

Risk Management

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Bonfire of the best-laid plans

Companies and investors have to factor in everything from population growth to natural disasters, writes Sarah Murray

For companies and investors trying to ensure access to basic resources, the world is looking increasingly challenging.

Sectarian violence is creating havoc in the Middle East – although oil production has not been disrupted as yet (see story below) – and the conflict in Ukraine has brought military confrontation to the borders of the EU, along with the threat of disruption to gas supplies from Russia.

Meanwhile, extreme weather events, such as freak storms, floods and droughts, appear to be becoming more common. Climate change, experts say, is posing a significant risk to food security. Meanwhile, natural disasters such as earthquakes, volcanic eruptions and tsunamis continue to take their toll.

Planning is key. Companies have to worry about dislocation of their extended supply chains (see page 4), or how to avoid litigation arising from negligent business practices, for example in the extractive industries (see page 2).

In 2013, extreme weather events were behind \$37bn of the world's \$45bn disaster-related insured losses, according to Swiss Re, the reinsurer group.

Yet while evidence mounts of the havoc these disasters wreak, the private sector remains under prepared.

Companies that are slow to adapt could face increased costs. In addition to



Disaster strikes: wildfires destroyed homes and property amid record hot temperatures in California this year

Jorge Cruz/AFP/Getty Images

known risks from factors such as population growth, extreme weather events and other natural disasters can also lead to shortages of essential resources such as energy, water (see page 4) and raw materials.

These less predictable risks are often

ignored but pose particular challenges to business continuity.

When compiling its Natural Hazards Risk Atlas, Maplecroft, the risk consultancy, assesses the risk to business of everything from seismic activity and tsunamis, to cyclones, flooding,

wildfires and drought. A single event can have a profound effect on access to resources. In Japan, for example, energy bills were pushed up by increased reliance on imports after the country turned off its nuclear reactors after the

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Petroleum

Under-investment and political instability put price trends in doubt, says Judith Evans

At a time when oil prices have just hit a four-year low, it might seem odd to be planning for scarcity. But many investors are doing just that.

Tom Nelson, co-portfolio manager of Investec's Global Energy fund, says Investec thinks oil supply will struggle to meet demand over the next five years. "There are considerable unknowns when it comes to oil and gas supplies in the medium to long term."

Russ Koesterich, chief investment strategist at the asset manager BlackRock, says the world is not "running out of oil", but adds: "There's a good chance that oil supply may be tighter in future than expected."

Threats to global oil supply security include production decline rates, lack of exploration success, geopolitical hazards and lower capital expenditure delaying big projects, Mr Nelson says.

Iraq and the US have been seen as key sources of oil production, but question marks hang over both, leading to expectations of a strong rebound in prices. In its medium-term oil market outlook, published in June, the International Energy Agency, the west's energy watchdog, forecast a "robust" increase in global supply capacity of 9m barrels a day to 105m b/d by 2019.

But Iraq was expected to account for 60 per cent of production growth within Opec, the producers' cartel, a figure that the country's conflict calls into question, although it has so far left most production intact. "This expansion looks increasingly at risk," the IEA added.

Mr Nelson believes the IEA's estimate is overly optimistic, and points out that the IEA has consistently overestimated non-Opec production growth. He has increased holdings of US and Canadian exploration and production companies in his portfolio, in anticipation of tightening supply.

Other political risks in oil-producing countries include sanctions on Russia, elections in 2015 in Nigeria and simmering unrest in Venezuela.

Not all analysts in this sector share Mr Nelson's expectation that supply will face strains within five years. Jon Clark,



Political risk: on guard at Zubair oilfield in Basra, Iraq — Essam Al-Sudani/Reuters

partner in oil and gas transaction advisory services at EY, says: "I've not seen analysis that suggests a medium-term shortfall in supply, absent a disruption event. There are also potential demand disruptions, largely related to economic outlook."

The managers of the high performing Guinness Global Energy Fund believe the recent price lows have resulted from Saudi Arabia, Kuwait and the United Arab Emirates temporarily increasing production by 2.9m b/d. They think the Middle Eastern producers will cut back to ensure price stability.

There are also question marks over whether the US shale revolution, which has helped increase energy supplies and drive down prices, will prove a lasting transformation.

"In the medium term, there is enough crude but at what price can you extract that crude?"

Will Riley, Guinness Global Energy co-manager, notes that current low prices are likely to have a rapid effect on capital expenditure in the shale oil sector, since companies tend to operate "hand to mouth".

The Guinness managers see strong potential in the US's existing oil sites, but adds "the US has struggled to find another large shale resource, despite three years of trying".

The Guinness managers hold a full 58 per cent of their portfolio in exploration and production, with a strong focus on the US. They are also biased towards oil against other energy

sources, as they expect prices will rise to between \$130 and \$150 in nominal terms by 2030.

A further concern for investors is a potential lack of investment in new sources, as oil majors cut back on capital expenditure. Mr Nelson believes there is already a problem of under-investment, citing a JPMorgan survey that predicts a fall in upstream spending in 2015 – only the second in a decade.

"We believe this under-investment will compound the structural problems already faced by the industry," he adds.

Mr Riley said capital expenditure is being reduced sharply by a switch among "super major" energy producers to "value-over-volume" strategies, a trend led by Total of France.

"They are abandoning long-term production growth targets in favour of a refocus on return on investment for individual projects and overall return on capital," says Mr Riley.

