RISK MANAGEMENT

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Pollution Risks from Natural Disasters and Response Case Studies

Trends show that economic losses from natural disasters have been on the rise for some time. Early in 2017, California has already been subjected to flooding and an overabundance of water, when not long ago drought conditions and fire hazards were at the forefront of the state's concerns. The recent high water levels of the Oroville Dam in the Sierra Nevada foothills – a result of increased snow melt combined with excessive rains– is an example of a situation where past design parameters are no longer relevant. Similar to these trends, associated pollution risks have also evolved.

Trends in Economic Damages

The Centre for Research on the Epidemiology of Disasters provides an objective basis for vulnerability assessment and decision-making in disaster situations. One of its goals is to help policymakers identify the disaster types that are most common in a given location, achieved in part by maintaining the International Disaster Database. Figure 1 shows the numbers of geophysical and hydro-meteorological disasters along with resulting economic damages for the period between 1950 and 2012. As might be expected, damages fluctuate from year to year, but the long-term trend is compelling. Figure 2 from the United Nations Office for Disaster Risk Reduction shows the more recent past, with data collected from 1980 through 2015.

Figure 1. Numbers of Disasters and Economic Damages 1950 – 2012

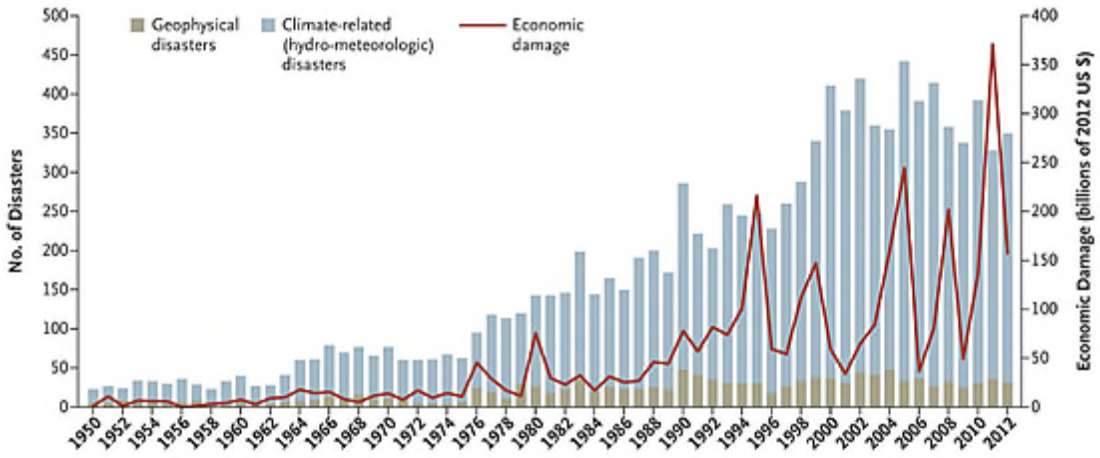
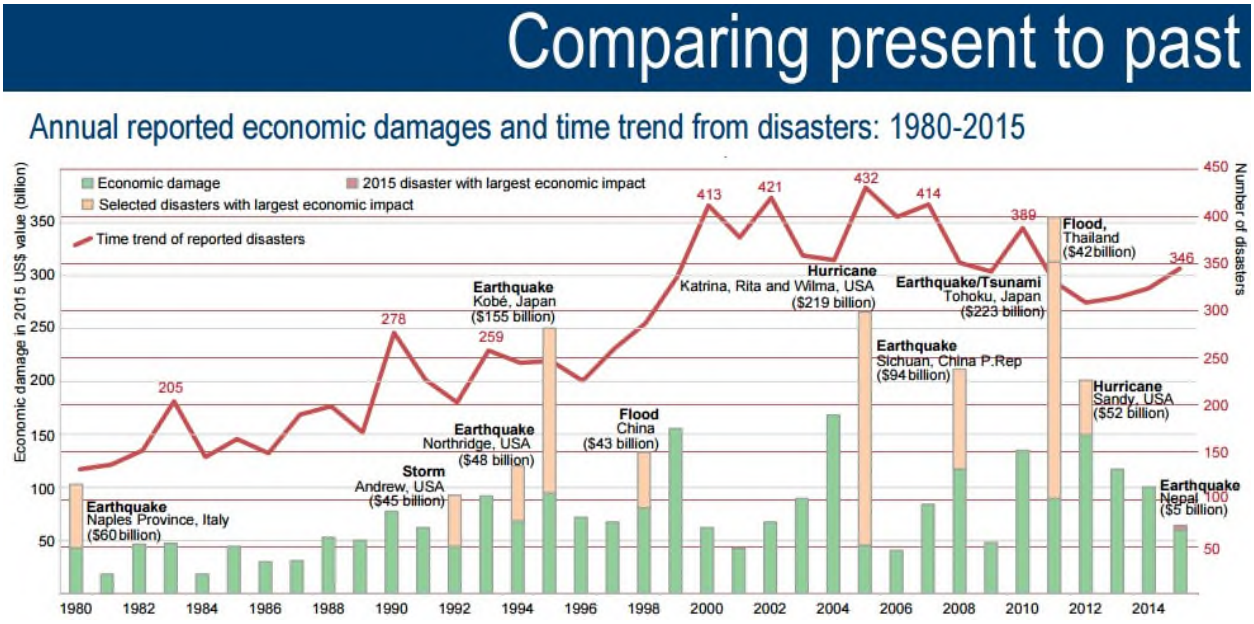


