

The Impacts of Climate Change

Executive Summary¹

Observed climate impacts and risks are varied and widespread, with short- and long-term consequences for ecosystems, human health and wellbeing, food production and security, water resources, infrastructure, economies, and finance. Climate science offers a way to understand the impacts of climate change, which are already felt by communities and sectors across the United States and will continue to be in the future. As a result, more and more cases related to climate change are being filed in the United States each year. By understanding climate impacts, judges can better prepare for and assess how climate change will make its way into the courtroom.

This module focuses on the concept of risk and highlights the multidimensional dynamics that shape complex climate impacts. It emphasizes how climate change is impacting ecosystems, societies, and people globally and locally. While climate-related risks will increase, the extent of the impacts will be determined by how ecosystems, societies, and people—including judges—adjust to and cope with climate change. The degree of future greenhouse gas emissions, arising mostly from the burning of fossil fuels, will be the most important determinant of climate risks and impacts. Residual climate impacts are inevitable even with emissions mitigation efforts and adaptation actions, although the severity of impacts that remain will be determined by how much investment is made in mitigation and adaptation.

Scientific and technical evidence is essential to better understand the present impacts of climate change and those projected under different warming scenarios. This module relies on consensus documents from international and national climate assessments, including synthesis reports from the Intergovernmental Panel on Climate Change—better known as the IPCC, U.S. National Climate Assessments, and recent reports from the U.S. National Academies of Sciences. These collaborative studies rely on robust and diverse evidence from a wide range of disciplines and employ an array of methodological approaches. These differing forms of evidence are essential to capture the many ways climate change affects sectors of both human and natural systems.

This module uses a widely recognized risk framework employed in disaster risk assessment, in which risk is determined by a product of three interconnected variables: hazards, vulnerability, and exposure. Hazards describe the potential of climate-related physical impacts, while exposure is the presence of people and ecosystems in places where hazards could occur. Vulnerability refers to the susceptibility of people and ecosystems to harm from hazards—and the lack of capacity to cope and adapt. Importantly, risks are not derived from hazards alone, but from the interactions of hazards with varying exposure, vulnerability, and responses of people and ecosystems.

The risk framework is highly applicable within a climate context. The framework helps to evaluate the different types of climate-related impacts, understand how those impacts differ, and assess the potential for reducing risk, the potential for climate-related impacts, now and in the coming years. Disproportionate risk arises from societal inequalities and uneven socioeconomic development, so marginalized and underserved individuals and communities are more vulnerable to adverse impacts from climate responses. For example, climate change is leading to more frequent high-tide flooding, storm surge, and heavy rainfall events (the hazards), which increases the flood risk for people, ecosystems, and infrastructure in coastal and low-lying areas (exposure). At even greater risk are low-income communities that have fewer resources to finance infrastructure resilience and the relocation strategies needed to cope, adapt, and respond (vulnerability).

As the climate continues to change, interactions between exposed sectors and systems will amplify and transmit risks, affecting groups in different ways. Coordinated adaptation and mitigation among levels and branches of government can help to increase resilience to climate impacts and reduce future risks.

¹This is a summary of The Impacts of Climate Change by Katharine J. Mach.