Ogan Kose, senior managing director at the management consultancy Accenture, says buyers of crude oil are meanwhile seeking to lock in the current low prices as much as possible through long-term contracts.

The managers of the Artemis Global Energy Fund predict "sustained oil shortages" as a result of the spending cuts and, like their rivals, have increased holdings in exploration and production stocks.

Mr Kose, who specialises in commodity trading and risk management, adds: "In the medium term there is enough crude, but at what price can you extract that crude? The majority is going to start coming from offshore platforms and other expensive locations. There will be enough crude, but not enough at cheap prices."

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Risk Management

Climate change moves up investment agenda

Pension funds

Despite pressures to boost short-term performance, funds are recognising need to move into low-carbon holdings, says *David Ricketts*

Christine Lagarde, managing director of the International Monetary Fund, delivered a sobering wake-up call in February when she warned that the world was "perilously close" to reaching a climate change tipping point.

As well as the direct impact of severe weather fluctuations in the form of storms, floods and droughts, the longer term effect on natural resources poses a severe economic threat. This is an issue that pension funds are being urged to address in their investment portfolios as a matter of urgency.

Given the size of assets under pension funds' control, there is a growing recognition that failure to adapt asset allocation to account for climate change risk could lead to significant losses.

"There is a huge risk of running out of vital resources, but there is also a big

opportunity to make money from trying to fix the problem," says Aled Jones, head of responsible investment for Europe, the Middle East and Africa at Mercer, the consultancy. "It is important to persuade pension fund trustees to look at both sides."

Credible scientific research on impending climate change risks has existed for some time, but not everyone is convinced that pension funds are taking the threat seriously enough.

Louise Rouse, director of engagement at ShareAction, a charity that promotes responsible investment, says: "Climate change, which is going to lead to a lot of resource constraints, has not featured as prominently in pension fund investment thinking as one would expect."

She adds that significant climate change comes with extreme weather events, which will impact on food and water supplies. There will be a huge number of companies and stocks facing volatility, she says, and that will have an effect on pension fund returns.

However, Ms Rouse acknowledges that responsibility to adapt does not lie solely with pension fund trustees, and points to many "structural reasons" why schemes continue to invest heavily in industries that are contributing to

climate change. "Pension funds are under pressure," she says.

"Defined benefit schemes have deficits and are valued every three years, which makes them become short-term, stock-chasing funds. The big income-paying investments are fossil-fuel companies."

Despite a battle with dwindling funding levels and increasing liabilities, some pension funds have implemented changes to their investment approach to tackle climate change risk.

In Australia, the Local Government Super, one of the country's largest public sector pension funds, announced in October that it was "moving away from high-carbon investments" and would divest its assets in coal.

Peter Lambert, chief executive of the A\$8bn (\$7.1bn) scheme, called climate change "an unarguable scientific reality and one which poses a very real investment risk".

The BT Pension Scheme, one of the UK's largest private-sector pension funds, has been exploring ways to allocate capital to investments that could outperform as a result of policy moves to a low-carbon economy.

For example, in 2011 the scheme invested £100m in a carbon-tilted

version of the FTSE All-Share index, where carbon-intensive companies are under-represented.

Likewise, the UK's Environment Agency Pension Fund has increased its allocation to sustainable property, infrastructure and forestry - areas that are seen as a hedge against both inflation and climate change.

However, not all schemes think they can afford to take risk such as climate change into account.

Mercer's Mr Jones says pension funds often face other priorities considered to be more important to their asset allocation decisions before they can consider climate change risk.

"Most investors have short-term priorities, even pension funds that are distracted by short-term issues such as funding levels," says Mr Jones.

Amin Rajan, chief executive of Create Research, a fund consultancy, agrees that implementing investment strategies to tackle resource risk is hard to achieve for a majority of pension funds as its impact is "hard to measure".

But he points out that it is implicit in the types of asset classes that are now being used - for example, infrastructure, venture capital, private equity, commodities and weather derivatives.

Defined benefit schemes have deficits, which makes them short-term, stock-chasing funds'

Appetite for untapped riches grows despite many hazards

Africa Population growth, global warming and political violence are concerns, says *David White*

It is Africa's great paradox: the continent is home to a wealth of natural resources and most of the world's poorest countries.

According to the African Development Bank, the continent holds about 30 per cent of the world's known minerals and half its uncultivated arable land. It is a significant producer of oil and, increasingly, gas, a position bolstered by recent discoveries.

In one way or another, however, its resources have all caused trouble. Access to oil and mineral revenues, land and water have given rise to friction and conflict. Hopes pinned on extractive industries as a basis for broader development have been largely disappointed. The continent has ample energy potential, but most energy investment goes to export projects, and only a minority of countries manage to supply electricity to more than half their populations.

With low farm productivity, most African countries have become net food importers. Forest and marine resources are depleted by illegal and under-regulated logging and fishing. Water is abundant in large areas, but others are plagued by recurrent water and food shortages. Drinking water supplies in sub-Saharan Africa have improved rapidly since 2000, but still reached only 64 per cent of people in 2012, according to UN agencies, well below the average for developing regions.

