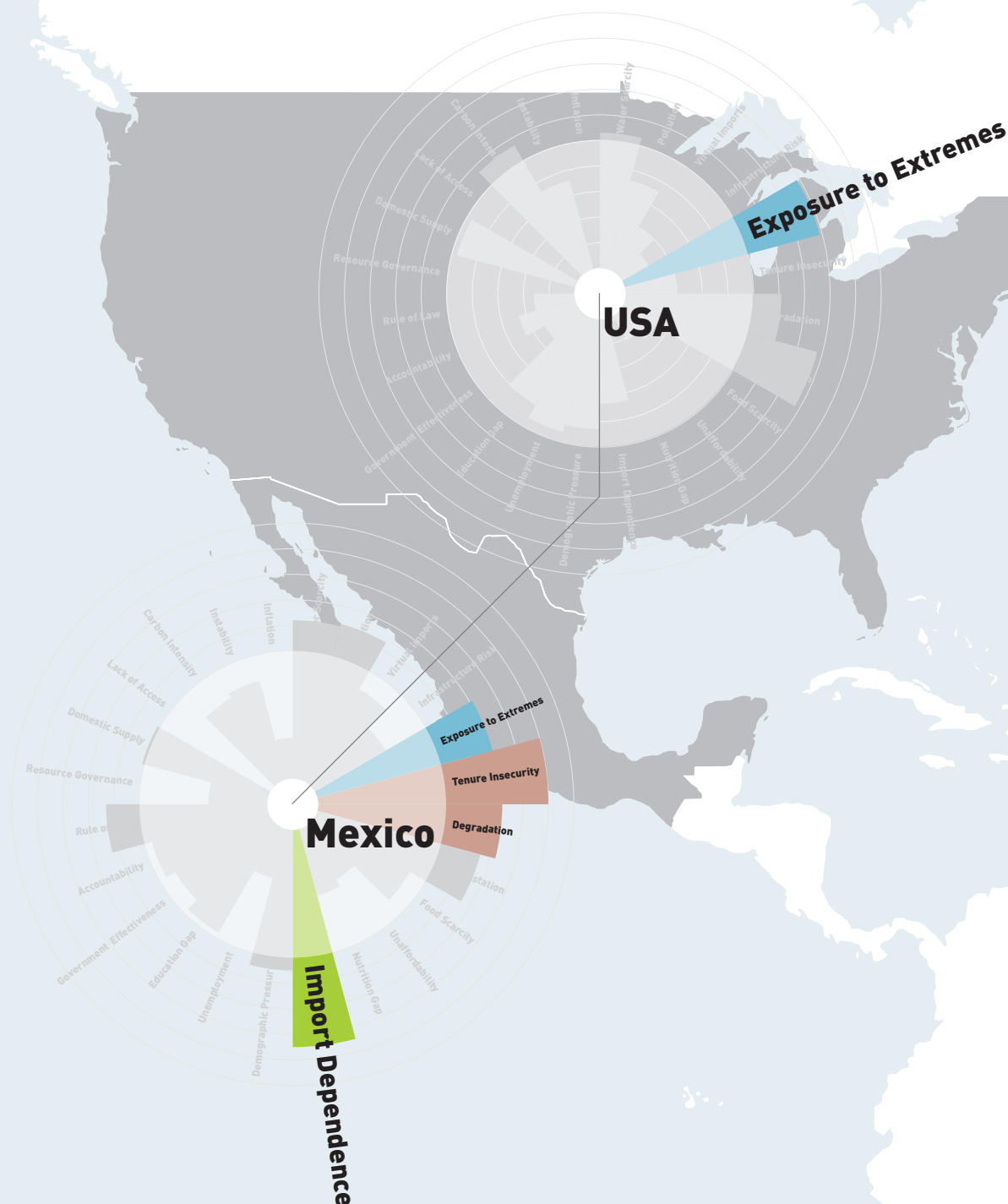
Blueprint 6

Egypt, Sudan and Ethiopia are part of the Nile Basin, where water cooperation has been strained in recent years. Sudan and Egypt are also part of the Arab World. The UAE and other Gulf investors are some of the world's most water-stressed and food import-dependent countries and see this region as a strategic destination for agricultural investments. There isn't enough water in the Nile for all, but focusing on common interests in food security offers new opportunities to build trust and strengthen cooperation.

Blueprint 7

Mexico's food security and climate change in the USA

Mexico's rise as a manufacturing superpower has happened in tandem with a shift to increased dependency on the United States of America for agricultural imports, in particular the country's main food staple, corn. However, food price volatility and climate change in North America have created shocks to corn availability, leading to food riots in Mexico. In 2015, Mexico will deepen its leadership role in the new \$1.2 trillion Pacific Alliance (PA), a bloc with Colombia, Peru and Chile to increase their penetration of Asian markets.¹⁹⁰ However none of these countries can provide Mexico with large-scale supplies of corn. This provides a strategic opportunity for the PA to build linkages with Brazil and Mercosur, where their comparative advantage is already helping Mexico to diversify its dependency on US corn.



Mexico's corn import-dependence

Over the past 3 decades, Mexico has transitioned from an economy driven by oil and agriculture, to one dominated by manufacturing and services. Mexico is expanding its role in global manufacturing, and has more free-trade agreements than the US and China combined.¹⁹¹ Its structural transition towards manufacturing has been aided by the North American Free Trade Agreement (NAFTA). However as a result of this, Mexico imports over one-third of its corn, the majority from the USA; its food import bill has risen from \$2.6 billion in 1990 to \$18.4 billion in 2011. The 2008 food price spike affected Mexico's trade balance and from 2010 to 2012, Mexico's corn import costs accounted for its entire agricultural trade deficit.¹⁹² Mexico has become highly sensitive to the US agricultural policies. In the last 10 years, the expansion of corn-based ethanol in the US is estimated to have cost Mexico about \$1.3 billion in higher grain import bills. A 20% increase in corn prices in the US raised the cost of tortillas by 14%, undermining Mexico's food security.¹⁹³

