



MANAGING  
RISK IN A  
CHANGING  
ENVIRONMENT



# ENVIRONMENTAL SYSTEMIC RISK & INSURANCE WHITE PAPER

June 2014



## FOREWORD – RSA

Managing risk is at the heart of what insurers do. For hundreds of years we have been helping individuals and businesses respond to a changing world by assessing and addressing dangers and then providing restitution when losses arise. Without the protection and risk-transfer services we offer, much economic activity would cease to exist altogether.

The financial crisis brought home the idea of systemic risk, with one seemingly isolated event or set of events having far-reaching consequences. Now there is much we need to understand about how environmental systemic risk can have a similar impact, with effects such as pollution and the degradation of nature no respecters of national borders or existing business models.

We have sought to find out how well this type of risk is understood in the insurance sector and ask whether there is more insurers can do to take account of it in their and their customers' long-term strategies. Research has revealed some emerging practice while current approaches offer both opportunities and challenges in meeting new threats.

Traditionally, underwriters assessed the risk customers faced based on the immediate and direct consequences of an accident or misfortune on a single entity. Today, systemic risks provide a new existential threat to our customers and to us as an industry. Many companies have just-in-time international supply chains which, while efficient, are particularly susceptible to shocks. By spotting trends early and identifying complex interdependencies we believe we can help customers understand and mitigate the problems they face.

Insurers and reinsurers now need to work with companies to update their risk evaluation and loss quantification. The methods and pricing tools which have served us well for many years may not have the potential for adaptation we need. Where that is the case we need to respond now rather than when it is too late. Nowhere is the case for action more pressing than for environmental systemic risk.

We want to see the insurers co-operate to deliver improved sustainability for the people, businesses and communities we help protect. The impact of climate change and trends towards more frequent and more severe extreme-weather events mean the need for a response is acute. By meeting this need as an industry we can build the resilience which will benefit all in society and demonstrate the responsibility we take.

**Phil Bell**  
RSA Group Casualty Director

## FOREWORD – WWF

A complex-sounding concept such as environmental systemic risk is best explained through real-life examples. It was one particular incident which started WWF and RSA on the process that led to this paper and to our shared call for more discussion and more agreement on how to manage and mitigate this emerging threat.

The effect of heavy rainfall in Chile in 2009 was exacerbated by deforestation, meaning more water washed across farmland, taking with it low-grade nitrogen fertilisers. These flowed into rivers that had already lost biodiversity following man-made straightening and so the nitrogen-loaded waters went straight into estuaries where fish farms were located. The resulting algae bloom meant fish were starved of oxygen and a multi-million dollar insurance claim followed.

This loss – of fish stocks caused by rain – prompted both our organisations to think about ways we can better protect ourselves and the environment from previously unforeseen damage. The research we have since completed suggests we need new thinking and risk-evaluation methods which model multiple interacting factors and vulnerabilities.

Future resilience for businesses and communities will require a response which understands the consequences of an event in one place can be felt somewhere quite different and over long periods of time. This is a new challenge for an old industry to meet but insurers have shown their willingness to collaborate to meet other emerging risks and it is something we believe they can – and must – do again.

**Sue Charman**  
Head of Corporate Stewardship – Finance

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## INTRODUCTION

This paper outlines what environmental systemic risk is and why it is an issue of increasing importance. It suggests the impacts it has on insurers but also the barriers which exist to an industry response. Finally it makes recommendations as to the ways the insurance sector as a whole, as well as individual companies can respond.

It is designed to facilitate further discussion and debate on the approach to better mitigation and effective pricing of new risk classes.

Research for this included consultation with insurers, as well as with various industry bodies, seeking to establish what is currently understood by the concept of environmental systemic risk and how it is contributing to different business strategies.

The analysis used in the preparation of this paper was undertaken by PwC on behalf of WWF and RSA Insurance Group plc.

The findings and recommendations are derived from a combination of desk research (see Bibliography) and consultation with 15 organisations from the insurance industry (see Appendix).

## SECTION I:

## WHAT IS ENVIRONMENTAL SYSTEMIC RISK?

Traditionally, risk has tended to be viewed as isolated to one person, event, item or organisation. For example, the likelihood of a car being stolen does not affect the likelihood of other cars being stolen. The pricing and underwriting of insurance therefore relies on the ability to match the willingness to pay to reduce the risk exposure against potential losses.

Systemic risk exists when the potential harm cannot be contained because of interlinkages and interdependencies between different places, activities or assets. Because of such connections, a failure in any one part of a system or market can lead to it collapsing in its entirety, just as removing one part of a house of cards means the whole structure fails.

In financial terms, systemic risk became all too apparent when the collapse of the US mortgage-backed securities market led to the financial crisis and a global recession from which many countries are still recovering. The lesson learned in hindsight is that detecting and mitigating financial risks requires a broader, deeper and more forensic approach than was used before.

Environmental systemic risks could prove equally insidious. The loss of an oil tanker at sea might not just include the value of the ship and its cargo. Any resultant crude oil spillage could have a profound effect on wildlife, on nearby coastline, on those who depend on fishing or tourism in the area and so forth. The initial accident on the Deepwater Horizon oil rig in the Gulf of Mexico in April 2010 led to the loss of nine lives, and it was nine months before the ruptured well was finally sealed and the resulting spill had an impact on the local environment and economy, which continues to be felt and has cost BP at least \$42bn<sup>1</sup>.

Systemic risks are characterised by complexity, uncertainty, ripple effects and the potential for irreversibility. There may be little or no historical precedence to use as guidance. On many occasions the scale of the risk might only be revealed when the worst happens, but effective risk management can identify existing or potential interdependencies and seek to isolate risks, prevent contagion and mitigate damage.

