

HOW NEW DATA TOOLS CAN ASSESS CLIMATE RISKS

Climate change doesn't just threaten the environment, it poses risks to a country's businesses and economy. Understanding these risks can be complex, yet there are a growing number of tools that can help businesses analyze how their operations will be affected. In order to integrate climate risk into their overall risk management models, companies will need a thorough understanding of how climate change can affect them. With it, they can then take steps to build resilience into operations.

Extreme weather events caused by climate change—floods, storms, and protracted droughts, as well as rising temperatures and water shortages—can lead to financial and economic losses for consumers, businesses, and governments. Yet many organizations lack the type of analysis needed to proactively prepare for such risks. While an abundance of information that could help companies understand climate risk exists, it often is not presented in a useful way or is prohibitively expensive.

Now a growing number of datasets and scenario planning tools allow organizations to better understand how climate change in general—and specific aspects of it in particular—threaten their operations. These tools, many of which are still under development, can help articulate, quantify, and measure exposure to climate change risks, expected losses from extreme events, and potential changes in their operating environments.

DEFINING CLIMATE RISK

Climate change is not a single risk. Companies face a multitude of risks across their business, each one of which has the potential to affect revenues, buildings, assets, and overall operations. The United States Department of Defense called climate risk a “threat multiplier,” that is, a risk that has the potential to make many other business risks worse. Looking at the impact of any one risk to operations in isolation, such as rising sea levels, could give a firm a false impression of its overall climate risks and prevent a thorough assessment of the multidimensional consequences of climate change on business operations.

Businesses need to start by identifying and defining potential climate related risks that pose a threat to their operations, including physical risks as well as policy, operational, and business interruption risks. These could include water shortages, the impact of climate change on other key resources, and carbon pricing policies, among many others. Once identified, businesses

will need to analyze and evaluate the impact that those risks present to operations in order to integrate climate risk into overall risk management models.

The challenge for businesses in evaluating climate risk, however, is that the potential consequences of climate change are unclear, as is the timeframe for those consequences. Being able to precisely pinpoint when and where climate related disruptions will occur is nearly impossible, particularly for extreme weather events that are periodic and acute. The uncertainty of the timing and severity of climate outcomes combined with the short-term nature of most business risk management decision presents an additional challenge to understanding climate risk.

Policymakers also recognize that climate risk is not simply a single risk to the economy. Many countries are beginning to explore policies to address these risks across industries. For example, in 2015, the G20 and the Financial Stability Board established an industry-led Task Force on Climate Related Financial Disclosures with a mandate to develop voluntary disclosure mechanisms on climate risk along three categories: physical risks, transition risks, and liability risks. If successful, these efforts will increase the amount of climate risk data available to promote better risk decision making by many types of users, including businesses and their investors.¹

DIFFERING BUSINESSES, DIFFERING RISKS

Each business faces its own specific set of risks from climate change. These risks are interconnected and don't just affect the physical assets of a business. Businesses also need to assess policy risks, legal risks, technological risks, market and economic responses, and reputational considerations. In general, climate risks can be divided into two broad categories, direct and indirect.

| Direct Risks | Indirect Risks |
|---|---|
| Stem from physical changes in extreme weather and climate, and affect assets, operations, and supply chains in a company's direct control | Result from risks a company does not have direct control over, including resource availability, changes in regulatory environment, consumer behavior, socio-economic conditions, and stakeholder expectations |
| Affect production capacity, operational costs, and ability to do business | Affect demand for goods and services, operational costs, and market valuation |
| Tend to be more obvious and readily identified | Are typically harder to identify and may be underestimated |

relevant climate statistics, measured at the project site. For many emerging markets, however, such data sets were previously seldom available.

Evolving climate research and new generations of climate models are now boosting the confidence of climate risk modeling, including in regions and geographies previously lacking significant data.² In addition a number of sophisticated climate risk analytics and modeling tools allow businesses to assess and quantify climate risk and incorporate that information into their decision making process. Climate risk analysis, which needs to be tailored to business operations, starts with an assessment of a business's objectives, its key risk parameters, and an understanding of which aspects of its operations could be affected by climate change. A food company, for example, would need to focus on the availability of water for crop production, supply chains, and other factors.