The 'Tortilla crisis' and Mexico's political risk

Corn accounts for 60% of the final price of tortillas, Mexico's main food staple. From 1993 to 2006 the price of tortillas increased by 733% in the Mexican countryside, affecting the rural economy and the accessibility of peasants to staple foods.¹⁹⁴ In 2007-2008, Mexico's exposure to global food price volatility led to the 'tortilla crisis' as the cost of corn and local concern over shortages caused the domestic price to increase by up to 67%.¹⁹⁵ Tortilla prices tripled in some areas, causing riots in major cities.¹⁹⁶

While higher prices provided direct benefits to local corn producers, net buyers of corn, typically the poorest rural and urban households were badly affected.¹⁹⁷ In 2011, tortilla price inflation ran at more than 3 times the minimum wage, leading to government-imposed price controls that were only partially effective.¹⁹⁸

Climate change expected to reduce corn output in North America

In the past 4 years the USA has been hit by a series of droughts considered to be the worst in up to 130 years in some areas.¹⁹⁹ The US drought has affected 80% of US agricultural land and lowered average corn yields to 1995 levels.²⁰⁰ The impact of these droughts has pushed corn prices to record highs.²⁰¹

US crop yields are predicted to decrease by between 30–46% and 63–82% over the next century under different climate change scenarios.²⁰² US corn production losses due to heavy precipitation and excess soil moisture may double during the next 30 years, causing additional damages totalling an estimated \$3 billion per year. Total losses paid to farmers through the Federal Crop Insurance Corporation were \$21 billion in the period 1981-2000, a figure likely to increase with climate change.²⁰³

While in Mexico imported corn is mostly destined for feed and processed foods, rising prices prompted domestic industries to substitute with locally grown corn used to make food.²⁰⁴ In Mexico, corn occupies 50% of the total cultivated area and is also highly susceptible to climate variability.²⁰⁵ Droughts are responsible for 90% of Mexican agricultural losses.²⁰⁶ Furthermore over 80% of total economic losses from weather-related disasters during the past 2 decades occurred in the agricultural sector.²⁰⁷

Strategic trade and investment agenda

As climate change intensifies, Mexico must:

Encourage investments in resilience

Small and medium scale farmers constitute 80–90% of agricultural producers, yet the majority of their household income comes from other activities.²⁰⁸ Land tenure insecurity and limited access to formal credit, irrigation and extension services are obstacles to resilience.²⁰⁹ The new 6-year Agricultural Development Plan announced in 2013 should rally the private sector to consider the opportunities. In 10–15 years Mexico could increase annual production of corn from 23 to 33 million tonnes (MT). Irrigation and infrastructure projects in the southern part of the country could add another 24 MT per year, more than enough to meet Mexico's growing demand for corn, estimated to reach 39 MT per year by 2025.²¹⁰

Expand strategic trade relationships

The PA brings together 37% of Latin America's total GDP and receives 45% of all foreign investments into the region.²¹¹ The alliance will help Mexico to reduce its dependence on the USA as a single export market for its manufactures,²¹² and build competitive advantages to penetrate Asian markets.²¹³ Food security and the agriculture sector provide a way of considering how the PA can engage constructively with Brazil and Mercosur. Mexican corn imports have become more diversified since 2010 in response to the growing risk of US drought. In 2013, a growing share of Mexico's imported corn has come from Brazil, Argentina and South Africa, highlighting the growing importance of South American corn producers to Mexico's food security.

Mexican corn imports by value (2000 – 2012)

Source The Observatory of Economic Complexity, MIT

Year	2000	%	2005	%	2010	%	2011	%	2012	%
Sources	USA	99.89	USA	99.62	USA	99.44	USA	87.83	USA	87.71
	Venezuela	0.04	Brazil	0.15	Brazil	0.25	South Africa	11.46	South Africa	10.69
	Brazil	0.02	Chile	0.12	Colombia	0.09	Canada	0.54	Brazil	1.53
	Guatemala	0.02	Guatemala	0.06	Argentina	0.08	Brazil	0.09	Colombia	0.05
	Chile	0.01	Argentina	0.04	Chile	0.06	Chile	0.02	Chile	0.01
Total value	\$0.55 billion		\$0.71 billion		\$1.58 billion		\$3.00 billion		\$2.95 billion	

Methodology

The structural changes to the 2015 Index include the replacement of the Crops theme with a newly developed Governance theme. The 8 themes are divided into a total of 24 dimensions. These dimensions, which are mapped on the visual, are underpinned by a total of 44 data points.

The data

The selection and processing of the data for the ESI 2015 has followed five criteria:

Coverage

Data that allows for the assessment of country-level trends, in global datasets that allow for a comparison between countries.

Relevance

Data that is relevant to assess resource-related risks in an unambiguous way.

Accessibility

Data that is publicly available, either through peer-reviewed scientific data or data compiled by international organisations.

Quality

Data whose quality can be controlled and represent the best measure of the issue currently available globally.

Recency

The most up-to-date datasets available for all data points up to October 2014

Index construction

The transformation of raw data into the index scores involves several steps. The following section discusses how the data in the ESI 2015 has been transformed and normalised:

Transformation

Where needed, data points were transformed using the natural logarithm to make the values for different countries comparable. The natural logarithm is a commonly used statistical tool that presents differences between values in a way that highly different data can be compared on a common scale.

Normalisation

To allow for aggregating and comparing different data on a common scale, the data points were normalised on a 0–100 scale (100 meaning the riskiest). This scale was developed taking into account the lowest and highest values of all countries for a data point, allowing for a comparison not only between the countries profiled in the 2015 report, but of all countries in the database, thereby reflecting the relative values.

For some data points, extremely high or low values distort the scale, making it difficult to compare the values in a meaningful way. Thus, using a common statistical procedure, minima and maxima were created that excluded these extreme values. In most cases where new minima and maxima were set, values higher than 95% of all countries were not taken into account for the calculation process. For data points with more extreme values different thresholds were used. For example, the 5th and 80th percentiles of all countries were used as minima and maxima, meaning that the lowest 5% and highest 20% of the range of values were excluded. In other cases a particular rationale derived from expert interviews was used to determine the minima and maxima for particular data points.