Pressures are expected to increase on two fronts - the population is set to double to more than 2bn by 2050, and climate change threatens to extend arid and semi-arid areas, curb food production and limit the scope for hydro power. Despite Africa's growing profile as an

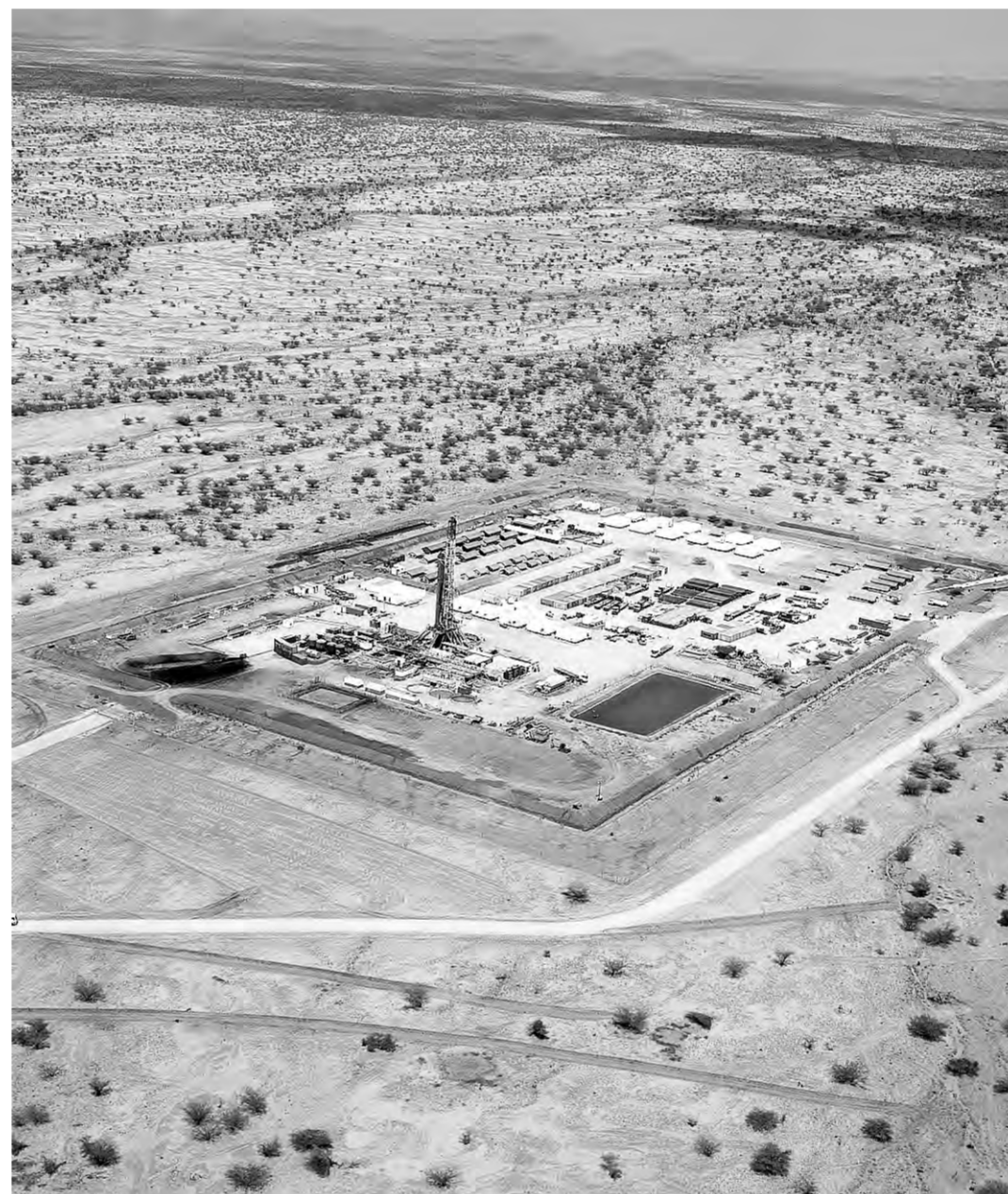
investment destination, foreign companies operating in any of these sectors continue to find it a high-risk environment. Oil and mining companies, especially, have been hit by a wave of changes and uncertainties affecting tax and other key conditions in numerous countries - including Nigeria and South Africa, the biggest economies - as governments seek more revenues and economic benefits from, and control over, these activities.

Many risks such as political violence, expropriation, regulatory changes and currency upsets are covered by investment guarantee and insurance schemes provided by the World Bank and other multilateral, public and private institutions. But others, such as infrastructure failings, corruption and bureaucratic hold-ups are not.

Africa can always spring surprises. Amara Mining, a gold prospector traded on London's Alternative Investment Market has not only faced lower world gold prices, but two of the trio of west African countries it was focusing on have been hit by the Ebola epidemic.

"You have to look at what could possibly go wrong, and try to ameliorate that," says John McGloin, Amara's executive chairman. He underlines the importance of working with local communities, which often means investing in facilities such as healthcare and education. "It's a delicate area. If you don't do it correctly, you lose the whole project," he says, adding: "The more you work with the local community, the less you spend on security."

Appetite for investment in Africa and its untapped resources has grown despite the hazards. Christoph Wille, an



Remote: Tullow Oil has moved into northern Kenya where there is little infrastructure

Eduard Gismatullin/Bloomberg

Africa analyst at the consultancy Control Risks, suggests one factor may be a perception that armed conflicts have become less widespread. But he cautions: "The risks in Africa are diverse and remain extremely challenging in some contexts."

