# Title: **Why Natural Disasters Are Going to Roil Supply Chains Over the Next Decade**

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## **How Natural Disasters Shatter the Mechanics of Global Supply Chains**

Historically, natural disasters have only represented one factor among many that procurement and strategic sourcing professionals consider when assessing risk along their supply chains. Most of the time, in fact, they didn’t even register at or near the top of these concerns. Issues like factory shutdowns, labor disputes, geopolitical ramifications, and supplier bankruptcies were typically treated as more consequential risks, with greater potential for serious disruptions to manufacturers.

With the prevalence of large-scale, ten-figure disasters set to climb significantly in the coming years, though—and credible data like those published by the UN and Pew bolstering the statistical case for this perilous trend—professionals in supply chain risk management need to start paying closer attention. While a factory shutdown or a specific supplier going out of business may be costly and damaging in the near term, they are also generally isolated events with defined scopes. Natural disasters, conversely, are complex, multidimensional, and long-tailed. Calamities like hurricanes, droughts, flooding, and wildfires reverberate across the supply chain in myriad ways, endangering infrastructure, shipping routes, and production targets. Understanding some of the most prevailing and destructive scenarios these events can engender should be a foundational aspect of risk management in the 21st century.

## **Critical Bottlenecks Become Increasingly Vulnerable**

In December 2021, a typhoon struck Malaysia and led to some of the worst flooding in the country’s history. Tens of thousands were displaced, major roads were inundated and forced to shut down, and Klang, Malaysia’s largest port and one of the busiest in all of Southeast Asia, suffered critical damage.

Because the country is a crucial hub for semiconductor packaging, the flooding also triggered a major disruption in global chip production. Semiconductor supply chains that begin in fabrication plants based in Taiwan often move through packaging facilities in Malaysia, and the country’s severely compromised port and incapacitated transportation infrastructure derailed this key manufacturing node. Predictably, the consequences were felt well beyond Southeast Asia. The natural disaster exacerbated the existing worldwide semiconductor shortage, deepening the strain on global manufacturers and even causing some automakers in the U.S. to temporarily halt operations.

The typhoon in Malaysia and the destructive flooding it unleashed are just one recent illustration of how the increasing scale and frequency of natural disasters heightens the fragility of supply chain bottlenecks. When major international manufacturers, production epicenters, and transportation hubs with threads connecting them to customers all over the world are marred by significant weather events, the repercussions can be severe and sprawling. Such significant disruptions to global chokepoints are layered and multilateral, too, with knock-on effects that even the most prescient professionals may not see coming. And on a planet where the number of natural calamities is poised to continue climbing in the years and decades to come, the fallouts from disturbances to these critical locations are only going to loom larger and larger.

## **Hurricanes and Flooding Lash Major Ports**

Due to extreme rainfall, rising sea levels, and more powerful hurricanes—all phenomena caused by climate change—the severity and pervasiveness of flooding is projected to grow dramatically worse in the coming decades.

According to data from the [U.S. Environmental Protection Agency](https://www.epa.gov/climate-indicators/climate-change-indicators-coastal-flooding#tab-4) (EPA), it’s already exploded in frequency in coastal locations all over the U.S., with cities like Boston, Massachusetts, Charleston, South Carolina, and Atlantic City, New Jersey experiencing five times as many floods as they did in the 1950s. The agency’s report on flooding cautioned, in restrained, matter-of-fact terms, that such flooding “is expected to increase in depth, frequency, and extent in the United States during this century.”

A future deluged by higher sea levels and more catastrophic flooding is a distressing development for supply chains. Roughly 90% of all freight is transported by sea, and the 2,700-plus coastal ports in the world serve as irreplaceable hubs for all that tonnage and gateways to the marketplaces where it’s sold. Almost all of these ports, alas, are constructed on wharves that sit less than 15 feet above sea level (with some perched just a few feet over the water). As a result, these low-lying seaports that field massive cargo vessels and process thousands of shipping containers every day are uniquely vulnerable to the hurricanes, flooding, and other extreme weather events whipped up by warmer, more elevated oceans. These events can rapidly inundate wharves, severely damage critical infrastructure, and sabotage operations for extended periods of time.