The 2015 Earth Security Index Report, developed by the Earth Security Group, introduces and applies a country framework that captures the magnitude and scope of a series of country pressures along environmental, social and governance domains using publicly available information. The risk visual portrays dimensions where higher values represent worse performance.

The dashboard allows the Earth Security Group to conduct a multi-dimensional risk assessment of countries, markets and global inter-dependencies, and provide leading decision-makers in business, government and civil society with strategic intelligence on global sustainability risks and opportunities.

The ESI 2015's indicator framework has been substantially revised and improved from last year, with inputs from our Global Expert Group and other thematic experts (see acknowledgements). In this year's report, the index is applied to a series of cases that cover a total of 23 countries from the ESI database. The ESI 2015 framework assesses and visualises 8 themes that are deemed critical for a country's sustainability and development agenda: Governance, water, food, climate, land, population, fiscal and energy.

The data points in the raw datasets have different directions; in some cases a higher value is better while in others a higher value is worse. The formula has been therefore applied in two different ways in order to provide for a common scale, where 0 is the least and 100 the most risky.

Weighting and Aggregation

After transforming the data and normalising the data points into a common scale, data points were aggregated and weighted into dimensions (the visual wedges on the graph). The following section describes this aggregation and weighting process.

The aggregation of data points has taken place on the level of dimensions. The dimension score is calculated from the weighted average of all its underlying data points. The dimensions generally use an equal weighting, except for the fiscal instability and domestic energy supply dimensions, where weightings have been allocated based on expert interviews. For example, to reflect the importance of the risk of sovereign debt default, the data point probability of sovereign debt default has been given a greater weight than the other data points within the fiscal instability dimension.

Finally, in case of missing values for underlying data points, the following rule is applied: weightings of missing scores are redistributed equally across other data points, so that the overall weighting within the dimension does not change. If no data is available for a dimension, no score is calculated.

The visual

Using the values from the weighting and aggregation processes, the country risk visuals were created. The following section describes the methodology behind the country risk visuals.

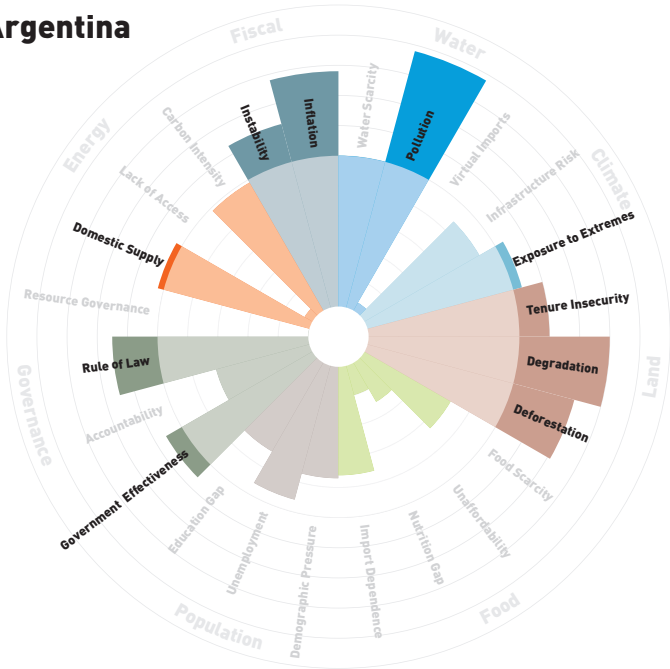
Scale

The visuals provide a risk profile that highlights the most critical resource pressures for each of the countries covered by the index. In each case, the visual represents dimension scores on a 0–100 scale, following the methodology described above.

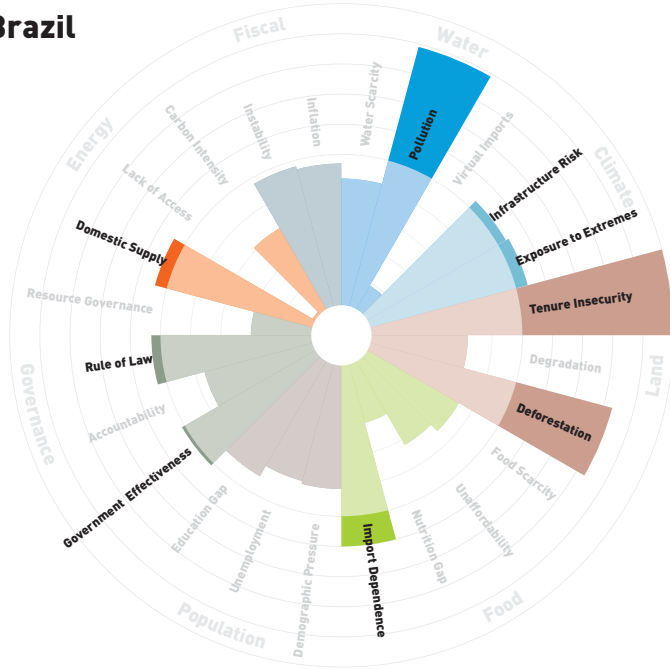
Visualisation

The wedges should be read in the same way as the scores: the bigger a wedge is, the riskier is the performance of that dimension. To aid the use of the visuals, a visual benchmark has been added that draws a highlight to those wedges that have a higher score than 50. This is a purely visual aid and does not imply a value judgement or statistical calculation, which does not mean that dimensions scoring 50 or less are not relevant to the risk profile of the country. However, this device allows the observer to focus on the smaller number of dimensions that surpass the 50 mark.