This environment tends to favour smaller companies willing to start projects in exchange for the prospect of high returns. Companies have been moving into remote areas - Tullow Oil in northern Kenya, for instance - where there may be little infrastructure and a scarcity of resources such as access to water and land suitable for agriculture.

"In these cases, community relations are going to be much more difficult to manage," Mr Wille says.

Chris Bredenhann, a partner at PwC's advisory division in Cape Town specialising in oil and gas, sees a change in companies' attitudes to local participation.

"Co-operative approaches seem to be gaining more traction," he says.

In Nigeria, Royal Dutch Shell and other oil majors have been selling onshore and shallow-water interests, reducing their exposure to sabotage and illegal siphoning of oil in the Niger Delta.

The International Energy Agency predicts that unrest, oil theft and uncertainty for operators over delayed legislation will cause Nigeria to lose its place as sub-Saharan Africa's biggest oil producer to Angola in the next few years.

So, are companies getting better at managing risk in Africa? Maria van der Hoeven, IEA executive director, gives a nuanced reply. "I think there is a realisation they have to be better at handling risks, and they do what they can," she says. But, she argues, it is up to African governments to "de-risk the situation" by providing better regulatory frameworks, financial stability and security.

Food Suppliers are adapting to meet consumer expectations

Agriculture is an inherently risky business. This is why governments subsidise crop insurance and futures exchanges have existed for more than a century, writes *Gregory Meyer*.

But risks to food supplies are changing. A growing world population, rising incomes, shifting consumption habits, biofuel mandates and global warming all present fresh challenges.

How farmers, traders, processors, food companies and policy makers meet them will be crucial to determining how well the world meets a 60 per cent increase in food demand by 2050.

There is no global shortage of calories. In fact, the world wastes a third of all food produced, or 1.3bn tonnes a year, according to the UN Food and Agriculture Organisation.

Nevertheless, 805m people around the world are chronically undernourished, the FAO reports. This is 200m less than two decades ago, but still a number that exceeds the populations of every country but China and India.

As populations and personal incomes increase, the average household will be better able to afford sufficient food, reducing hunger. But rising incomes also intensify risks to the food supply, as wealthier people tend to eat more meat, fish, dairy and eggs, requiring more feed grain per pound of food.

In an October speech, David MacLennan, chief executive of Cargill, the large, US privately held, multinational agribusiness, put it this way: "In short, the whole food system becomes more meat-destined than grain-destined."

"Dietary expansion" starts to happen when incomes rise above \$2,000 a year, he says.

Consumers also expect more from their food in terms of safety, healthiness and information on where and how it was raised.

For example, Shuanghui International of China was in part attracted by the safety protocols at Smithfield Foods when it bought the US-based pork producer for \$7bn last year.

Rabobank, one of the largest lenders to agribusiness, says the trend towards "conscious consumerism" will continue.

Justin Sherrard, Rabobank's head of food and agri research, says: "If you're going to measure up to those things, you've got to change the way you manage your supply

Biofuels are competing for corn supplies



chain. You've got to start introducing traceability systems, so you can demonstrate you're meeting consumer concerns."

A more immediate risk is transport. Although good weather has resulted in bumper crops this year across most of the northern hemisphere, railways and the storage silos alongside them are under strain. In some cases, this makes it uneconomical to bring surplus grain to food importers.

Bill Lapp of Advanced Economic Solutions, a US agribusiness consultancy, says: "The inherent advantage the US has had for a long time has been in transportation, both rail and water."

A further complication is that the biofuels industry has emerged as a competing source of demand for grain. In the US, the world's largest biofuel producer, 130m tonnes of corn is turned into ethanol each year, according to a Department of Agriculture estimate.

Biofuel policies have helped lift grain prices. They have "recapitalised" agriculture, Mr MacLennan says, making it better able to withstand shocks.

However, government targets, or mandates, risk exacerbating shortfalls unless they can be lifted in times of market stress, he adds.

Cutting down the size of the biofuels industry would carry its own risks. It accounts for about 1.5 per cent of world liquid fuels supply. Taking biofuels away could tighten oil markets and drive up the price of fuel, a key input cost for farmers and grain shippers.

Past shortfalls in agricultural commodities have led to export bans and panic buying by governments and consumers, driving up prices.

Members of the Group of 20 nations and some others have sought to avert this risk with the creation three years ago of the Agricultural Market Information System, which sheds light on opaque grain balances and encourages members not to disrupt trade in cereals.

There are signs these efforts are working. For example, says Abdolreza Abbassian, senior grains economist at the FAO, after disastrous global wheat harvests in 2012, Ukraine was persuaded not to stop grain exports.

An understanding of grey areas is crucial for success in business

Ethical investing

Companies may aim to act responsibly, but right versus wrong is often anything but clear-cut, writes *Sophia Grene*

Investors' long-term success may increasingly depend not just on the narrow financial performance of the companies whose shares they buy, but on how well they manage the ethical questions that will ultimately shape the outcomes for those companies.

While many asset owners look on responsible investing as an ethical obligation, the growing consensus is that it is also good business.

This view casts responsibility as a question of risk management. If you invest only in businesses with good

human rights practices, engagement with local communities, clear accountability through the supply chain and clarity about exposure to resource scarcity, you are less likely to be caught out by an unforeseen problem such as protests over water rights or litigation following an oil spill, such as BP's Deepwater Horizon debacle in the Gulf of Mexico.