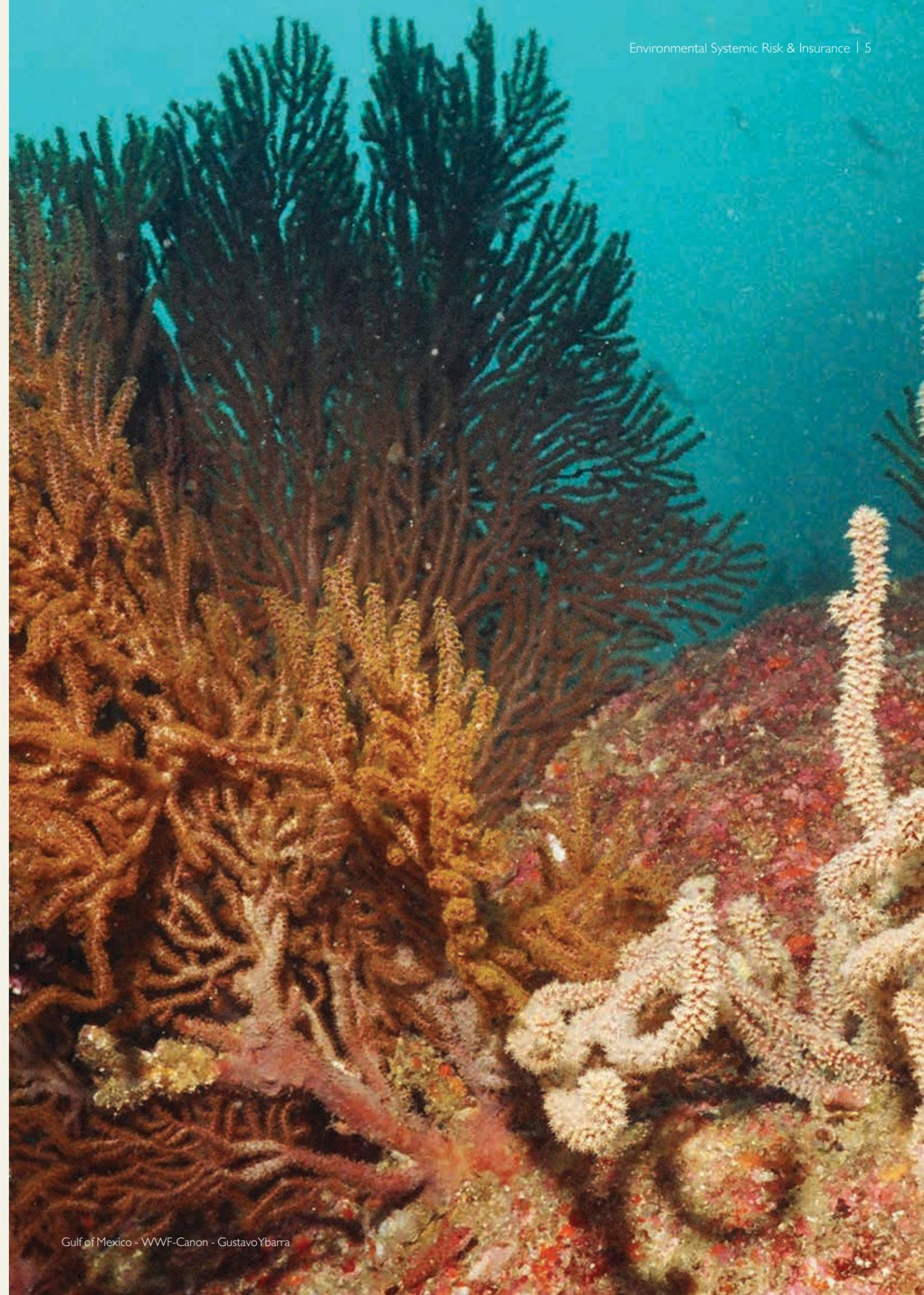
Claims on environmental risks could come about as a result of natural catastrophes such as flooding, snow and ice, wind storms, drought or an industrial/man-made incident such as the discharge of pollutants into a waterway or particulates into the air. Such claims could be triggered by a single catastrophic event or materialise over time and because of – as well as in spite of – technological advancements. Therefore it is right that the insurance industry considers carefully the approaches it takes to this emerging risk class.

Given the innate complexity and vulnerability of many ecosystems around the world, we need to improve our understanding of environmental systemic risk as a matter of urgency. As our understanding and ability to price ecosystems services matures, so will our ability to help create sustainable, practical proposals for sophisticated risk management.

“As the global financial sector recovers and moves into the post financial crisis era, there is one notion that crystallises before our eyes more acutely than ever: we need to understand systemic risk in a much more holistic way”.

Richard Burnett, Partner, Earth Capital Partners, and Co-Chair, UNEP Finance Initiative

<sup>1</sup> <http://www.theguardian.com/business/2013/feb/05/bp-deepwater-horizon-charge-rises>



## SECTION 2:

## WHY IS THIS AN ISSUE NOW?

**The risks are materialising**

We have started to see a long-term upward trend in the number of extreme weather events in the past 20 years. There is overwhelming scientific evidence climate change is contributing to the incidence and severity of these events, while insurance industry data shows a marked increase in overall insured losses. The latest analysis from the Intergovernmental Panel on Climate Change (IPCC)<sup>2</sup> concludes that the impacts on climate change are projected to be widespread:

“Observed impacts of climate change have already affected agriculture, human health, ecosystems on land and in the oceans, water supplies and some people’s livelihoods. The striking feature of observed impacts is that they are occurring from the tropics to the poles, from small islands to large continents and from the wealthiest countries to the poorest.”