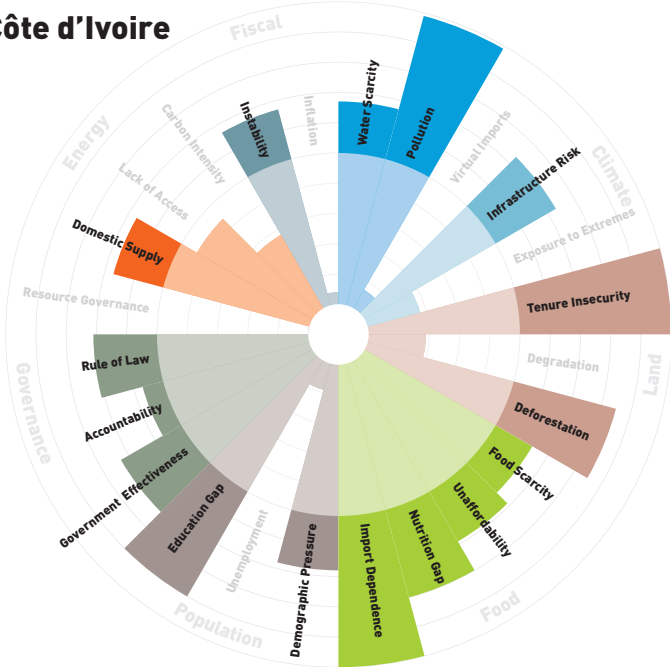
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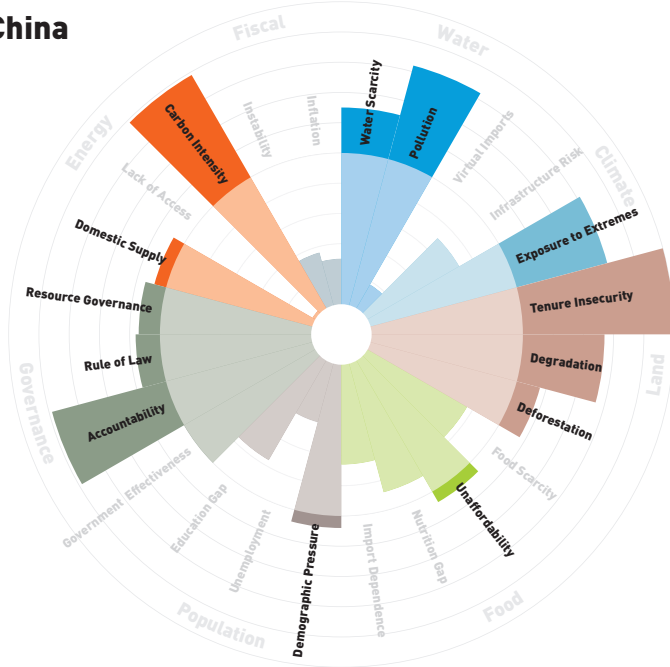
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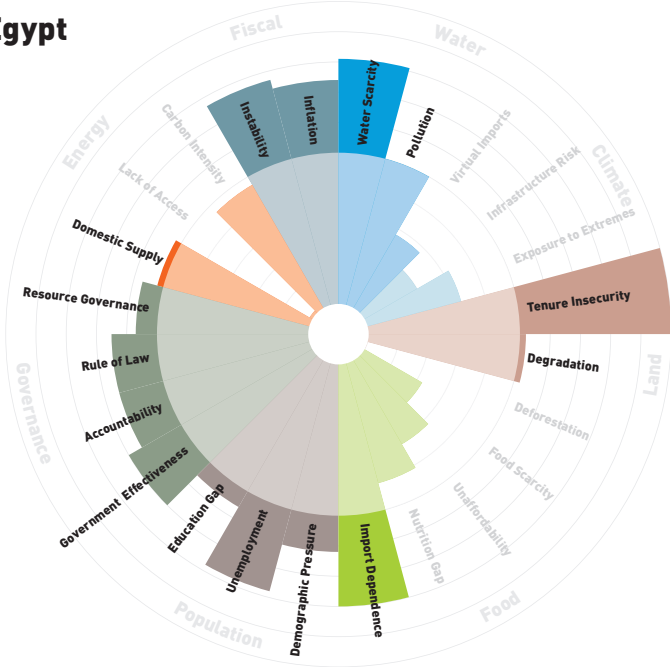
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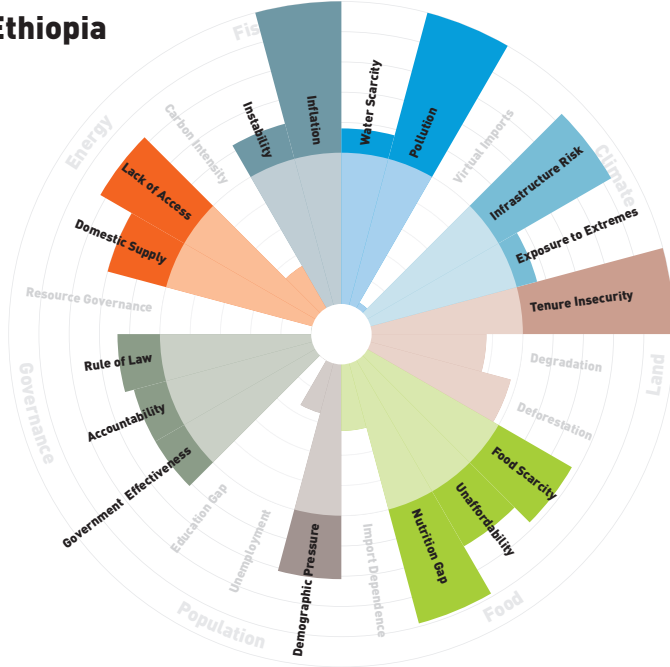
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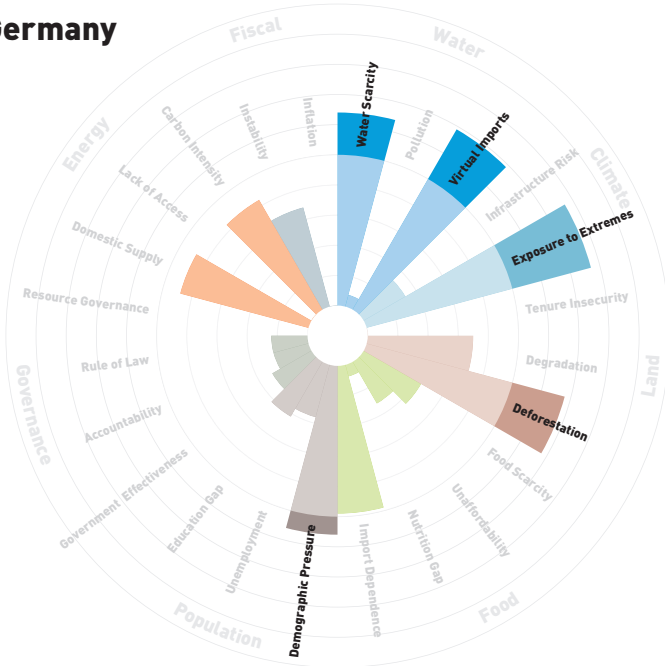
Egypt