Figure 2. Numbers of Disasters and Economic Damages 1980 – 2015



In 2016, insurance payouts from natural disaster claims were the largest since 2012. Damages worldwide totaled $175 billion, and only $50 billion was covered by insurance. Two Japan earthquakes ranked as the largest disasters, accounting for $31 billion in damages ($6 billion insured). Flooding in China near the Yangtze River caused $28 billion in damages, the largest amount for a weather-related disaster in 2016. In the southeast U.S./Caribbean region, Hurricane Matthew accounted for over $10 billion in damages, with insured losses accounting for approximately one-third of that amount. Last year saw a spike in insured losses from floods, making up 34% of all insured natural disaster losses compared to the 10-year average of 21%.

Wildfires (2016)

Wildfires have been more severe and have had a much greater impact to the built community and environment in the past few years than ever before. Intense wildfires are not only occurring in western states; several damaging large wildfires have occurred in both the Midwest and the eastern U.S. Ash and debris from structures burned by fires can contain concentrated amounts of heavy metals. The residual building materials—including stucco, roofing materials, furnaces, vinyl tiles and mastic, thermal system insulation and other building materials commonly used in homes and facilities built before 1984 - may also contain other contaminants of concern such as asbestos. Additional hazardous materials may also be left behind after wildfires such as household hazardous waste, chemicals used in manufacturing facilities, and other household oddities (ammunitions, mercury, paint, pesticides, and herbicides). Ash containing asbestos and heavy metals becomes a hazard that is not only associated with burned structures, but also windblown ash that may be able to travel to non-burned residential neighborhoods and communities.

The scope of work associated with the removal and disposal of waste generated during wildfires can be quite broad, depending on state and municipal requirements. The waste can fall into one of several categories that can make transportation and disposal an additional challenge, such as trash and burn ash, white goods, household hazardous waste (HHW), asbestos-containing material, charred and burnt landscape, metal, concrete, and construction and demolition debris. Some examples of the many response tasks that may be required during a wildfire cleanup include health and safety monitoring, asbestos and debris surveys, soil and ash sampling, oversight of debris staging and removal to appropriate non-owned disposal facilities. These examples are cited to demonstrate the susceptibility of properties –specifically those with environmental loss hazards presented by manufacturing, storage, or treatment of hazardous materials or substances – to elevated pollution risks. Regulators in states like California have begun scrutinizing disasters, even going as far as developing the CalRecycle initiative, which promulgated new regulations governing the management and disposal of "environmentally-impaired debris" generated during wildfires. This amplified involvement by regulators is coupled with the fact that businesses may be seen, in a court of law, as having culpability for releases of these materials or contaminants during a natural or man-made disaster. With all these challenges, preplanning can be an important aspect to minimizing environmental risks during wildfire seasons.

Hurricane Matthew (2016)

Hurricane Matthew produced rainfall in excess of the amounts predicted to occur once every 1,000 years. Increased rainfalls were enabled by warming in the ocean and coastal atmospheres, which hold more water as temperatures increases. As a result, more rain fell during Hurricane Matthew than would have been produced during an identical storm a few decades ago.

One of the more significant response activities for this and other large storms has involved the sheer volume of debris removal necessary. As a provider of technical and advisory services to the USEPA Superfund Technical Assessment and Response Team (START IV), Tetra Tech conducted numerous assessments of high risk industrial facilities post-disaster. Tetra Tech also managed massive debris removals around the clock for many weeks after the storm on behalf of local and regional authorities, and these response activities continue today.

Significant pollution risk associated with flooding events includes breaches of waste impoundments such as coal-fired power plant ash ponds and animal waste lagoons. One breach was reported at a Duke Energy coal ash impoundment in Goldsboro, NC. North Carolina is also home to more than 2,100 permitted hog farms, many of which include pollution risks from large liquid manure lagoons. After Hurricane Floyd in 1999, North Carolina purchased 42 hog operations in an effort to eliminate more than 100 waste lagoons from floodplain areas. Nonetheless, Matthew-related flooding left more than 10 other large-scale lagoons inundated in the state.