As the impact of climate change becomes more apparent we need to understand the interdependencies with other environmental issues such as biodiversity and water availability and non-environmental ones such as energy, food and business continuity. For example, flooding risk exposure as a result of the changing climate will be compounded by population growth and urbanisation, leading to a build-up of property assets in coastal areas. An increasingly integrated approach is needed.

**Businesses are taking note**

The World Economic Forum’s survey<sup>3</sup> of the ten global risks of greatest concern in 2014 includes four which are environmental: water crisis, failure of climate change adaptation and mitigation; greater incident of extreme weather events such as floods and storms; and food crises.

The 2014 PwC Global CEO Survey<sup>4</sup> also shows environmental risks high up in corporate thinking, with 46 per cent of CEOs – and 36 per cent of insurance industry CEOs – agreeing that resource scarcity and climate change will transform their business.

**Regulations are being introduced**

For example, the EU Environmental Liability Directive<sup>5</sup> is aimed at “preventing and remedying damage to animals, plants, natural habitats and water resources, and damage affecting the land”. The liability scheme places obligations on organisations to undertake necessary preventative or remedial measures to the environment as a result of their activities and was extended to include offshore oil and gas exploration and production after the Deepwater Horizon incident.

In addition, Solvency II, due to be implemented in 2016, will create a supervisory mechanism that encourages robust risk evaluation for insurers. This has implications for capital requirements and for risk modelling but could also include environmental systemic risks. While Solvency II will focus largely on year-on-year compliance and not the longer-term horizons of emerging risks, it could nonetheless shape insurers’ thinking in the future.

**The stakes are high for insurers**

In a highly competitive industry such as insurance, any insurer with greater understanding and management of environmental risk exposure stands to gain an advantage. However, from a pricing point of view, reflecting environmental risks through higher premiums could also give an early-mover disadvantage as customers simply switch to those who are not taking account of it. For both reasons, an industry-wide approach would be beneficial.

Our research shows reinsurers have already invested heavily in understanding systemic risks – including environmental ones – in recent years. This is welcome and puts further pressure on primary insurers to catch up on their management and pricing of such risks.

Finally, stakeholders will increasingly expect insurers to have considered environmental systemic risk and the wider impacts losses can have. Insurers have started to do this, including through the work of the UN Principles for Sustainable Insurance initiative,<sup>6</sup> ClimateWise<sup>7</sup> and the Geneva Association<sup>8</sup>. However, as these initiatives mature it is right to consider whether more should now be done to advance our individual and collective thinking for the good of the industry and above all those whom it seeks to protect.

<sup>2</sup> Working Group 2 (WGII) released the second section of the Fifth Assessment Report on impacts, adaptation and vulnerability to climate change on 31 March 2014.

<sup>3</sup> [http://www3.weforum.org/docs/WEF\\_GlobalRisks\\_Report\\_2014.pdf](http://www3.weforum.org/docs/WEF_GlobalRisks_Report_2014.pdf)

<sup>4</sup> <http://www.pwc.com/gx/en/ceo-survey/>

<sup>5</sup> <http://ec.europa.eu/environment/legal/liability/>

<sup>6</sup> [www.unepfi.org/psi/](http://www.unepfi.org/psi/)

<sup>7</sup> [www.climatewise.org.uk](http://www.climatewise.org.uk)

<sup>8</sup> [www.genevaassociation.org](http://www.genevaassociation.org)

## SECTION 3:

### HOW MIGHT ENVIRONMENTAL SYSTEMIC RISK IMPACT ON INSURERS?

The research we undertook shows insurers are at relatively early stages of understanding the implications of environmental systemic risk on their business activities. These are some of the core effects which should be considered:

#### Accumulation Management

Insurance companies hold portfolios of investments and policies which allow for diversification and stabilisation of losses. However, the interdependencies of these risks might not be fully understood in an environmental context. Accumulation management is vital to understanding the relationships between risks and to managing them effectively. Munich Re<sup>9</sup> has suggested that natural hazards lead to localised accumulation of insured losses, for example with earthquakes or flooding affecting properties in a given area. However, and as we saw with the 2011 Thai floods, there can be significant additional knock-on effects. In the aftermath of Hurricane Katrina, which hit the US in 2005 and was the costliest natural disaster in the country's history, Risk Management Solutions<sup>10</sup> defined the characteristics of a 'Super Cat[astrophe]', which fits with those of an environmental systemic risk:

- Non-linear losses, where the scale of the event causes losses to increase further;
- Demand surge, with constrained resources leading to increased costs;
- Long delays, with the scale of the damage adding to time and costs;
- Claims exaggeration, with difficulties in monitoring owing to the volume of claims;
- Coverage expansion, with litigation risks on policy interpretation; and
- Loss interaction, with a correlation of losses between locations, lines of business and coverage.

Additional losses may occur from a 'Super Cat' because of pollution (e.g. of sewage or hazardous materials), evacuation costs, multi-line losses (i.e. across Property, Motor and others) and asset-liability correlation, where the assets of the insurer itself may be affected.

#### Underwriting and risk modelling

Risk modellers have in the past used historic data to price risk and determine underwriting requirements. Environmental systemic risk – including the projected effects of climate change – means models are in need of updating. Those which do not take account of more extreme weather events may not adequately account for the scale of losses or the timescale in which these may be recorded. Industry collaboration will be required if interdependencies are to be accurately assessed and accurate pricing made possible. Where this leads to higher prices or withdrawal of cover it will maintain the financial health of insurers but also send a strong price signal to deter unsafe or unsustainable business practices. Governments may have to step in as insurers of last resort.

#### Capital allocation and adequacy/solvency

Higher insured losses from extreme weather events may mean increases in insurance capital requirements. The Association of British Insurers<sup>11</sup> says a 2°C rise in global temperatures will increase capital requirements on UK insurers by more than £1bn to account for higher flooding risks. However, more capital being held means less is being used to invest, which could have ramifications for global capital flows. Interviews with industry leaders suggest Solvency II could have an impact here but it may also cause unintended consequences if the focus is on short-term compliance, by reducing the emphasis on long-term risks such as those posed by climate change.