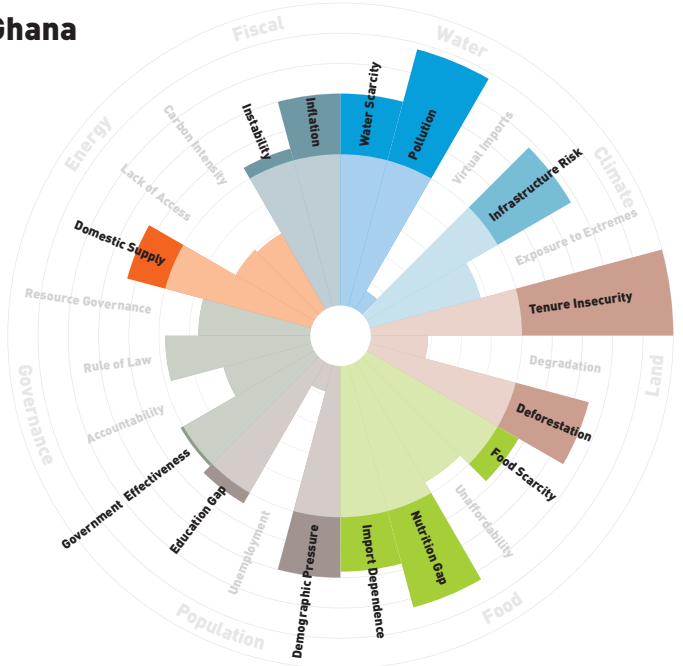
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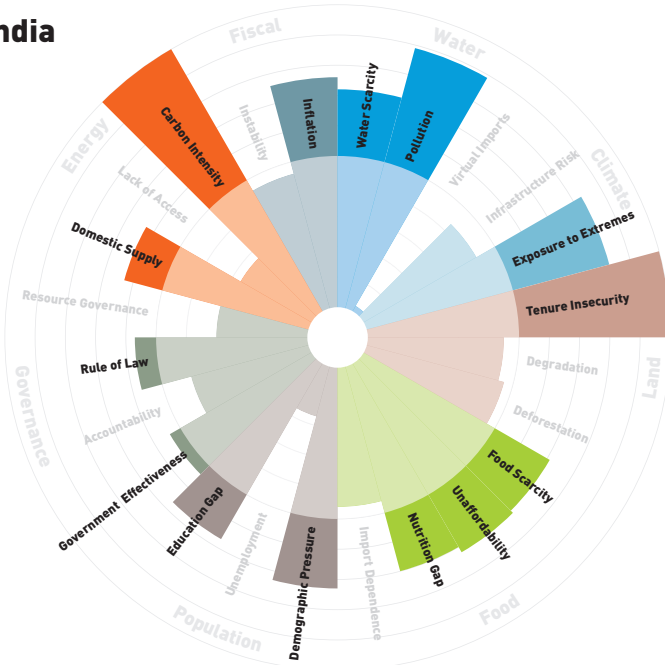
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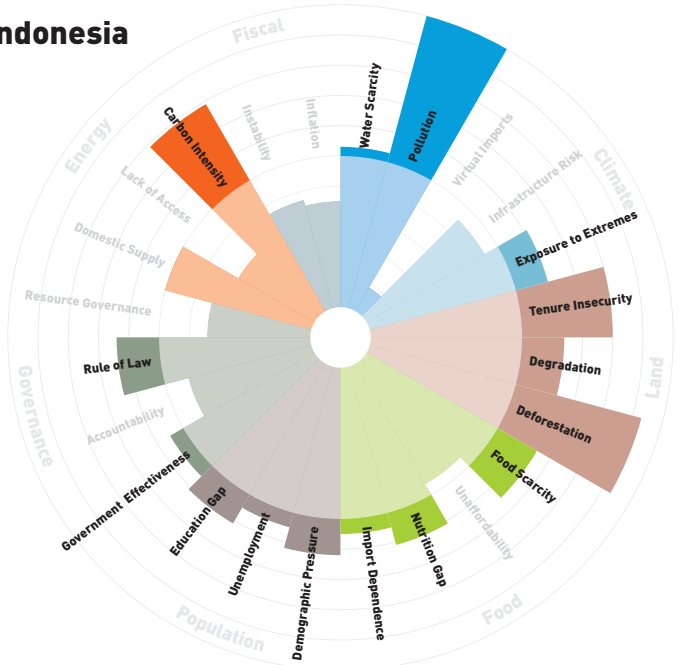
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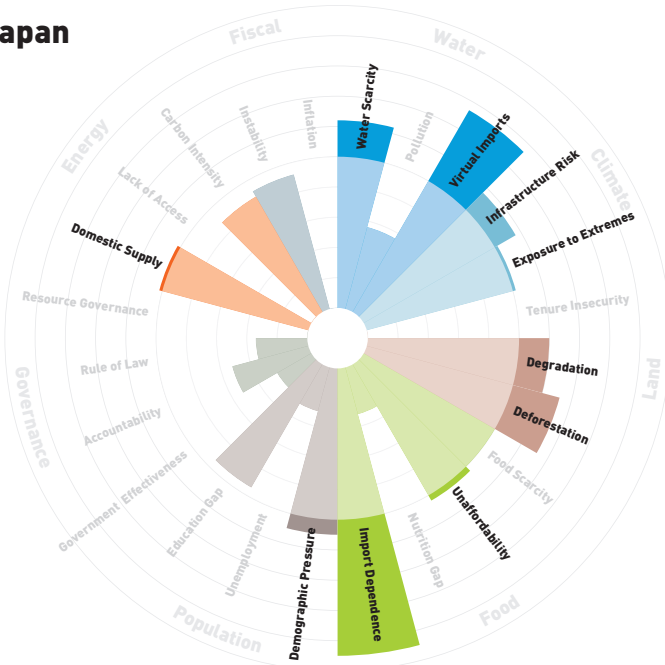
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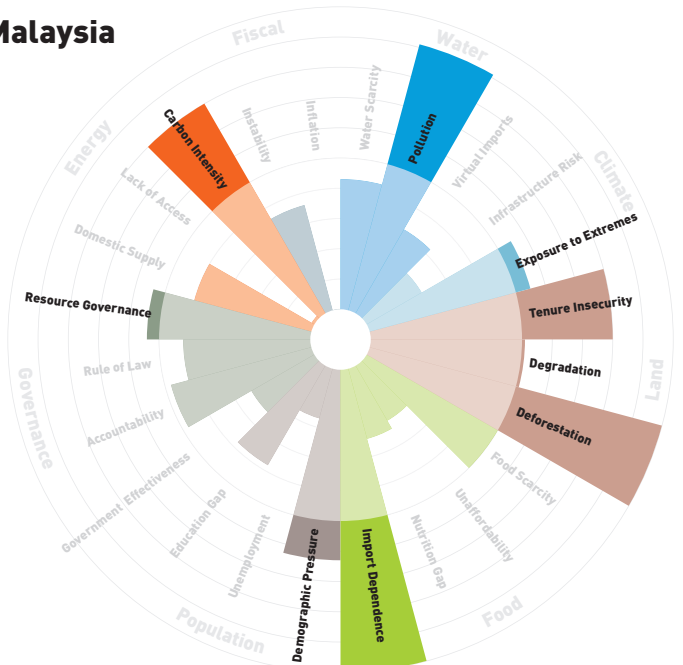
