

Resilience

Natural disasters often impose significant and long-lasting stress on economic, social and ecological systems. From Atlantic hurricanes to midwest tornadoes to western wildfires, no corner of the U.S. is immune from the threat of a devastating natural disaster. In general terms, resilience is a characteristic that human and natural systems exhibit that helps these systems withstand and recover from an adverse shock or event. In the case of



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natural disasters, communities often face both chronic (e.g., drought) and acute (e.g., hurricane) natural hazards simultaneously, thus, making resiliency planning challenging. Community resiliency is often assessed as independent constructs of either *vulnerability* or *recoverability* (e.g., Cutter et al. 2003; Frazier et al. 2014). In reality, to represent resilience, these two constructs are integrated, with the status of each influencing the other. Collectively, assessments regarding infrastructure and housing conditions; building code policies; and socio-economics can influence vulnerability *and* the capacity for recovery. Equally important to the resiliency issue is recognizing the inevitability that one or more natural hazards can contribute to both short- or long-term adverse

impacts on a community. Measures such as the number of past natural disaster events provide insight for determining potential threats while values related to monetary, natural and human losses help frame possible magnitude of impacts.

Nationwide, communities are beginning to recognize the need to balance planning, investment and development activities across a full-range of socio-ecological systems in order to build and enhance resilience. In the face of a constantly changing natural hazard landscape, the benefits of creating built *and* natural environments that are resilient to adverse climate events helps promote and sustain community success over time.

Relationship to Ecosystem Services:

In towns and cities, resilience is promoted through planning while in nature, this trait is assumed inherent (NRC 2012; Meadows 2008). Natural systems have innate internal structures and functions, such as diversity and redundancy, to facilitate recovery from an adverse event (Holling 1986; National Fish, Wildlife and Plants Climate Adaptation Partnership 2012; Melillo et al. 2014). However, by simply existing, nature helps mitigate the impacts of natural hazard events and potentially decreases the recovery time. In both human and natural systems, the success of the recovery process is dependent on the robustness of the mechanism. This robustness refers to the system's ability to resist or tolerate change without adapting its initial, stable configuration. In the case of nature, ecological conditions may be the determining factor for recovery and resilience while the depth and breadth in planning or governance is a pillar for resilience in built environments—including restoration, preservation or conservation considerations for the ecosystems on which communities depend.



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