Whether they have developed a clear policy or not, companies are being asked to consider their ethical positions more than ever before.

"Reducing our carbon footprint is not just a technical scientific necessity; it has also emerged as the human rights challenge of our time," said Archbishop Desmond Tutu on the eve of the UN Climate Summit in September.

Just as investors in the 1980s boycotted companies dealing with the apartheid regime in South Africa, today they should be considering their role in

averting disastrous climate change, said the archbishop.

Some institutional investors, led by US universities, but including Australian and Swedish pension funds and philanthropic institutions such as the

If a bank's carbon footprint is bigger than an oil company's, which should an ethical fund invest in?

Rockefeller Foundation, have declared they will divest their funds of all investment in fossil fuels.

This makes for good headlines, but the story is slightly more complicated.

Georgina Williams, group executive for marketing and current affairs at Australia's largest pension fund,

AustralianSuper, says one problem is the lack of a clear divide between what is a carbon investment and what is not.

If a bank, for example, has a bigger carbon footprint than an oil exploration company, which should an ethical fund invest in? Or if it is defined by industry rather than direct emissions, how much of its revenue can a company derive from the taboo industries before going on the banned list?

As with carbon emissions, so with most other ethical issues. What is apparently a clear-cut question of right or wrong can become fuzzy and complicated once dealing in the real world, or rather in the interface between the real world and the financial markets.

Since a significant number of asset owners and managers have now signed up to the UN-backed Principles for Responsible Investment, which attempt to set a minimum standard of ethics for

investors, it can be assumed that many institutional investors feel they have an obligation to act responsibly.

However, things turn out to be less than straightforward.

Agriculture investment in Africa is an example of how an apparently ethical investment strategy can end up harming vulnerable people and societies. This raises the question of how to balance the harm against the good done - a problem that many investors are likely to have thought responsible investing would remove.

Most agricultural investments made for financial return unsurprisingly focus on goods for export - tobacco, coffee, cocoa and biofuels - rather than food to be consumed locally.

Agriculture cuts across a broad range of resource issues and ethical questions. Because of the rapidly growing human population (forecast to reach 9.6bn by

2050), producing more food is a priority. But there are strongly competing demands for the resources needed to produce food.

In many areas, water is becoming scarcer than ever, as increasingly urban populations consume the water that farmers rely on for irrigation. Land to grow food is used for biofuels, or taken from indigenous peoples without official title, or ravaged from rainforest areas.

Water scarcity is likely to be a leading factor in both business and geopolitical arenas in decades to come. Without even addressing the question of whether it is ethical to invest in private water companies in developing countries, any company that uses water as part of its processes (including all agriculture and many industrial businesses) needs to be managing the inherent risk in being dependent on a vanishing resource.

Risk Management

'Paradox of poverty' haunts resource-rich Amazon

Brazil Raising beef production is vital to the economy but it means more demand for pastureland, says **Samantha Pearson**

In the weeks leading up to Brazil's elections in October, the country's presidential candidates battled over everything from inflation and foreign investment to day care centres and murder rates. However, one topic was noticeably missing from the debate: the Amazon rainforest.

Amazon, a research institute, says: "The region is superlative in terms of natural resources and its environmental importance - it represents about one-third of the world's tropical forests, and is home to the largest river basin on the planet and is rich in mineral resources and hydroelectric potential." It adds: "Even so, the debates passed over the [issue of] the Amazon."

It is no wonder that politicians have often steered clear of the topic.

While the region is Brazil's and Latin

America's biggest natural asset, it also faces many competing demands and, as such, represents one of the continent's biggest challenges.

Brazil's ruling Workers' party (PT), in power since 2003, has put large areas of rainforest under federal protection to try to prevent deforestation and reduce the country's greenhouse gas emissions.

In October, the government created the latest reserve, Alto Maues, a 6,680 square km area of mostly untouched forest.

Yet even the protected areas remain vulnerable, as it is very difficult to oversee such vast areas of the jungle and ensure that rules are respected. Last year, deforestation of the Amazon in Brazil went up for the first time since 2008, rising 29 per cent.

Moreover, the protection of the Amazon rainforest does not just depend on actions taken within the region itself. Productivity gains in cleared land further south are also vital to allow the country to meet its food production targets without sacrificing further parts of the rainforest in the process, explains Elisio Contini, a researcher at the Brazilian Agricultural Research Corporation (Embrapa).

Brazil's fight against deforestation



Deforestation: illegally logged timber floats down the river — Paulo Santos/Reuters

also has a significant social dimension. The Amazon basin not only contains some of the world's most vulnerable species but also Brazil's poorest families, presenting the government with a huge dilemma.

While Brazil, which is home to more than 60 per cent of the Amazon, is under intense international pressure to

protect the region, it is also under domestic pressure to bring development to its most remote states.

"This paradox of poverty in the middle of the biggest reserves of the world's natural riches has proven to be unsustainable," writes Judson Valentim, another researcher at Embrapa.

"As a result, this region has been at the

centre of the debate around sustainable development, drawing the attention of researchers, policy makers and civil society on a local, national and international level," he continues.

In the private sector, companies such as Natura have made the most of the perceived risk of development to the Amazon by finding a way to make sustainable development profitable. The listed cosmetics company sources many of its ingredients from villages deep in the Amazon rainforest, and works with scientists, NGOs, universities and farmers to discover new ones.

