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Climate Change: Defining *Adaptation* and *Resilience*, with Implications for Policy

Congress has increased its attention to risks that climate variability and change pose to communities, the economy, and other dimensions of society. Legislative provisions related to climate change have referenced *resilience* or *adaptation*. Federal, state, and local agencies, and other stakeholders, often intend different meanings when they refer to *resilience* and *climate change adaptation*.

This product presents selected definitions in use for *resilience* and *climate change adaptation*, and describes trends and evolutions in use related to climate change. To assist Congress as it considers proposals to enhance adaptation and resilience, and exercises its appropriations and oversight functions, this product seeks to clarify and identify some of the choices implied by differences among definitions. Terms used and definitions provided in legislation, regulation, and guidance may shape how executive agencies or the courts interpret congressional direction and its implementation. Congress may wish to consider whether to clarify terms in legislation or to give discretion to the executive branch. Statutory language may be broad, precise, or ambiguous.

Climate Change Adaptation and Resilience

Grammatically, *adaptation* is a process, action, or sometimes the result of the action, whereas *resilience* is a condition or capacity. In practice, the distinctions and relationship between the two terms are more complicated, with numerous definitions used for each. A CRS review of definitions used by federal agencies and the Intergovernmental Panel on Climate Change (IPCC) indicates that there are notable differences between the two concepts of *adaptation* and *resilience* in the context of climate change. Additionally, there are differences among entities in their definitions of a single term. The differences suggest potentially important nuances that may have policy and implementation consequences. Some agencies and stakeholders appear to use *adaptation* and *resilience* interchangeably or to poorly distinguish their meanings.

Over the past decade, CRS has observed a general shift from a prevalence in federal use of the term *climate change adaptation* to a rise in the term *resilience* in the context of climate change. *Resilience* also has become more prevalent as an objective of risk reduction more generally. The shift in use of the terms in the context of climate change policy may connote change in the concept or approach, a reduction of priority for climate change adaptation, greater integration of climate change risk management into multi-hazard management efforts, or political sensitivity to explicit references to “climate change.”

Definitions of Climate Change Adaptation

Scientific and programmatic literature defines *adaptation* in various ways. Below are a few examples among the variety of definitions. The IPCC defines *adaptation* as

[t]he process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate harm or exploit beneficial opportunities. In natural systems, human intervention may facilitate adjustment to expected climate and its effects.... (Noble et al. 2014)

The U.S. Global Change Research Program (USGCRP), in its Glossary, defines *adaptation* as “adjustment in natural or human systems in response to a new or changing environment that exploits beneficial opportunities or moderates negative effects.” The Fourth National Climate Assessment, also associated with the USGCRP, says that “[a]daptation refers to actions taken at the individual, local, regional, and national levels to reduce risks from even today’s changed climate conditions and to prepare for impacts from additional changes projected for the future.”

The interagency U.S. Climate Resilience Toolkit takes a narrower approach, defining *adaptation* as “the process of adjusting to new (climate) conditions in order to reduce risks to valued assets.” The Government Accountability Office (GAO) has defined *adaptation* as “adjustments to natural or human systems in response to actual or expected climate change.” The U.S. Department of Agriculture takes a slightly different approach: “Adaptation refers to the process of finding ways to prepare for and flexibly respond to changes in climate.”

The Federal Emergency Management Agency (FEMA) has long used *mitigation* as “any sustained action to reduce or eliminate long-term risk to people and property from natural hazards and their effects.” Although not described as *adaptation*, many of FEMA’s mitigation efforts may support adaptation to climate changes.

Definitions and Uses of Resilience

The IPCC, in a 2012 report on disaster risk management, defines *resilience* as “the ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a potentially hazardous event in a timely and efficient manner...” The USGCRP Glossary defines *resilience* as “a capability to prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment.” The interagency U.S. Climate Resilience Toolkit defines *resilience* as “[t]he capacity of a

community, business, or natural environment to prevent, withstand, respond to, and recover from a disruption.”