#### Claims management

The increasing frequency, unpredictability and severity of events can put huge strains on claims functions. In an extreme scenario, if an insurer's own premises or operations are damaged by the same incident which customers are claiming for, staff may be unable to work to manage with the claims.

#### Loss reduction via adaptation and repairs

Rather than withdraw from high-risk regions or markets, insurers can incentivise policyholders to protect themselves against damage and so limit potential losses. They can also offer sustainable repair options when rebuilding damaged properties. Understanding and rewarding actions that minimise or mitigate environmental systemic risks will be important. This will require collaboration across industries to identify best practice.

#### Investment management

Our research suggests some insurers conduct 'asset-liability matching' so losses from an event may not lead to large claims as well as reduced value of assets. However, it is unclear both whether this is a widespread practice and whether it takes adequate note of environmental systemic risk. The insurance industry's role as an investor also means it has considerable influence in changing company behaviour and market trends. It can use this to insist that environmental considerations are incorporated into overall strategic and resilience planning.

#### New product development and updating existing products

Insurers can cover (and invest in) assets or projects which help manage environmental systemic risks, for example low-carbon projects such as renewable energy sources. Micro insurance is also spreading in emerging economies, improving disaster resilience in those areas previously least able to withstand and recover from them.

<sup>9</sup> Munich Re, 2013 Natural Catastrophe Year in Review (2014) [https://www.munichre.com/touch/site/touchnaturalhazards/get/documents\\_E2138584162/mr/assetpool.shared/Documents/5\\_Touch/Natural%20Hazards/NatCatNews/2013-natural-catastrophe-year-in-review-en.pdf](https://www.munichre.com/touch/site/touchnaturalhazards/get/documents_E2138584162/mr/assetpool.shared/Documents/5_Touch/Natural%20Hazards/NatCatNews/2013-natural-catastrophe-year-in-review-en.pdf)

<sup>10</sup> 'Hurricane Katrina- Profile of a Super Cat', RMS (2005) [http://www.rms.com/publications/katrinareport\\_lessonsandimplications.pdf](http://www.rms.com/publications/katrinareport_lessonsandimplications.pdf)

<sup>11</sup> ABI, Assessing the Risks of Climate Change: Financial Implications (2009) [http://ipcc-wg2.gov/nj-lite\\_download.php?id=6608](http://ipcc-wg2.gov/nj-lite_download.php?id=6608)

<sup>12</sup> <http://www.gsl.rsagroup.com/en/our-specialisms/construction-engineering/renewable-energy>



## SECTION 4:

### BARRIERS TO MANAGEMENT OF ENVIRONMENTAL SYSTEMIC RISK

Interviews and research conducted suggests barriers exist which could be preventing an industry-wide approach to managing environmental systemic risk. These fall into six main categories:

#### Lack of understanding

Environmental systemic risk is not a well-known term, even though conventional systemic-risk terminologies are in general use. A commonly understood definition is therefore needed, without which collaboration or action will remain difficult. The long-term time frames involved with one of the main risks, climate change, is also a challenge, with the recent recession exacerbating this as individuals, companies and governments prioritise shorter-term financial concerns.

#### Limits of insurability

Some environmental risks are currently considered uninsurable, for example because there are too many similarly exposed units, because of high loss probabilities, unaffordable premiums or incalculable losses. Biodiversity losses may fall into this final category as something like the societal, economic and environmental impact of the extinction of a species may be difficult or impossible to quantify. However, there are examples of where this has been done, e.g. the decline of bees could have financial impacts as the commercial value of bees' pollination has been put at £200m a year in the UK<sup>13</sup>.

#### Pricing is reactive

Many primary insurance contracts are renewed annually. This provides the flexibility to update prices to reflect new risks, but this tends to happen after events have occurred. Raising prices early, before the materialisation of a risk may therefore make an insurer uncompetitive. Although reinsurance has longer time horizons it is also bound by investors' shorter-term outlooks and so the environment might not be prioritised relative to other, more immediate risks. With clients, insurers and reinsurers having different timetables, environmental systemic risk may not be adequately considered or addressed throughout the insurance value chain.

#### Lack of data and uncertainty

A lack of historic data makes pricing harder and uncertainty greater, meaning many insurers and reinsurers will be less willing to participate in risk bearing. Data shortfalls are also weaker in new markets, making the prospect of environmental systemic risk cover even more remote.

#### Regulatory barriers

Those consulted for this study suggested strong government leadership is critical if market mechanisms are to be able to manage environmental systemic risk. Existing rigidity within regulatory structures may inhibit the innovation required to make this a reality.

#### Competitive pressures

As long as the main effect of competitive pressures is to keep the price of premiums down, forward-thinking companies who look to price in environmental systemic risk will be at a disadvantage. The rationality of acting in the long-term may therefore be overridden by the short-term requirements of ensuring survival.

## SECTION 5: RECOMMENDATIONS

We believe the insurance industry is well placed to understand a rapidly changing risk landscape and can take a lead in addressing environmental systemic risk.