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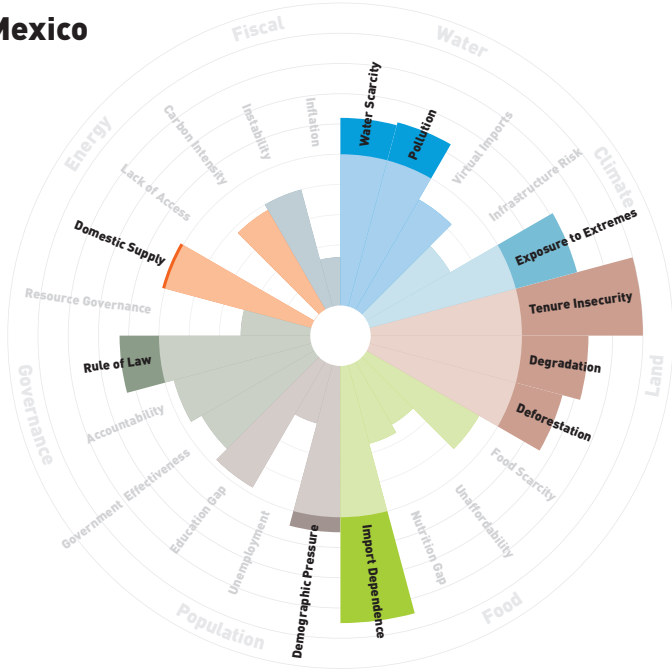
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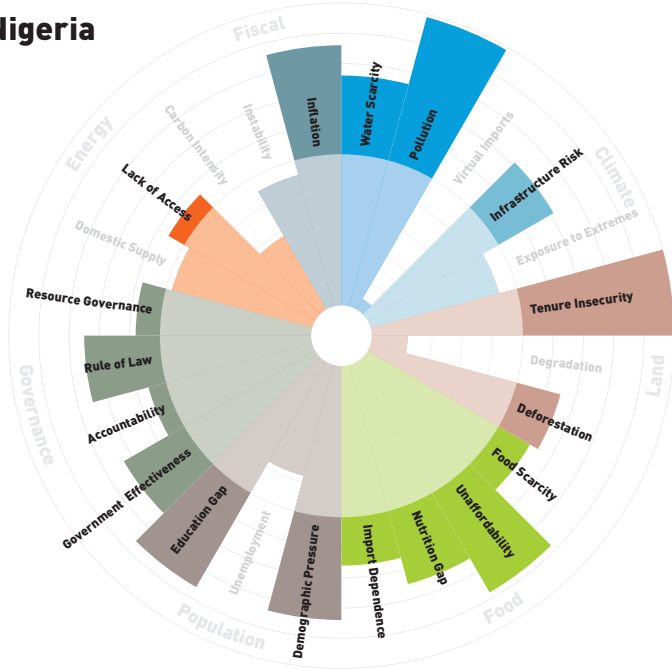
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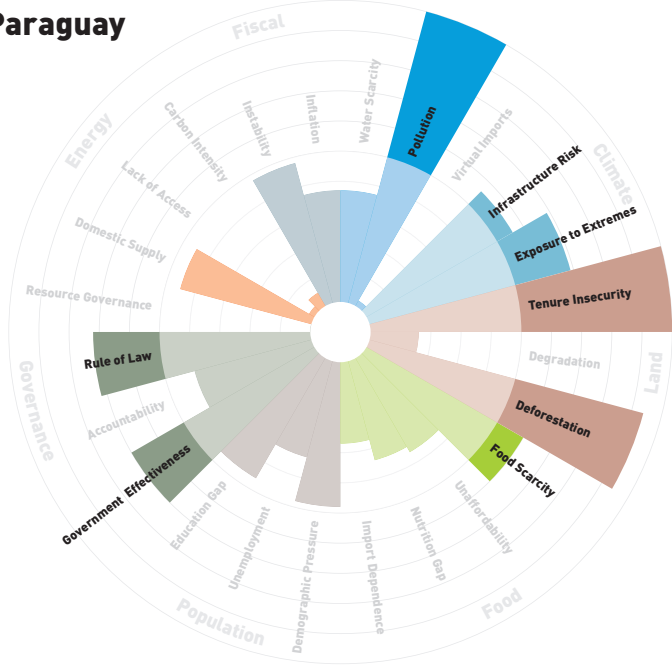
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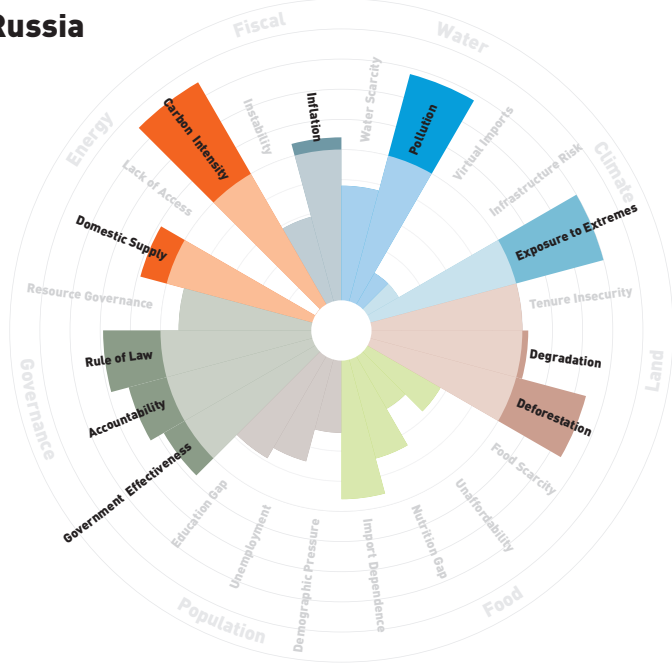
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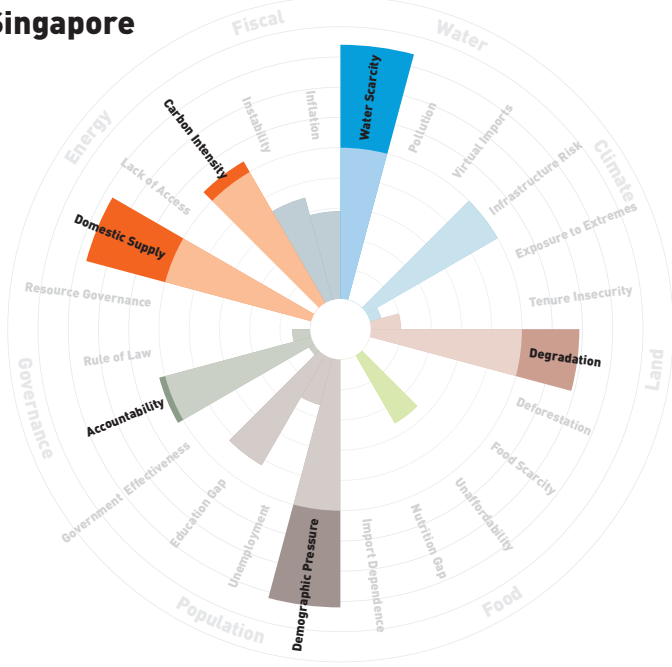
Paraguay