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The array of seaborne natural disasters—supercharged by climate change and growing more potent by the decade—jeopardizes ports all over the world. For the manufacturers, importers, and strategic sourcing professionals reckoning with these expanding risks, the ultimate upshot is a shipping and logistics landscape that is less predictable and more precarious. In the years to come, companies will be forced to navigate delays, fluctuating transportation costs, and operational impediments more frequently than ever before.

## **Mega-Droughts Stymie Shipping Waterways**

The Panama Canal is in the midst of a yearlong crisis. Severe drought conditions in the Central American country have pushed water levels in Gatún Lake—the enormous reservoir that feeds into the canal and sustains its locks system—dangerously low, forcing local authorities to restrict the number of ships that pass through the canal. The high-traffic waterway lowered its capacity to 24 transits a day late last year, a 36% decrease from the 38 vessels that normally traverse the shipping lane on a daily basis.

Though the Panama Canal’s transformation into a global supply chain chokepoint has been garnering the most media attention over the past 12 months, a raft of other critical waterways have been stricken by drought in recent years. A dangerous dearth of rainfall has afflicted the Rhine River in Europe, the Yangtze River in China, and even the U.S.’s own Mississippi River. The commercial consequences of these arid conditions and the shrinking water levels they cause have been rising in kind. The World Economic Forum estimated that the total economic damage caused by droughts in 2021 [surged by over 60%](https://www.weforum.org/agenda/2023/10/drought-trade-rivers-supply-chain/#:~:text=This%20has%20potentially%20alarming%20consequences,And%20that%20can%20be%20expensive.) when compared with the average over the preceding two decades.

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The world’s maritime supply chains are able to lean on an impressive level of resilience and flexibility in the face of disruptions. When a key global passageway constricts or shuts down completely, container ships are often quickly diverted to alternate routes. But the expanding litany of droughts spanning multiple hemispheres is making the world’s sprawling maze of waterways more expensive and difficult to navigate. Lower water levels in the rivers, lakes, and reservoirs that form and feed key corridors of seaborne supply routes means less stability and continuity for the manufacturers, suppliers, and shipping companies that rely on these transportation systems every day.

## **Heat Waves Blight Transportation Infrastructure and Strain Energy Grids**

Twenty-twenty-three was the warmest year since government agencies began keeping records on global temperatures in 1880. The top 10 warmest years since record-keeping started nearly a century-and-a-half ago, meanwhile, have all occurred since 2014. Underpinning this succession of broken records is a severe weather event that may not feature the sound and fury of soaring tsunamis or wolfish wildfires, but is almost certainly among the deadliest varieties of natural disasters experienced on earth. Over the past decade, a string of heat waves ranging from India to the Southwestern U.S. has taken tens of thousands of lives, subjecting millions of people to punishing temperatures and crippling heat indexes.

Heat waves don’t just put an enormous strain on the human body, though. They also exert crushing pressure on roads, railways, and other transportation infrastructure; push energy grids to the brink; trigger power outages; and spike temperatures in the warehouses and other facilities that store the world’s collective inventory. As the annual number of heat waves increase and temperatures continue to climb to new heights, these logistical threats are going to become increasingly normalized features of our hotter planet. It’s entirely conceivable, in fact, that over the next decade we’ll come to see the summer season as a force multiplier for supply chain disruptions, driving staggering stretches of unprecedented heat that severely impair the movement of goods around the world.

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## **Mitigating the Approaching Onslaught of Natural Disasters**

While the number, scale, and media attention paid to natural disasters may fluctuate from year to year, there’s no disputing the overarching upward trajectory of extreme weather events throughout the world. Because natural disasters can disrupt, derail, and disable supply chains in a multitude of ways—some predictable and others far less foreseeable—commodity managers and procurement professionals need to start prioritizing them as top-tier risks.

The potency and magnitude of natural disasters have been steadily growing since the turn of the 21st century, and by almost all accounts will continue rising for decades to come. Manufacturers that fail to grasp their escalating profile and capacity to wreak havoc on all facets of the supply chain are leaving themselves needlessly vulnerable to the costly, even ruinous disruptions emerging from a less stable, more mercurial planet.