ENVIRONMENTAL LAW INSTITUTE
CJP CLIMATE JUDICIARY PROJECT™

Risks and Costs of Climate Change

Executive Summary[1]

Given the acceleration of climate change and subsequent climate-related litigation, it is important that judges and the judiciary understand the tools used to respond to climate risks, both physical and financial, such that they can critically review evidence presented to them and interpret the law in accordance with the best scientific understanding. This module provides an overview of the means by which scientists, economists, and policymakers project greenhouse gas emissions scenarios, the scenarios' resulting physical impacts, and the financial consequences of those impacts.

While scientists and policymakers have historically used cost-benefit analysis to assess and manage risks, **iterative risk management—the continuous identification, research, evaluation, treatment, and monitoring of risks—has become the preferred means of managing risks posed by climate change.** Not only is iterative risk management designed to accommodate enormous uncertainties in future outcomes, but it is also particularly adept at incorporating new findings as scientific research advances and the climate changes. Most new studies are generally consistent with the existing consensus, and even the few findings which totally contradict prior beliefs should not change existing scientific conclusions. Rather, scientists and policymakers should adjust the confidence with which those prior beliefs are held, as confidence in a finding is based on the type, quality, and consistency of the available evidence. The module illustrates this point by diving into three real-world examples: the possibility of runaway greenhouse gas emissions from the Arctic tundra, the pace of Antarctic ice sheet melting, and the quantification of global monetary damages from climate change.

Economists use various wide-ranging damage estimates to quantify the risks of climate change. These estimates include the value of statistical life, the social cost of carbon dioxide, reasons for concern, and global damages measured in percentage of global GDP, all of which are discussed in depth in this module. A few common threads run through these estimates. First, any estimate which depends upon projections of climate change, such as the social cost of carbon dioxide, must be updated when climate science changes; their economics are dynamic because climate science is dynamic, and climate science in turn is dynamic because climate change is accelerating. Second, none of these damage estimates provide a fully comprehensive measure of damage because there are currently no reasonable estimates for many factors – whether ecological, physical, or economic – known to be vulnerable to climate change. These damage estimates also often do not reflect possible adaptation efforts that would reduce damages by more than they cost, and they are highly sensitive to long lists of assumptions about discounting, human behavior, and the particulars of the climate system. Finally, their global, and even national, applications are controversial because they cannot adequately account for diversity across national economies, even when exchange rates are

applied. This module describes how some of these wide-ranging damage estimates may be analyzed in assessing policy decisions despite their shortcomings.

Scientists say that humankind has three options for responding to climate change: mitigate, adapt, or suffer. Though some risk of harm will always exist, mitigation and adaptation allow for suffering to be minimized, or at least lowered to an acceptable level.

Together, mitigation and adaptation reduce climatic risks through a two-pronged approach aimed at each of the elements of risk. All risk is the product of the likelihood a harmful event will occur and the magnitude of damage that the harmful event will cause if it does occur. Mitigation reduces the likelihood that harmful events will occur. The primary means of climate risk mitigation are reducing and sequestering greenhouse gas emissions, and for that reason, climatic risk mitigation must be informed by confidence in the attribution of climate-induced damages to human causes, such as anthropogenic greenhouse gas emissions. Because the effects of greenhouse gas emissions remain the same regardless of their geographic point of origin, their mitigation must be global in nature, and this often leads to a tragedy of the commons, where no nations mitigate optimally because they lack the proper incentives to do so.

Adaptation, on the other hand, aims to reduce the damage associated with harmful events. While some adaptation measures can be based upon local observations, long-term proactive adaptation, too, requires analyzing projected climate change scenarios. Policymakers seeking to minimize financial harm from climate change can view insurance deductibles as representing individuals' levels of tolerable financial risk in adapting to a changing climate.

[1] This is a summary of Risks and Costs of Climate Change by Gary Yohe.