Beef production is a central element in the problematic relationship between Brazil's natural and agricultural resources. It increased sixfold between 1950 and 2006, turning the country into one of the world's top exporters of the meat. By 2019, it is expected to account for up to 30 per cent of the global beef market.

While higher beef production between 1950 and 1975 was largely the result of an increase in the country's pasture areas, growth since has been achieved by higher productivity, says Prof Contini.

In practice, this not only means rearing more animals per square kilometre

but also finding ways to improve the quality and quantity of the meat.

While many of these initiatives are dependent on government investment, the private sector has been playing an increasingly important role, says Prof Contini.

Without the productivity gains between 1950 and 2006, it would have been necessary to create an estimated 525m hectares of pasture area to achieve the 2006 production levels of beef, Prof Contini says, adding that in the decade between 1996 and 2006 alone, productivity gains in the beef industry spared an estimated 73m hectares of the Amazon.

The rate of deforestation in the Amazon is still alarming, but such productivity gains along with more direct efforts to stop illegal logging have played a crucial role in the battle at least to slow the destruction of the region's richest resource, analysts say.

While agriculture through pasture expansion represents one of the biggest risks to the Amazon, the lobby behind the protection of the Amazon also potentially represents one of the biggest threats to the expansion of the beef industry - an industry that is vital to the country's economy.

The unexpected puts paid to the best-laid plans

Continued from page 1

2011 earthquake and tsunami led to nuclear meltdown at Fukushima.

Globally, companies' exposure to risk is rising as they move into new markets. Maplecroft's latest analysis shows that countries facing the highest financial costs from natural hazards include many emerging economies.

Maplecroft also points to an increasing concentration of global economic output in countries facing substantial natural hazard risk. These include Bangladesh, India and the Philippines.

"With the economic shift from west to east, there's been an increase in exposure to these natural hazards," says James Allan, head of environment and climate change at Maplecroft. "These

\$37bn Cost of global disaster-related insured losses in 2013	50% Proportion of disclosed risks companies saw as likely in 2013
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countries are more inherently exposed. That's why we're going to see an increase in losses in the coming years."

Recent research by CDP, the environmental charity, which requests public companies' annual environmental information on behalf of institutional investors, found that S&P 500 companies see climate change posing growing physical and financial risks.

In 2013, half of the physical risks that companies disclosed were described as being from "more likely than not" to "virtually certain", up from 34 per cent in 2011.

But if the risks are becoming clearer to the private sector, the question for companies is how to react.

Michael Wilson, a partner at KPMG who leads the consultancy's Risk in the Boardroom programme, argues that companies need to take a broader approach and involve a wide range of

functional leaders, rather than simply assigning responsibility to a risk management committee.

"The companies that do this well take a cross-section of people from operations and back office, as well as from the different geographies they're involved in, and talk through situations such as a hurricane or extreme weather," he says.

Another important strategy, particularly for companies in sectors such as manufacturing, is looking at the risks posed to their suppliers (See page 4). "Companies need to see how the risk cascades through the supply chain," says Richard Hewston, Maplecroft's principal environmental analyst.

But with less predictable risks such as climate change, for example, even the insurance sector - which is often regarded as being ahead of many other industries - appears poorly prepared to address the risks.

A report produced by Ceres, a sustainable investor group, revealed that only a few companies in the sector had developed robust climate risk management practices. Some 82 per cent of the 330 US insurance companies surveyed earned a "beginning" or "minimal" preparedness rating.

"Most of industry is still sitting on its hands," says Cynthia McHale, director of the insurance programme at Ceres.

The financial services industry also has some catching up to do, according to Mr Allan. "That's because they're removed from the companies they're investing in," he says. "So they're probably a couple of years behind ... in understanding their exposures."

Aside from the difficulties in assessing and managing natural disaster risk, companies must battle vested interest - admitting a risk exists could affect the value of an asset.

Finally, planners face the natural tendency to respond to immediate challenges and neglect problems that seem farther off.



Firefighting: risk management planning is essential — David McNew/Getty Images

Contributors

Sarah Murray,
David White
FT contributors
Judith Evans
Reporter, FT Money
David Ricketts
Associate editor, Ignites Europe
Sophia Grene
Reporter, FTfm
Gregory Meyer
Markets reporter
Samantha Pearson
Brazil correspondent
Jeremy Grant
Singapore correspondent
Michael Dempsey
Freelance journalist

Emma Boyde
Commissioning editor

Steven Bird
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Andy Mears
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Risk Management



'Water is the ultimate risk-management problem,' says Giulio Boccaletti of The Nature Conservancy, an environmental charity — Channi Anand/AP

Innovative solutions required to weather storms and droughts

Water Growing instability calls for creative new thinking from businesses, reports Sarah Murray

As São Paulo, Brazil's biggest city, grapples with the most severe drought in eight decades, police escorts have been brought in to prevent emergency water trucks from being hijacked. Yet, while shortages create extreme difficulties for citizens, the corporate sector is also heavily dependent on water for many of its operations.

More than three-quarters of US companies surveyed this year by Pacific Institute, an environmental research group, and communications company Vox Global said they already faced problems related to water. And almost 60 per cent of respondents said water challenges would affect their profitability and growth in the next five years.

This month, research by the NGO CDP (formerly the Carbon Disclosure Project), which requests annual environmental information from public companies, found that 68 per cent of respondents believe they are exposed to water-related risk.