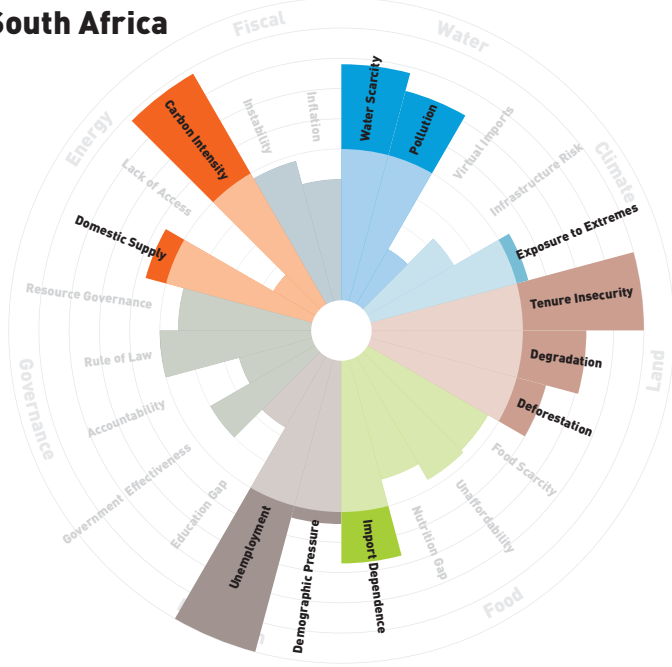
Russia



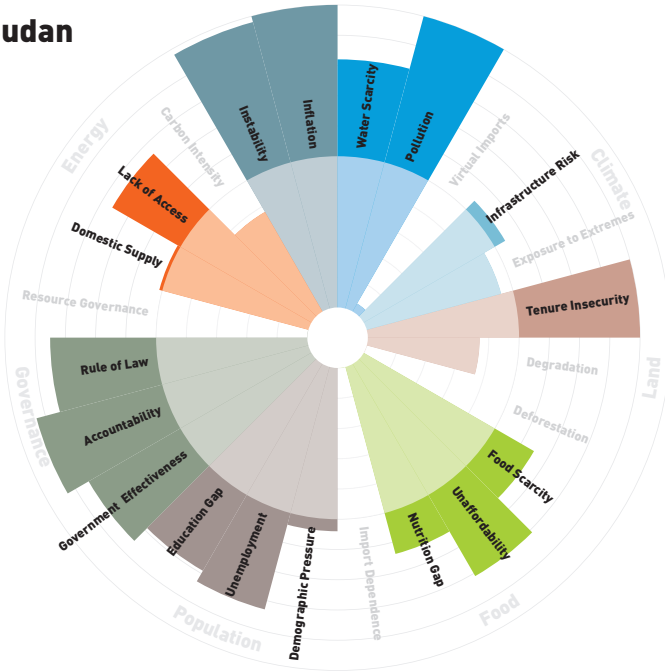
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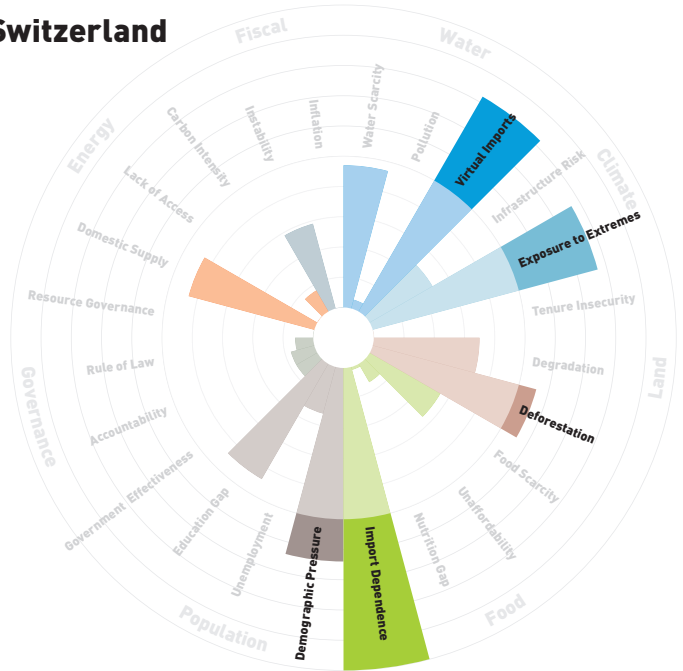
South Africa



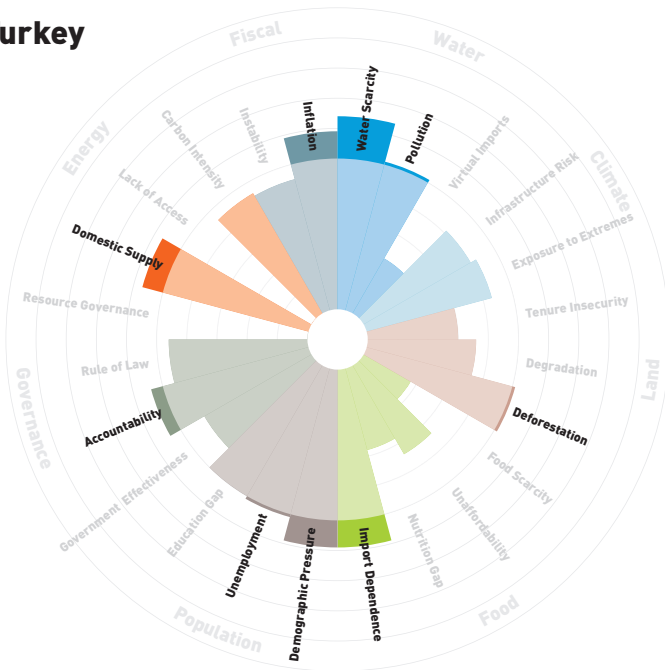
Sudan



Switzerland



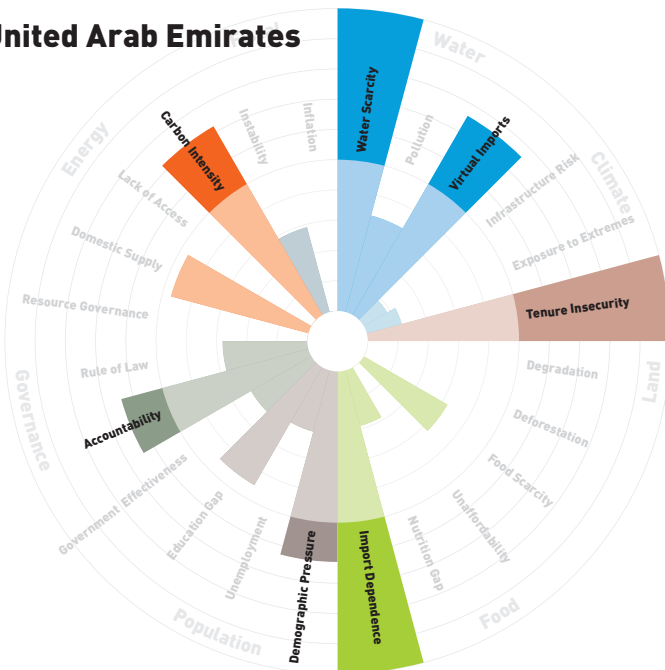
Turkey



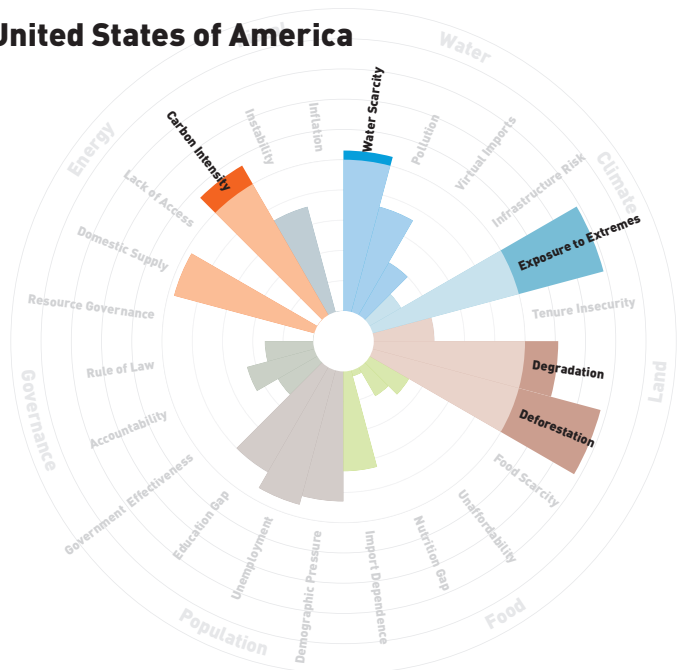
Ukraine



United Arab Emirates



United States of America



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Blueprint 1

China / South America

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Blueprint 2

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Blueprint 6

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