### But more can be done to improve this, including:

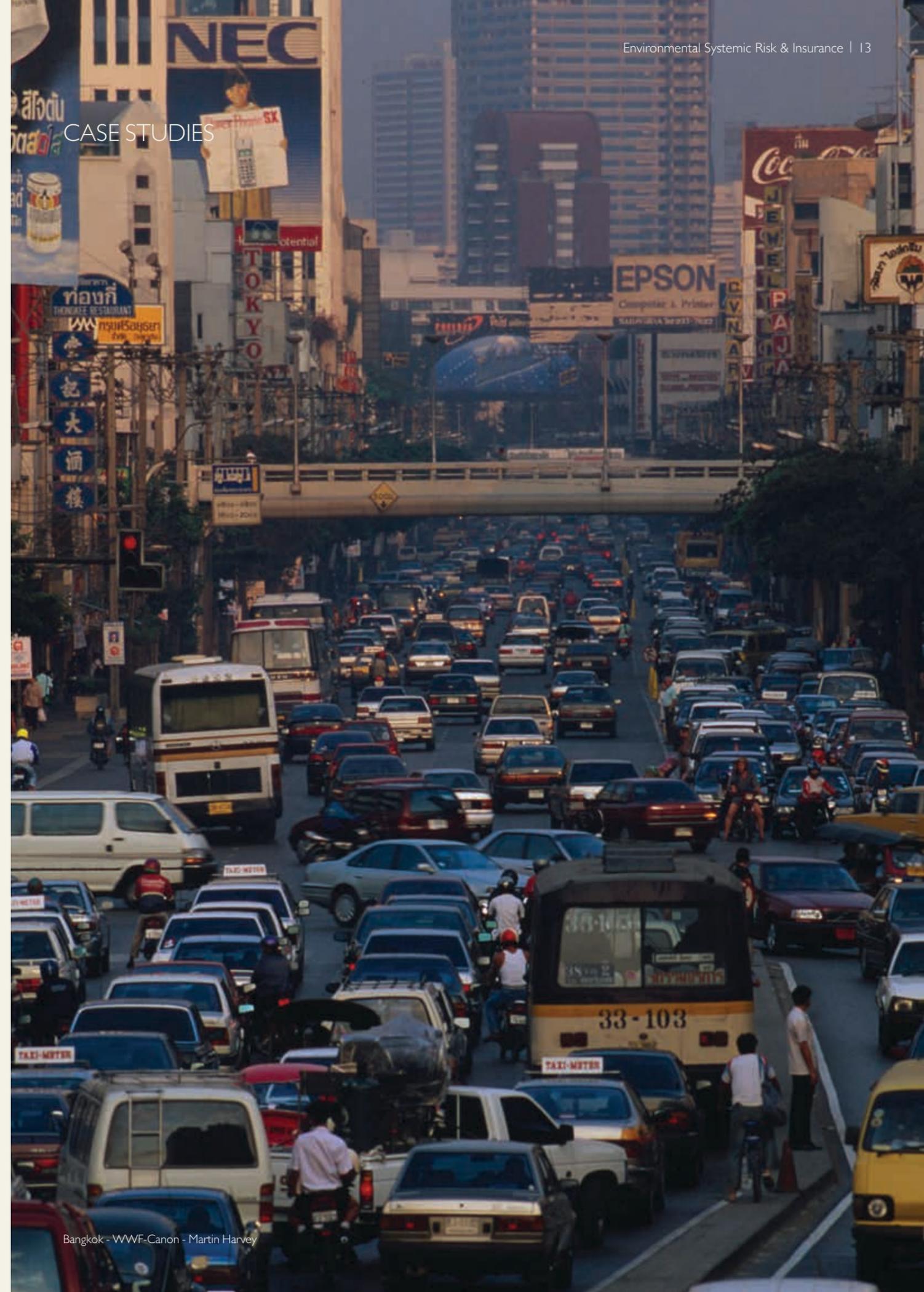
- **Talking to governments and regulators.** This will help tackle unhelpful variations in different jurisdictions, give clearer market signals, remove obstacles in the way of responsible action and help ensure officials and insurers work together on prevention and mitigation plans such as flood defences;
- **Collaborating with other insurers and reinsurers.** A consistent message is that no insurer or reinsurer can go it alone. Market-wide approaches are needed which also balance against anti-trust concerns. Regulators should be brought in at an early stage;
- **Building close relations with information providers.** Outside the insurance industry itself these include academics, NGOs and risk modellers;
- **Engaging more with customers.** Larger clients can be an especially useful source of information which enriches risk-management strategies. Where the cost of one-to-one interactions is prohibitive, trade groups or strategic partnerships can help; and
- **Participating in industry initiatives.** These can identify shared views, spread best practice and provide a neutral forum for co-operation.

### For individual insurers, some or all of the following might be appropriate:

- Establish a **clear mandate from the Board** for identifying environmental systemic risk, both financial and non-financial, and integrating its management into all core insurance processes;
- Conduct a **portfolio review** to assess the impacts of environmental systemic risk across all business lines, both on the insurance and investment sides of the balance sheet;
- Identify any **opportunities for competitive advantage** in areas such as new product development and risk modelling;
- Review **underwriting guidelines** to reflect environmental systemic risks;
- Undertake **more research** and identify better data to inform levels of pricing, capital and reserves to match changing risks; and
- Provide **information, tools and training to employees** to develop environmental systemic risk-management skills.

There is an opportunity to show leadership on an issue which could increasingly shape our world. That is in the interests of the insurance industry, its stakeholders and all in society. By taking the initiative now, the benefits could be felt long into the future

## CASE STUDIES





### CASE STUDY I: THE THAI FLOODS

Thailand experienced its worst floods for five decades between July and December 2011<sup>14</sup>. There were more than 800 deaths and more than five million people in total were affected, including in the capital, Bangkok. Around 10,000 factories were forced to close and 350,000 workers laid off while production was suspended.

The direct damage to physical assets cost \$21bn, with a further \$26.5bn in lost economic opportunities. Insurers and reinsurers paid out \$12bn – 70 per cent of which was written outside Thailand, including \$2.2bn by Lloyd's of London.

