

Climate and Extreme Weather Events: Considerations for Insurance, Infrastructure Planning & Environmental and Financial Compliance

1st Edition



JSIHELD
UNIVERSITY

+1 516 621 2900 • info@jsheld.com • jsheld.com

Copyright © 2021 J.S. Held LLC, All rights reserved.

Climate and extreme weather events are threatening human health and safety, food, water and energy security, and the environment in broad areas ranging from the USA to China, Europe, Latin America, and the Caribbean. This paper will focus on the undeniable current climatic conditions (putting aside the questions of causes and reasons)¹ and their influences and impacts upon the insurance market, primarily events that are happening more frequently, in locations not anticipated, and on larger scales than experienced historically.

Introduction

Climate and extreme weather events have recently focused on fire, wind, water, and extreme temperatures and the complex impacts on infrastructure. Aging infrastructure remains a top challenge for public municipalities, natural gas suppliers, and electric power grid operators. The challenges are exacerbated by an aging workforce and intensifying extreme weather events and natural disasters—wildfires, floods, freeze and drought. The net result is that there is a rising awareness of the increasing risks to public and private infrastructure systems and the need for significant investment harden capital investments.²

Critical infrastructure resilience requirements shifted during 2020-2021 as the workplace shifted dramatically compounding the pressure on municipalities and utilities to be resilient³ in their services and make the sorely needed investment in automation, supply, treatment, conveyance, and storage facilities across all categories from renewables to water, natural gas, and associated technology infrastructure. Cyber-security and industrial control systems (ICS) failures, although heavily covered by the media, are important.⁴ However, measures to improve them are incremental and less costly over time when compared to the massive discrete costs related to natural disaster events. To evaluate and predict the impacts from these risks, brokers, actuaries, and under-writers are beginning to utilize artificial intelligence (AI) and data analytics to predict future risk profiles for weather events.

The following information may be of particular interest to the under-writers, adjusters, attorneys, carriers, and professionals seeking to provide viable and affordable risk and insurance products for clients.

The impacts of climate and extreme weather spans entire regions, including Central America, Andean peaks, river basins, and low-lying islands, according to a new report from the World

¹ The term “climate change” cannot even be mentioned without invoking arguments. Many argue the Industrial Revolution has recently created change, while others maintain that any trends are simply natural. Others point to more discrete potentials, such as nations who have recently not acceded to agreements to reduce emissions. The underlying climate “disease - cause” is heavily argued in the news, United Nations, and world forums, culminating in the United Nations Climate Change Conference 1-12 Nov 2026 (COP26). Therefore, for purpose of this paper will avoid this portion of the topic as it is highly politicized

² <https://www.zurichna.com/-/media/project/zwp/zna/docs/kh/infrastructure/aging-infrastructure-whitepaper-april-2017.pdf>

³ <https://globalresilience.northeastern.edu/solution/critical-infrastructure-resilience/>

⁴ <https://www.munichre.com/topics-online/en/economy/us-pandc-market-trends-impacting-public-entities.html>

Meteorological Organization (WMO).⁵ The report voices concern about the loss of forests from fires and over harvesting, thereby reducing a vital carbon sink.⁶ A farmer in Huaraz Peru has a compelling lawsuit for glacial melt flooding impact against Germany's largest Utility RWE which is gaining traction.⁷ Although this may sound trivial, the world's deadliest glacial avalanche and landslide occurred at the neighboring village, Yungay which is a consideration for the legal case.⁸ The political, legal, and International Arbitration landscape is changing based on climatic events compounded by stressors. Climatic events in the Northern Triangle (Honduras, Guatemala, El Salvador) destroyed crops creating unfarmable conditions, causing mass migration of populations first to high crime cities and, second, to the US Border.⁹ Climatic events further impact geopolitical events, security and unrest, and immigration. This is seen not only in Latin America but in Africa, where Ethiopians are facing the worst food insecurity the country has seen since the 1983-1984 famine, which killed over 1 million people.¹⁰ Climatic events can also cause conflict, civil war, and other international conflict which then lead to complex broader risk and parametric issues for underwriters and reinsurers.

Where Are Extreme Climate Events Having the Greatest Impact?