With the rapid evolution of climate science, information on changes in the frequency and intensity of extreme events and the potential impact on business operations is becoming available. The analysis typically requires global data gathered from sources such as the National Center for Atmospheric Research, the National Aeronautics and Space Administration's Global Climate Change Directory, the United States Environmental Protection Agency, Columbia's Consortium for International Earth Science Information Network, the Earth Institute, and the National and Oceanic and Atmospheric Administration data centers. Analysis

Climate risk analysis should adhere to established patterns of risk analysis, which follow the approach of identification, analysis, quantification, mitigation, and monitoring. Companies also need to assess business risks of climate change in light of their particular strategy, risk tolerance, and other business specificities.

The identification and analysis of potential risks begin by taking multiple sources of data and modeling them in various scenarios. Because of the uncertainty around the timing and impact of climate change, this process will involve evaluating the probability of different climate change scenarios, including timeframes and warming levels, among other factors.

Assessing the results of those models will allow a business to understand how its assets, systems, and critical operations are exposed to the frequency, severity, and duration of climate change and to determine how this exposure will change over time. From this information a business can begin to analyze the impact of climate risk on financial returns, performance, and the ability to meet customer needs. With these assessments, businesses can then determine the best approaches, plans, and options to mitigate climate risk, including building in resilience to risk and purchasing risk mitigation insurance.

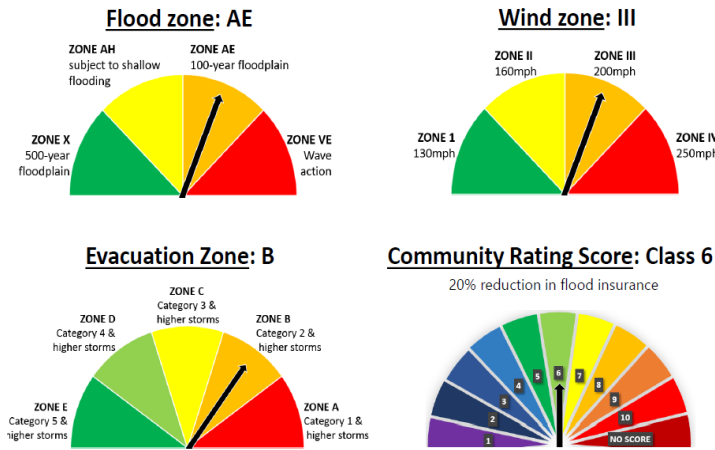
DATA, CLIMATE RISK ANALYTICS AND TOOLS

The most fundamental component for understanding and analyzing climate risk is clear, verifiable, timely, and comparable data and modeling. Climate risk assessments should ideally draw on long-term, high-quality records of all

The World Bank Group's Climate and Disaster Risk Screening Tool is one of the only comprehensive climate risk screening tools for emerging market businesses.

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Government Risk Categories Assessment
THIS PROPERTY IS WITHIN THE FOLLOWING GOVERNMENT-DESIGNATED RISK ZONES:



Special Flood Hazard Area (SFHA): YES

Source: Coastal Risk Consulting's Flood Risk Assessment Tool – www.coastalriskconsulting.com

of this data will require using downscaled projections of global climate models to local conditions.

To do that, these general climate projections are coupled with localized weather data that draw on information from the specific location of the business, including historical weather statistics from local weather stations. This process is easiest in regions where these models are in good agreement. In regions that lack such agreement, global and regional models can still provide better understanding of expected changes at a local level. The global and local data are then combined with a collection of highly localized climate models, resulting in tens of thousands of data points and probabilistic projections for the future. The statistical modeling projection built from these data points helps businesses understand climate risks in operations, the costs of those risks, and risk drivers. Additional tools draw on this information to analyze how climate risks interact with other business risks and how those risks evolve over time.

Several institutions and climate analytics companies can now help businesses analyze and assess climate risk using this process. Fundamentally, the tools and models used by businesses to understand climate risks are only as good as the input into those models. Some