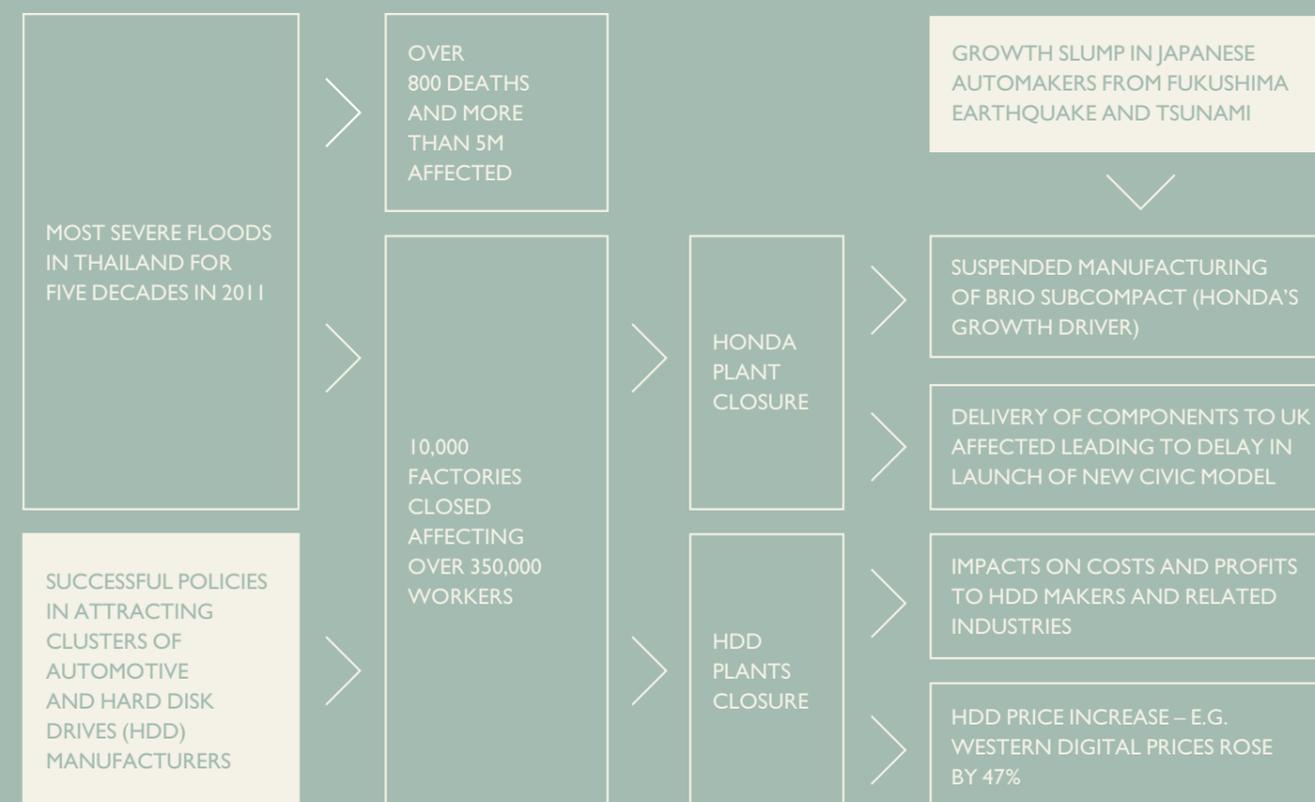
But the damage spread beyond Thailand's shores. The country is an important supplier for the consumer electronics, textiles and automotive industries. Manufacturing output in November 2011 fell to half of what it was in June of the same year. For those relying on Thai suppliers as part of their global supply chain, the effect was extremely damaging.

The car manufacturer Honda had to halt production of its Brio subcompact in its Thai assembly facilities and also had to cut by 50 per cent its production as far afield as Swindon, UK, as vital electronic car components were not available for its new Civic model<sup>15</sup>.

Thailand is one of the world's leading manufacturers of hard disk drives (HDDs). In the six weeks after the floods, the price of these more than doubled, with Intel losing \$1bn of revenues as a result and the set-top box manufacturer Pace issuing a series of profit warnings. The Japanese economy also took a hit, with disruption at leading manufacturers including Sony.

Since the floods, many manufacturers have diversified their production, for example by opening facilities in the Philippines in case of further Thai floods.

What began as an environmental and humanitarian disaster became an economic one, both as a direct result of the flooding and because of the knock-on effect. Lessons have now been learned but only through experience and at great cost.



<sup>14</sup> [http://en.wikipedia.org/wiki/2011\\_Thailand\\_floods](http://en.wikipedia.org/wiki/2011_Thailand_floods)

<sup>15</sup> [http://www.just-auto.com/news/honda-civic-uk-launch-delayed\\_id117017.aspx](http://www.just-auto.com/news/honda-civic-uk-launch-delayed_id117017.aspx)

## CASE STUDY 2: DROUGHTS IN THE UNITED STATES AND FOOD PRICES

America is the world's largest producer of corn. Corn is a key ingredient of many of the world's processed foods and animal feed. The National Climatic Data Centre reported that in 2012 the US suffered its most expansive drought since December 1956. Over 63% of the country was considered to be suffering moderate to exceptional drought in early September 2012, nearly twice the area affected by droughts in 2011<sup>16</sup>.

A combination of dry conditions and extreme heat, including record-breaking temperatures over the summer months has led to both localised and international impacts including lakes drying up and the destruction of agricultural crops. At the international level this has a subsequent impact on the availability of crops and prices.

According to the U.N., global corn prices surged nearly 23% in July 2012, exacerbated by "the severe deterioration of maize crop prospects in the United States, following drought conditions and excessive heat during critical stages of the crop development."<sup>17</sup> Analysts predict the basket of food prices tracked by the U.N. could climb 15% by July 2013 from current levels<sup>18</sup>. The fall in feed crops is also expected to have major repercussions for the meat and dairy industries, as the increase in the costs of feed stocks increases the prices faced by consumers and lowers profit margins.