Investors and pension funds increasingly have an Environmental Social and Corporate Governance (ESG) mandate, which insurers—who are often investors—must consider. The following graphic is provided by the Assessment Capacities Project (ACAPS) Humanitarian Analysis Program (HAP) which seeks to develop knowledge, skills, and attitudes among those responsible for humanitarian complex emergencies and crisis analysis within their organizations, a datapoint for underwriting. ESG finance looks at all aspects of the human condition, and, unfortunately, most of those locations which are already at humanitarian stress levels due to other impacts are also being those most impacted by climate and severe weather events. ESG investments in infrastructure development and humanitarian assistance have grown even more necessary considering today's challenges. Authoritarian regimes are exploiting each emergency resulting in mass displacement and forced relocation resulting in compounding political risk. Private and Public ESG fund managers within the Impact Finance Field globally are following thematic investment and issue areas such as climate, sustainability, food, and water resource diversity. These new investment models apply to major insurers and reinsurers who also act as investors.

⁵ <https://public.wmo.int/en/our-mandate/climate/wmo-statement-state-of-global-climate>

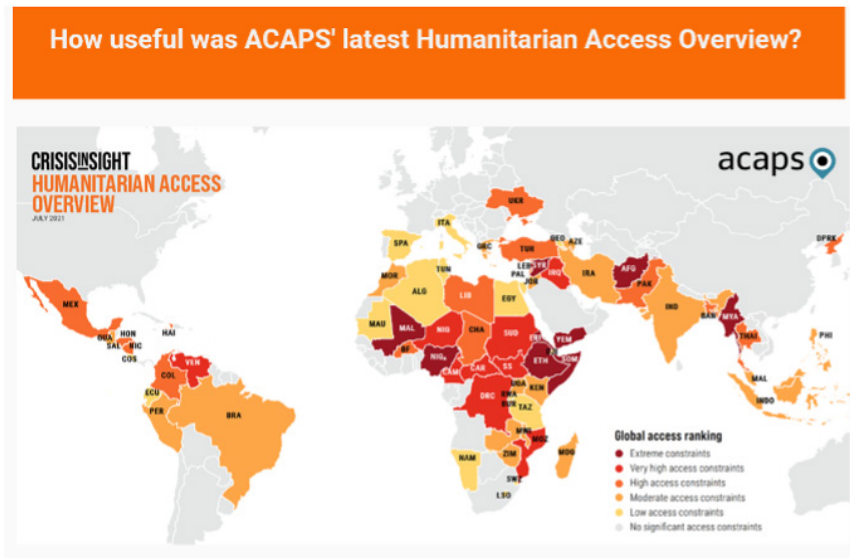
⁶ <https://www.treekly.org/post/five-causes-of-deforestation>

⁷ <https://germanwatch.org/en/huaraz>

⁸ [1970 Huascarán debris avalanche - Wikipedia](#)

⁹ [Climate Change Has Central Americans Fleeing to the U.S. - Bloomberg](#)

¹⁰ <https://www.usaid.gov/results-and-data/budget-spending/congressional-budget-justification/fy2022>



Environmental and Financial Compliance

The climate change agenda promoted by most ESG funds involves integrating nature-based solutions within projects and building water resilience around the world at the forefront. Flood mitigation infrastructure, resilient¹¹ access to water for agriculture, and subsequent mitigation for the drought/fire nexus are critical to reducing human risks and the cost of insuring against those risks. Key projects, engineering firms, and insurance products that do not specialize in deploying to work across national level climate resilience schemes risk not being funded. With COP26 due to be held later this year in Glasgow, Scotland the challenges faced by the water and infrastructure industries globally continue to be critical to a robust market. Critical advocates for ESG energy solutions include a wide cast of players, ranging from Blackrock to the wind and solar advocates to the nuclear energy industry.¹² Natural gas producers are responding to market conditions as much as policy decisions (to further reduce fugitive emissions and provide fewer emissions to maintain the freedom to operate and finance business.¹³

Insurance & Risks

The insurance market must be able to both forecast and de-construct climate and extreme weather events to determine forensics, root cause, and capabilities for resilience into rebuilding and reconstitution of impacted areas. The broad spectrum of events which includes the USA Gulf hurricanes;

¹¹ <https://www.swissre.com/institute/research/sigma-research/2021-resilience-index.html>

¹² <https://nei.org/news/2021/experts-weigh-in-on-esg-and-climate-finance>

¹³ <https://insideclimatenews.org/news/07012020/infographic-united-states-emissions-2019-climate-change-greenhouse-gas-coal-transportation/>

Puerto Rico, New Zealand and LATAM earthquakes; Hawaiian Lava flows; and multiple Western USA fires shows natural disasters' strength and complexity. International collaboration with insurance community and insured clients is required to bring resolution to the complex international legal and geopolitical events ranging from climate impacts to natural disasters to subsequent human conflicts and/or terrorism.¹⁴

Infrastructure Planning

When considering the development of any new project, early attention must be paid to environmental, energy, and water resource management, including availability of reliable and clean energy, water supply, on-site management and conservation, treatment, and potential for reuse.