The sources of risk emerged as scarcity (43 per cent), flooding (28 per cent), drought (18 per cent), declining quality (14 per cent) and regulatory uncertainty (13 per cent).

Giulio Boccaletti, managing director for water at The Nature Conservancy, an environmental charity, sees three main reasons for water risk increasing

globally: rising demand; insufficient infrastructure (from groundwater and soil to reservoirs); and greater variability, with rises in the frequency and intensity of droughts and floods.

"Water is the ultimate risk-management problem," says Mr Boccaletti. "And the problem is that the statistics are changing... so we're getting the dimensioning of our solutions wrong and we're feeling the effects of that."

Among the industries most directly affected are agriculture, which consumes some 70 per cent of the world's water resources, according to the UN's Food and Agriculture Organisation. The energy sector is also vulnerable; hydroelectric generation relies on water, of course, and the recovery of shale oil and gas requires large amounts of water.

Nor are the risks purely related to shortages. Tightening regulatory requirements can also have an impact on companies' operations - as can a lack of regulation. "Governments have a significant role to play in the governance of water," says Cate Lamb, head of CDP's water programme. "And we're in this situation because of poor water governance historically."

Companies are responding in various ways. "There is increasing recognition that a business-as-usual response is no longer sufficient," says Ms Lamb.

Seeking new types of insurance is one

route some companies are taking. "We see more widespread use of rainfall-based protection by power producers in hydroelectric regions," says Stuart Brown, head of origination for weather and energy at Swiss Re Corporate Solutions. To develop one such product Swiss Re, the reinsurer, partnered with the World Bank on customised water insurance in Uruguay. This covers the state-owned hydroelectric power company if insufficient rainfall means it must turn to thermal generation, which costs more and requires oil purchases.

Parts of a country may face severe drought, while other regions suffer serious rain

Working with suppliers is also critical, though sometimes the solutions are relatively simple. In Vietnam, for example, Nestlé is training coffee farmers to save water by reducing the amount of irrigation given to their crops. Farmers now place plastic bottles that have been cut in half in their fields and check them each morning for condensation.

If they contain dew, explains José Lopez, head of operations at Nestlé, the soil is wet enough not to irrigate that day. This also improves the crop, he

adds, "because one of the problems with excessive irrigation is that it washes out the micro-organisms in the soil that bring the nutrients into the plant".

As the Swiss Re and Nestlé examples demonstrate, the challenge for companies is that responses to water risk vary widely in type and scale, and must be adapted to local conditions.

This is because, unlike other environmental risks such as greenhouse gases, water stress is highly localised - parts of a country might be experiencing severe drought while other regions could be dealing with substantial rainfall.

Moreover, water is a resource that is used by the entire community. Companies might therefore become highly water efficient in their own operations, but still suffer shortages because of use by neighbours such as agri-businesses or power generation companies.

This, says Mr Boccaletti, means that companies need to address water risk on several fronts.

First, they need to increase water efficiencies internally. Second, they need to work with their suppliers to manage risks. Finally, they need to engage the broader community - from local government to citizen groups - and play a role in addressing the water problems that affect everyone.

"That's the newest territory for business," Mr Boccaletti adds.

Diversification remains at the heart of reducing the margin for error

Supply chain

Contingency plans and attention to detail help ensure smooth delivery, writes Michael Dempsey

Globalisation may be unstoppable, but extended supply chains are trailing a whole new set of problems in their wake. Assessing the risk element is a discipline that combines established wisdom with some new tricks.

Zurich Insurance, for example, has harnessed computer software to help mitigate this risk. It takes historic examples of supply chain disruption and uses them to project images of possible problems on to customers' own logistics maps, which clients can access online.

Despite a background in accounting Nick Wildgoose, Zurich's customer adviser for supply chain risk, admits that comprehending the mass of figures involved in a complex chain is never easy. Hence the software uses symbols such as dials to indicate how severe a failure at a particular point in the chain could be. "The idea is to bring different elements together and make them easier to understand," he says.

The insurer is immersed in the complexities of risk at all levels and Mr Wildgoose maintains that its customers need to give the supply chain more attention. "If a large part of your revenue is at risk from a supply chain, you are honour-bound to analyse it and understand every component right back to the basics."

This approach is evident at eXception EMS, a UK electronics manufacturer. The company assembles sophisticated equipment for the oil, gas and aerospace sectors.

One of eXception's primary components is the printed circuit board (PCB) that contains the basic elements at the heart of all digital systems. These are made across Asia, but a combination of local factors has forced Steve Healings, eXception's supply chain director, to think very hard about exactly where he purchases them.

"Our risk management policy is to have a geographic spread of suppliers," he explains. The idea is that any natural disaster will not hit the company's entire supply. With the Japanese tsunami of 2011 in mind, he is splitting up his suppliers. Mr Healings says that when he allocated contracts recently, he awarded them to manufacturers in both Thailand and Malaysia.

Digital communications have shrunk the world in some respects, but the distance between eXception's UK office and Asia still presents problems. "Trying to manage supplier relationships

from 6,000 miles away is tough," says Mr Healings, who has established a small office in Penang, Malaysia to allow his company to smooth out any ripples at the Asian end before they interrupt deliveries.

