LLOYD'S

Exposing the risk of food and water security

Extreme weather events leading to food and water shock

Sunny summers, snowy winters... the idealised vision some might have had of climate change has long since been debunked. Climate change is complex. On top of this, social and economic changes are affecting the impact of heatwaves, freeze, droughts and water loss, windstorms, and more. The impacts of such changes could be substantial, with each inflicting physical damage, economic loss, and social instability in both developed and emerging economies.

To help you understand the most severe impacts of these threats, we've modelled an 'Extreme weather leading to food and water shock' scenario, which analyses the potential cost of an event unfolding over the next five years.

Picture the scene: A chain reaction of extreme weather leading to food and water shortage

A rise in extreme weather – The scenario imagines multiple years of above worst-case economic losses from extreme weather, with an increase in all weather-related natural hazards, including heatwaves, freeze events, droughts, floods and windstorms. These events lead to property damage, erosion of key infrastructures, a below average crop yield for food producers, and contribute to disruptions in business continuity and global supply chains.

Further supply shocks – A combination of these heightened weather events and a simultaneous El Niño-Southern Oscillation (ENSO) warm weather phase further affecting crop fertility contribute to breadbasket failures in the United States. The global agricultural and food supply chain is disrupted, leading to panic buying and price shocks in developed markets and elsewhere.

Counting the cost – In areas experiencing water shortages, we see significant social disruption as populations vie for limited vital resources. The number of countries able to maintain a sustainable level of output shrinks dramatically and the global economy contracts at an ever-quickening pace.

How severe could the situation get?

The weather element of our five-year scenario was modelled using a baseline that is derived from the last 40 years of weather data. We have looked at the variation in expected frequency and severity of events to quantify the expected physical risk impacts of the scenario.

The food and water shock element of the model considers two unique data layers to cover the potential range of impacts. To support the food shock assessment, we looked at crop yield variation driven by temperature and precipitation. To support the water shock assessment, we looked at a water stress layer.

We have calculated the potential economic loss at three levels of severity:

Level	Scenario severity descriptions
Major (1 in 50-year probability	Multiple extreme weather events occur equating to the worst global loss in the past 40 years, in two consecutive years. The following three years see expected losses globally for extreme weather events. The crop production failures and water stress events increase in both frequency and severity relative to the present day.
Severe (1 in 100-year probability)	Extreme weather events occur, equating to 120% of the worst global losses in year one of our scenario and 110% for the next two years, followed by expected losses for the final two years. A major increase in the frequency and severity of crop production failures and water stress events arise, relative to the present day.
Extreme (1 in 300-year probability)	Extreme weather events occur, equating to 150% of the worst global losses in year one of the scenario, followed by 120% of the worst losses for the next four years. Catastrophic crop production failures and water stress extremes are widespread globally. Geopolitical action is undertaken to restrict movement of key agricultural supplies.

$5trn

Five year economic loss from potential extreme weather and global food and water

How vulnerable is the economy?

If this scenario were to take place, the global economic loss could reach **$5.0trn** over a five year period (the average loss across the three severities we have modelled), with an expected economic loss (the conditional loss multiplied by the probability of the event occurring) of **$710bn**.

Which sectors might be most at risk?

In the scenario, all sectors are impacted by climate change and food and water shock to varying degrees. Those most at risk in our model include:

Property: Housing stock and industrial buildings deemed at high risk of extreme weather impacts may lose significant value, becoming un-mortgageable or unsaleable. Property destruction along coastal areas becomes inevitable, as does housing in tornado corridors or plains at risk of flooding.

Food and drink: A food and water crisis will directly impact the agriculture, industrial and food distribution supply chain causing consumers to struggle to find access to a large variety of food, compared to what they are accustomed to.

Industrials and energy: With a food and water shortage event, we are likely to see increased political tensions as countries look to maintain food security. The industrial sector would be impacted by food shortages and lack of raw materials. Other impacts might include reduced spending and a drop in energy demand.

What can businesses do?

Tackle the problem at source: Being proactive and working to reduce the impact of extreme weather events as well as preventing further climate change. For example, changing the agriculture practices to use flood resilient seeds and smart irrigation systems. Businesses can improve their own carbon footprint and lobby governments to commit to similar goals, including renewable energy and environmental restoration.

Seek innovative alternatives: Actively reducing reliance on carbon-intensive fuel and seeking new technologies or strategies that lower environmental impact within your own operations or supply chains and that support with global net zero targets may help to mitigate the risk of further climate related damage. For example, using solar powered water pump systems.

Next steps

Work proactively to build resilience in your risk management against these threats and connect with your broker to discuss risk transfer for weather risk and supply disruption.

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