Countries require the capability to research, plan, and build the infrastructure to develop new buildings, utilities, and structures that are strategically located, as well as systems that are efficient in energy and water usage. Architectural and engineering teams are expected to have a deep understanding of LEED design principles, efficient water usage, and urban master planning.

Consideration of construction sites for capital asset placement requires risk assessments at a regional and country level to give opinions on different geographies and specific climatic areas within them. Each country and region present its own unique challenges in terms of site suitability, infrastructure capacity, environmental regulations, and speed of progression through the planning and build phase. Avoiding unnecessary and frustrating cost and schedule delays are objectives every client wants to achieve, particularly in countries which often have many complex and distinct climatic regions ranging from arid desert to mountainous cold regions to tropical jungles.

Significant aggravating factors exist, such as the rate at which humans are creating impervious concrete or impervious earth areas resulting in more frequent and severe flooding. Further, using the USA as an example, an aging building stock and infrastructure decreases the ability of them to resist and mitigate the effects from increasing climatic threats. For example, most U.S. city center building stock was designed based on a 50-year loading cycle but is nearing 100 years old or greater. Additionally, major city centers' infrastructures were constructed prior to WWII with only a 50 to 75-year life span. Similarly, major transportation infrastructure was constructed immediately after WWII with only a 75-year life span. For this reason, the American Society of Civil Engineers (ASCE) rates the US's infrastructure systems as "C" and "D".¹⁵

Aging infrastructure within emerging nations is even more susceptible to damage from flooding, hurricane, earthquake, and disasters as often evidenced by events in the Caribbean, LATAM, Africa, and Southeast Asia.

¹⁴ <https://www.iss.europa.eu/content/sahel-climate-conflicts-when-fighting-climate-change-fuels-terrorism>

¹⁵ <https://infrastructurereportcard.org/>



Conclusion

With the significant effort to transition much of the existing energy infrastructure in almost every developed country to a decarbonized system, the potential for systemic transient interruptions, disruption of reliable energy resources and insurance industry exposure has increased. Additional risk exposure may be driven by significant business interruptions caused by weather impacts and government curtailment —such as the recent universal failure of gas and electric energy delivery in February 2021 in Texas, Southern USA, and Mexico.¹⁶ The challenge is long-term reliable carbon-free base load generation meeting government-mandated resilience and reliability requirements. An example would be the compulsory need to consider energy storage for any significant renewable project that otherwise produces energy that is considered intermittent and non-dispatchable, i.e., wind or solar. However, large scale energy storage as well as Electric Vehicles (EVs) expansion brings other challenges such as shifting the “clean energy” extractive industry towards less-than-attractive locations in terms of human and environmental costs.¹⁷

¹⁶ Dulude, Banks, Norris, Assessment of Energy System Reliability Failures During the Extreme Cold Weather Event in the ERCOT Region, March, 2021.

¹⁷ [Clean-Energy Materials from Dirty Places | Manhattan Institute \(manhattan-institute.org\)](https://www.manhattan-institute.org)

Infrastructure limits, as well as any environmental, regulatory, or political hurdles must also be considered at the earliest stages of projects as these can cause delays and lead to increased costs. It is essential that a comprehensive due diligence process is followed. These additional measures could include the engagement of management and resilience experts to identify any potential issues. ESG and governmental financiers and investors demand this, and a comprehensive approach will reduce builder's risk, property, casualty, and supply chain disruption claims and future climatic impacts to resilient designs.

Acknowledgments

We thank our colleagues Richard Donohoe, Bill Bracken, and John Dulude for providing insights and expertise that greatly assisted in this research.

This publication is for educational and general information purposes only. It may contain errors and is provided as is. It is not intended as specific advice, legal or otherwise. Opinions and views are not necessarily those of J.S. Held or its affiliates and it should not be presumed that J.S. Held subscribes to any particular method, interpretation or analysis merely because it appears in this publication. We disclaim any representation and/or warranty regarding the accuracy, timeliness, quality, or applicability of any of the contents. You should not act, or fail to act, in reliance on this publication and we disclaim all liability in respect to such actions or failure to act. We assume no responsibility for information contained in this publication and disclaim all liability and damages in respect to such information. This publication is not a substitute for competent legal advice. The content herein may be updated or otherwise modified without notice.