The Department of Defense (DOD) uses a general definition of *resilience* when addressing climate change adaptation: the “ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions” (DOD Directive 4715.21). Climate change adaptation and resilience measures are often implemented as part of DOD-wide resiliency efforts carried out by the Military Services. For example, the Air Force approach to “installation resilience” includes assessing and preparing for *any event* that could disrupt the operations of its installations—be they manmade accidents and attacks, or natural disasters.

Congress (in Section 1235(d) of P.L. 115-254) directed FEMA to define for its use the terms *resilient* and *resiliency*. The agency has not completed this process.

Takeaways from the Variety of Definitions

Examination of the differences among definitions and uses points to elements that may be important for understanding intentions or for decisionmaking. Some uses appear only to address sudden-onset events, such as hurricanes or flash flooding; others would also encompass slow onset or chronic conditions, such as mean temperature increases, seasonal changes (e.g., change in timing of snowmelt), or shifting ranges of disease-bearing insects.

Climate change adaptation seems most often—but not always—associated with new conditions or forward-looking expectations. For both terms, when the objective is forward-looking, *adaptation* may imply a longer time horizon than *resilience*.

Adaptation often implies altering a system to accommodate persistent or long-term anticipated changes in the climate; this may involve system alterations that may not be necessary to enhance resilience to a static climate condition. *Resilience* is sometimes (but not always) considered as withstanding a hazard with a return to predisturbance conditions, or “bouncing back.” This can raise questions for federal actions as to whether their objectives are to return a system to its predisaster form or function, or to transform systems more profoundly in order to avoid risks while maintaining welfare or services in an evolving environment. Some in the climate change adaptation community see the desired outcome as systems well adapted to future climate conditions; this may go beyond some resilience concepts. For example, *well adapted* may entail removing development from a high-hazard location and not merely building hazard resilience. In other words, *adaptation* may favor removing structures rather than elevating them.

Until the 2010s, the climate change policy community used *adaptation* most often as the potential process of addressing impacts of climate change; it was less often conceived in a context encompassing nonclimate hazards, such as earthquakes. In contrast, *resilience* is often raised within a scope of multiple climate and nonclimate hazards, and is often used to characterize the capacity of a system (e.g., community, subpopulation, business, or ecosystem).

Additionally, *resilience* appears rarely to incorporate taking advantage of emerging opportunities in a changing climate. Although *adaptation* is often associated with adjustments to avoid negative consequences, it is also often associated with seeking opportunities and new benefits of change.

Implications for Congress

Generally, noting the distinctions between *adaptation* and *resilience*, as in the IPCC’s definitions, can help clarify policy implications. Uses may continue to evolve over time.

If Congress addresses climate change adaptation or resilience, it may clarify its intent by providing definitions, or leave definitions to federal agencies, or to interpretation by the courts if litigated. Some recent bills include *adaptation* and *resilience* in their definitions sections. Executive agencies may promulgate definitions through formal means or use flexible guidance or communications. Using the terms interchangeably may leave confusion and create uncertainty for stakeholders as to scope and federal intent, and may complicate Congress’s oversight and assessments of performance and effect of federal efforts.

If Congress addresses objectives and definitions regarding *adaptation* or *resilience*, it would face several questions, such as whether the term or terms used are to

- cover responses to sudden-onset risks or events and/or slow-onset risks, or both?
- apply to climate change-related risks, or to climate hazards in the context of multiple hazards?
- be explicit about anticipating and preparing for evolving future risks (i.e., use of climate change projections), or indicate use of historical data or recent climate conditions or risks?
- include making durable changes in anticipation of current or future conditions, or focus on recovery to predisruption status?
- allow for transformational change of the underlying system at risk as well as incremental change?
- seek potentially beneficial opportunities, not just avoid risks or adverse conditions?
- incorporate social aspects of adaptation and/or resilience, including capacity, equity, and other dimensions?
- suggest the level of acceptable risk implied in being well adapted or resilient? What is the outcome sought?

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