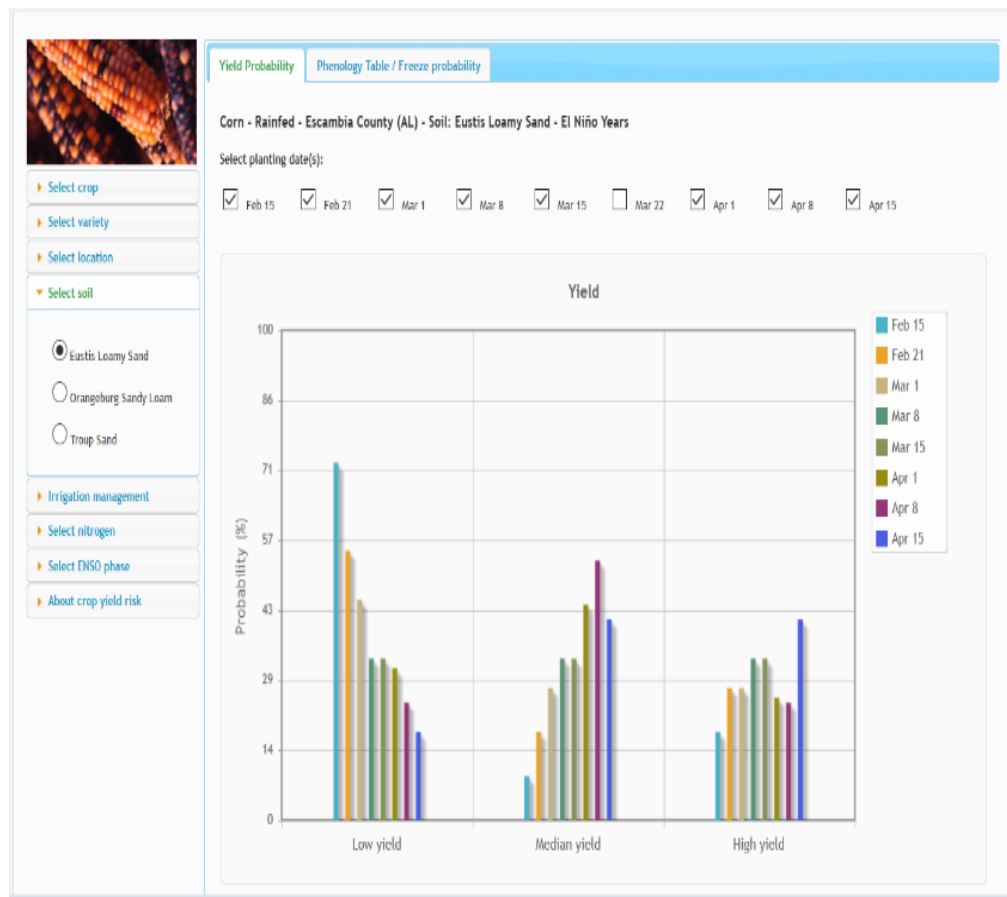
tools may be better able to assess certain types of risks. For example, tools focused on rising sea levels may be less capable of quantifying the impact of droughts.

Once a business understands its risks, it can take the appropriate measures to mitigate potential damage, such as climate-proofing physical assets, or buying insurance or other financial products. The appropriate adaptation actions and associated costs for a given client are highly specific to the assets or processes being adapted. Below are a sample of the available tools that businesses and governments can use to understand and assess climate risks.

Climate Risk Screening Tools

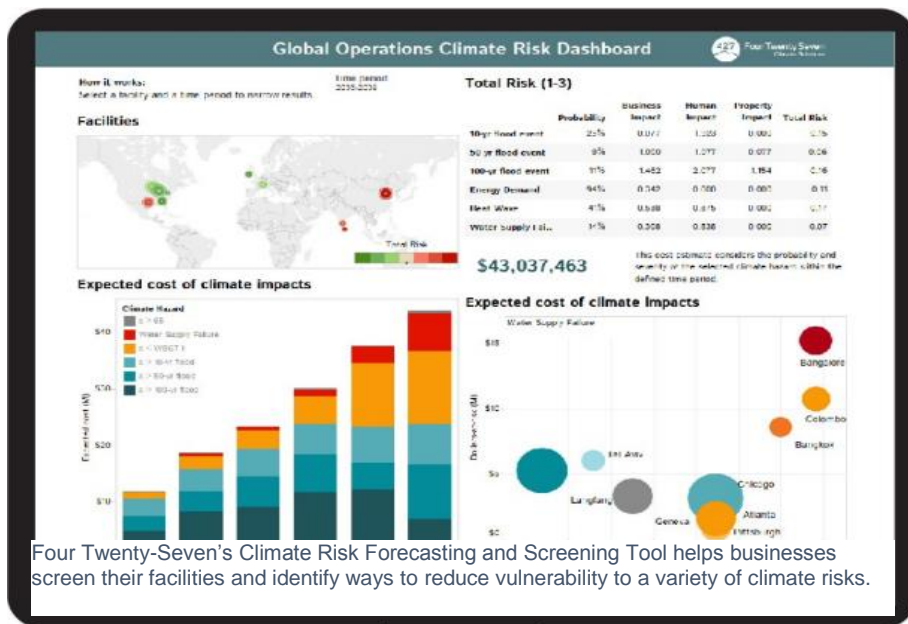
A number of climate risk screening tools are emerging and many institutions, including the World Bank and IFC, are employing them to help understand climate risk in the investments they make.