Hurricane Ike (2008)

More than eight years after the storm, Tetra Tech continues to respond to Hurricane Ike. Identifying and accessing available disaster recovery funding is a complicated process. Proper allocations of costs after a disaster will eliminate problems related to insurance and Federal Emergency Management Agency (FEMA) dollars. To avoid any duplication of benefits (receiving insurance money and FEMA

money for the same claim), proactive cost management is critical. Any entities that apply for FEMA funding should know insurance policy limits, deductibles, eligible and ineligible items for FEMA funding. The process through which FEMA handles insurance is to allocate costs to insurance first, then apply the eligible costs to FEMA claims. For a claim that was paid entirely by insurance, the insurance deductible is eligible for FEMA reimbursement.

Evolution of Pollution Risk

The intensity and frequency of extreme weather events across the United States in the last decade contributes to the increased risk and vulnerability of our nation's infrastructure and built environment to significant impact from flood events or other natural disasters. For example, in October 2015, the Columbia, SC metropolitan area experienced its near 1,000-year flood event – an event with only a 0.1% annual chance of occurrence. Similarly, the Houston region experienced a 500-year flood event (a 0.5% annual chance) two years in a row in 2015 and 2016. National flood insurance maps developed by FEMA use historical events as the predictor of future disasters rather than future projected climate conditions, thereby likely understating the potential flood exposure. Evidence to this fact occurred in August 2016 in Baton Rouge, LA when more than 150,000 commercial and residential properties were flooded, yet only a small percentage of the flooded properties were in the 100-year floodplain (1% chance of a flood annually) where insurance is required when mortgages are originated by a lending institution.
Together, these factors contribute to the potential for increased exposure and liability to environmental pollution claims from orphaned drums, ruptured tanks, inundated industrial wastewater systems, or processing and manufacturing facilities. Losses from natural disasters may be direct or indirect in nature. For this reason, businesses should account for the potential risk to business continuity posed by natural disasters, such as power failure, unavailability of transportation logistics systems, or interruption of supply chains.
Businesses have the ability to mitigate environmental risks they face from natural disasters. First and foremost, the facility siting and property acquisition process should include a hazard analysis, comparable to the process of evaluating environmental due diligence. Disaster avoidance offers businesses their best return on investment. However, once a facility is sited, engineering controls and "hazard-proofing" – whether to combat seismic, hurricane, wildfire, or flood hazard – is an integral part of any risk mitigation strategy. Once operational, a comprehensive threat and risk assessment can assist with understanding potential vulnerabilities to hazards. If an all-hazard risk assessment is performed (recommended), it is important for businesses to normalize consequences using pre-set criteria in order to compare the risk of a flood event to other types of hazards, such as an active shooter event. Results from the risk assessments can be used to perform benefit-cost analyses for potential alternative mitigation actions and ultimately inform decision-making and predict maximum return on investment.

Summary

The trend of increased frequency and severity of natural disaster and associated economic damage is well documented. Fortunately, we can draw on past experience to reinforce the need to actively manage the resulting increased pollution risk and regulatory requirements, and incorporate lessons learned into risk management best practice strategies. By doing so, we recognize the increased need to

identify vulnerable and perhaps underinsured operations through vulnerability assessments and business continuity planning. We should employ sound risk management strategies and incorporate the insurance products that are available, and take note that minimum regulatory requirements may not be adequate. One thing is apparent: we cannot rely not on historic data to predict the future.

Useful Links

The U.S. Environmental Protection Agency's Underground Storage Tank Flood Guide provides guidance to prepare for, prevent, or lessen the impact of flooded underground storage tank (UST) systems and return the systems to service. The guide can be found at https://www.epa.gov/ust/underground-storage-tank-flood-guide.

The United Nations Office for Disaster Risk Reduction provides practical services and tools such as the risk reduction website PreventionWeb, publications on good practices, country profiles and the Global Assessment Report on Disaster Risk Reduction, an authoritative analysis of global disaster risks and trends. Information can be found at http://www.unisdr.org.

The Centre for Research on the Epidemiology of Disasters website includes an interactive graphic that can be queried for disaster group, location/continent, and other parameters. This tool can be found at http://www.emdat.be/.

The Federal Emergency Management Agency (FEMA) identifies the zones where flood insurance is required through the National Flood Insurance Program (NFIP). Maps delineating both special hazard areas and the risk premium zones can be found at https://msc.fema.gov/portal and answers to questions about the NFIP can be found at https://www.fema.gov/media-library-data/20130726-1438-20490-1905/f084_atq_11aug11.pdf.

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