<sup>16</sup> US Drought Monitor, <http://droughtmonitor.unl.edu/>; <http://edition.cnn.com/2012/09/15/us/drought-perspective/index.html>;

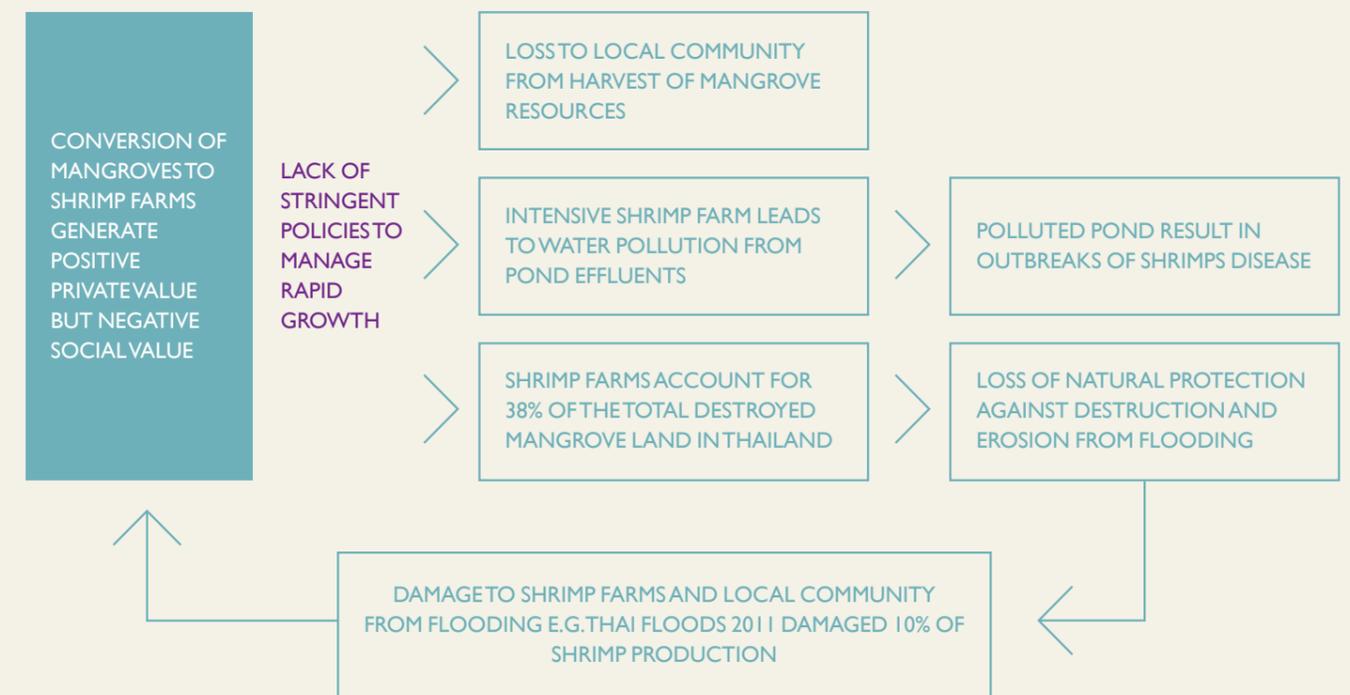
<sup>17</sup> <http://money.cnn.com/2012/08/09/news/economy/food-prices-index/index.htm>

<sup>18</sup> [www.parliament.uk/briefing-papers/SN06436.pdf](http://www.parliament.uk/briefing-papers/SN06436.pdf)

## CASE STUDY 3: DESTRUCTION OF BIODIVERSITY—REDUCED FLOOD PROTECTION

The Economics of Ecosystems and Biodiversity (TEEB) estimated the total annual economic cost of biodiversity loss and ecosystem degradation in 2008 at between **US\$2 and US\$4.5 trillion (3.3 – 7.5% of global GDP)**. This total figure includes losses attributed to a number of other risks that biodiversity is connected to, ranging from inland flooding to infectious disease and food price volatility.

As a specific case study, over the period of 1980-2002 mangrove forests in South East Asia, especially Thailand, were removed to make way for commercial shrimp farming. This has resulted in a loss of natural protection against tsunamis and cyclones. Analysis suggested that if the economic benefits of mangrove forests as coastal defence had been taken into account, and the subsidies for shrimp farming removed there is a net cost of shrimp farm conversion – i.e. the conversion should not have happened, had a more holistic cost benefit analysis been adopted. This was tragically illustrated in 2004 when areas where mangroves had been removed were devastated by the South Asian Tsunami with significant loss of life and property, whereas coastal areas still covered by mangroves were relatively less affected<sup>19</sup>. Similarly in Thailand, the 2011 floods caused huge losses to local industries, including shrimp farming leading to a 10% drop in shrimp production<sup>20</sup>.



<sup>19</sup> [www.newscientist.com](http://www.newscientist.com) – January 2005 - <http://www.newscientist.com/article/dn9931-facts-and-figures-asian-tsunami-disaster.html>

<sup>20</sup> <http://www.reuters.com/article/2011/04/01/thailand-flood-shrimp-idUSSGE73002320110401>

## CASE STUDY 4: DEEPWATER HORIZON

Deepwater Horizon was an offshore oil drilling rig owned by Transocean, and leased to BP since 2001. On 20 April 2010, while drilling in the Gulf of Mexico, 52 miles (84km) south-east of Venice, Louisiana, an explosion on the rig caused by a blowout killed 11 crewmen.