Small electronic parts are not a light cargo when shipped in bulk. Mr Healings buys PCBs in volume and shipments of up to 200,000 eXception PCBs are usually sent by sea. This is cheaper than air freight, but Mr Healings keeps the air cargo option open in order to respond rapidly to any surge in demand. "We can save on costs by using container vessels, but we also use air freight for a flexible response."

He says his company holds some buffer stocks in the UK in case of problems with supply. But holding stock ties up money and parts can quickly become obsolete. Risk analysis dictates the scale of these safety stocks.

"We have to make a decision based on our exposure to any delays in the chain," says Mr Healings.

Andrew Caveney is in charge of global supply chain work at the consultancy

'We keep the air cargo option open to respond to any surge in demand'

EY. He cautions against relying too heavily on prior experience of events within a given supply chain. "You need to watch things in real-time, not wait until you see a problem in the rear-view mirror. By then, it is too late."

He encourages clients to scrutinise local suppliers. Any reluctance to allow visits to a plant or permit an audit of the site suggests a company may not be able to deliver the goods as expected. Mr Caveney recommends asking local buyers to ask tough questions when they meet supplier executives. "You want buyers to become more savvy in spotting where a supply chain is coming under strain," he says.

Basic contingency plans are what ensure a stable chain. Mr Caveney agrees that the clustering of electronics plants in northeast Japan was shown to be an enormous vulnerability when the tsunami struck, but this should not have come as a surprise. "Industries do gather around one area, so their customers should have clear plans in place to buy from other sources."

Ultimately, cost considerations will always affect how a supply chain is arranged. But as the sequence of players involved grows and becomes more complex, the risk element increases. And that means controls that can be exerted are weakened unless very careful attention is paid to local details.

Saudi Arabia taps Singapore for technology

Desalination

The Asian city-state has been using a cheaper membrane technique, explains Jeremy Grant

It is hard at first glance to see what Saudi Arabia and Singapore have in common. One is a vast desert nation and the other a compact island about the size of Greater London.

Yet fresh water, or the lack of it, is the issue that binds them in a way that demonstrates how countries are learning from each other how to deal with resource scarcity.

Saudi Arabia has no permanent rivers or lakes and very little rainfall, while Singapore has high rainfall but, given its small size, little land for collection.

Since the 1970s Saudi Arabia has drilled to tap aquifers and has developed an extensive desalination industry, to the point where 70 per cent of drinking water in the kingdom's cities comes from seawater, according to Saudi government statistics.

Yet as the population expands and the economy grows, Saudi Arabia needs to develop its desalination industry further.

This explains why government officials visited Singapore last month to learn more about how the tiny Asian city-state has used desalination to move towards self-sufficiency in the precious commodity.

"The water ministry has an ambitious plan and Saudi Arabia is going to need a lot of desalination over the next 10 years," says Olivia Lum, chief executive of Hyflux, a Singapore company whose water treatment expertise has helped drive Singapore's rapid rise as leader in the global water industry.

Ms Lum, who grew up in Malaysia in a home with no running water,



Counting the costs: Saudi Arabia knows the worth of water — Fahad Shaded/Reuters

co-founded Hyflux in 1989 with an investment of \$20,000 (\$15,700). It had annual revenues of \$536m in the financial year ended December 2013.

The company has pioneered the use of advanced membrane technology in treating waste water and seawater to make it drinkable.

The Saudi interest in Singapore, and specifically what Hyflux has to offer, stems in part from the fact that most of Saudi Arabia's desalination capacity uses a so-called thermal method.

This is more expensive to run than membrane desalination since it requires energy to heat the water as part of the process.

Singapore was one of the first countries to use membrane technology to

desalinate water on a large scale for drinking and industrial use. Such a method is one of three methods used by Singapore to build up self-sufficiency in water supplies.

While half its water comes from neighbouring Malaysia - with which relations are currently good - Singapore has been busy building the capacity to produce its own water for reasons of national security.

The island state's fresh water for drinking and industrial purposes comes from three sources: water catchments; a massive purification programme implemented in 2003 called NEWater; and desalination.

Water demand in Singapore is about 400m gallons a day, with homes

consuming 45 per cent and the non-domestic sector taking the rest. By 2060, total demand could almost double, according to the government.

The government says Singapore is "on track" to more than triple NEWater capacity - and ramp up desalination, which can meet up to 25 per cent of current demand. Together, these are estimated to be able to meet up to 80 per cent of demand by 2060.

Some of that is likely to fall to Hyflux to build. It provided the city-state's first desalination plant, which opened in 2005, and has built a second which opened last year.

A third plant will be put up for tender by the government next year, industry sources expect.

Hyflux, meanwhile, has been going global. Its treatment facilities are found in more than 400 locations around the globe, including China, India, Saudi Arabia and Algeria.

In a few months, Hyflux is set to open what will be the world's largest desalination plant in the world in Oran, Algeria's second-largest city.

The increasing commercial viability of desalination will help both Saudi Arabia and Singapore, as they increase the proportion of their potable and industrial-use water derived from that process.

Thanks to scientific advances such as membrane technology, it costs about half as much to produce fresh water through desalination as it did 15 years ago, when it cost \$5 per cubic metre to produce.

"Today you can probably get in the range of \$1-\$2 [per cu m] depending on the oil price," says Ms Lum.

Increasing water scarcity is helping spread the use of large-scale desalination to new markets, she says. "Hyflux is in a strong position to provide clean, affordable and sustainable water solutions to meet worldwide demand," she adds.

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