The Climate and Disaster Risk Screening Tools developed by the World Bank provide a systematic, consistent, and transparent way



AgroClimate is a web-resource that gives farmers information about climate risks to help them manage crops

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Four Twenty-Seven's Climate Risk Forecasting and Screening Tool helps businesses screen their facilities and identify ways to reduce vulnerability to a variety of climate risks.

of considering short and long-term climate and disaster risks in project, national, and sector planning processes. These tools provide high-level screening at an early stage of program and project development, identify climate risk issues, and determine whether the project or program needs to incorporate other considerations as a result. The tools can be used for projects in numerous sectors including agriculture, water, roads, energy, health, non-road transportation, mining, fisheries, forestry, urban planning, and solid waste investments. The climate risk ratings they produce provide a structured and systematic process for understanding climate and disaster risks and serve as a basis for continued planning.

The Global Risk, Resilience and Impacts Toolkit (GRRIT), managed by the National Center for Atmospheric Research and the University Cooperation for Atmospheric Research, connects users to multiple public and private databases—from weather and climate models to current and projected populations, as well as risk, hazard, and vulnerability data.

GRRIT's tools pull critical pieces of information from these data sets that can be fed into other applications that help businesses evaluate their options, such as the Engineering for Climate Extremes Partnership climate risk applications. Other decision making tools being developed include one that can help cities prepare for climate change and an application that predicts coastal damages from cyclones.

AgroClimate is a product of the Southeast Climate Consortium, and is funded by the National Oceanic and Atmospheric Administration, the US Department of Agriculture, and the National Institute of Food and Agriculture. Developed in 2005, AgroClimate provides a number of tools for agricultural

businesses, including a short-term precipitation forecast tool, a seasonal forecasting tool, drought outlooks, hurricane forecasts, and annual assessments of agricultural climate risks.

AgroClimate, which is maintained and operated by the University of Florida, is regularly used during training events with agricultural producers. Its modular platform means that it can be easily expanded to include other geographies and information. AgroClimate prototypes are currently under development for countries in Africa and South America.

Coastal Risk Consulting provides coastal homeowners, as well as businesses and local governments, with an online flood risk assessment tool to help these groups make informed decisions about risk from floods, including those that result from storm surges and rising sea levels. CRC's flood prediction models integrate scientific data from NOAA, the US Geological Survey, the US Army Corps of Engineers, NASA, and other sources to assess current and future flood risk at the property level.

The company helps local governments determine appropriate measures to stave off climate risks. Its Coastal Community Risk Assessment generates flood risk maps, vulnerability assessments, a preliminary outline of potential adaptation strategies, and site-specific recommendations for future adaptation planning, including in areas such as sustainable design and construction, transportation, water management, flood risk and coastal management, emergency preparedness, health, and biodiversity.

Four Twenty-Seven, a climate solutions company that works with industry, government, and non-profits to integrate climate risk intelligence into decision making, provides a Climate Risk Forecasting and Adaptation Strategic Tool that helps businesses decide which measures to take to protect their operations against climate change. The tool helps businesses determine which of their facilities and supply chains are most exposed to extreme weather events and rising sea-levels in both the short and long term. In addition, the tool provides financial evaluations that look at the potential cost to a business if it doesn't prepare for climate change and a cost-benefit analysis of various preventative measures.

CONCLUSION

In both advanced economies and emerging markets, climate change has the potential to threaten numerous aspects of an organization's operations, from direct damages to physical assets to interruptions in business processes and supply chains.

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Fortunately, there are a host of new climate risk analytics and tools, including several from the World Bank that provide private enterprises and governments with methods to assess and begin to develop strategies to address those risks. By integrating climate risk into their overall risk management models, these tools help businesses in all countries better plan for disasters and adapt their operations to the changing climate. ■

¹ The Task Force on Climate-Related Financial Disclosures, "Phase I Report," March 31, 2016.

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² IFC and Acclimatise, "Climate Risk and Business: Practical Methods for Assessing Risk," September 2010.

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