The accident involved a well integrity failure followed by a loss of hydrostatic control of the well. This was followed by a failure to control the flow from the well with the blowout preventer (BOP) equipment, which allowed the release and subsequent ignition of hydrocarbons. Ultimately, the BOP emergency functions failed to seal the well after the initial explosions. The Deepwater Horizon sank after burning for 36 hours on 22 April 2010, and caused the largest offshore oil spill in U.S. history. BP made several unsuccessful attempts to stem the flow of oil. The ruptured well was finally sealed five months after the original accident on 19 September 2010<sup>21</sup>.

### Financial & regulatory implications

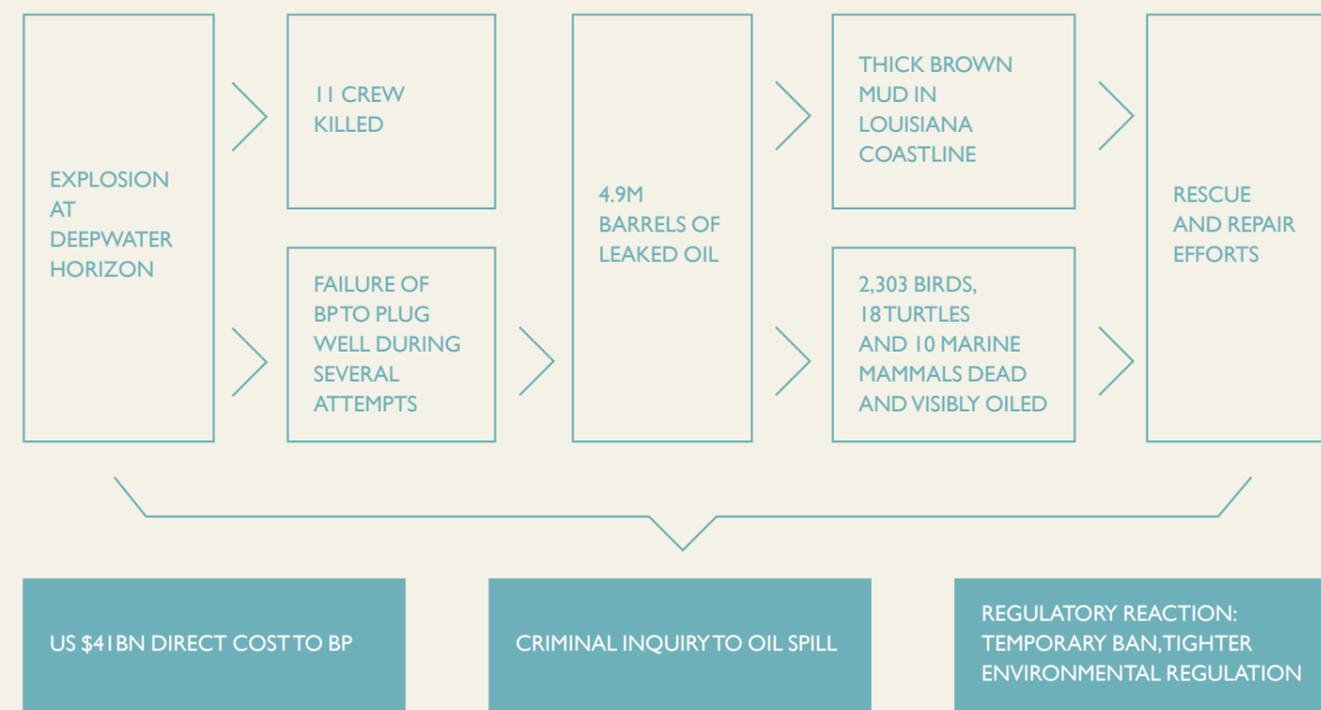
The direct cost to BP was \$4.1 bn to pay for the spill, two and a half times more than its entire 2009 profits.

The US announced a criminal inquiry into the BP oil spill. The US administration temporarily banned oil drilling off the US coast pending investigations into the cause of the BP spill. In August, the US Government announced that future applications for deep water offshore drilling will require an environmental assessment. The European Commission is now considering the extending the Environmental Liability Directive to include offshore oil and gas rigs. The US Interior Department ordered safety inspections of all 30 deepwater drilling rigs and 47 deepwater production platforms<sup>22</sup>.

### Environmental implications

Over the course of the five months, 4.9 million barrels of oil leaked before the well was capped, of which 800,000 barrels were recovered, the equivalent of 265,000 barrels was burned off the sea surface and 1.8m gallons of dispersants were used<sup>23</sup>. Coastal wetlands in Louisiana shores were inundated with thick, brown mud. A layer as much as 10cm thick in places, of dead animals and oil was found. During the incident, the U.S. Fish & Wildlife Service reported 2,303 birds dead and visibly oiled 18 turtles dead and visibly oiled and 10 marine mammals dead and visibly oiled. As part of the rescue efforts, 2,086 birds, 456 sea turtles, and two marine mammals, all of which were visibly oiled, were also rescued and cared for and in most cases released. Twenty five thousand eggs had to be transported from the Gulf to Florida's Atlantic coast to prevent deaths to an entire generation of sea turtles.

Large parts of the Gulf were closed to fishing. Surveys recorded surprising increases, such a 400% increase in sharks and a rise of up to 200% of small fin-fish and shrimps. However, scientists are uncertain about the long-term disruption to the marine food-chain. Conservationists warn that if a reef has been completely coated in oil, then it is probable that the slow-growing coral, which can take centuries to become established, will have died<sup>24</sup>.



<sup>21</sup> <http://www.bbc.co.uk/news/world-us-canada-10656239>

<sup>22</sup> Ibid.

<sup>23</sup> <http://www.bbc.co.uk/news/science-environment-13123036>

<sup>24</sup> <http://www.restorethegulf.gov/>

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## LIST OF PARTICIPANTS

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#### Why we are here

To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony and nature.

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