

Vulnerability of coupled human-environment systems

Theoretical and empirical research on vulnerability has developed rapidly over the last quarter century (Dow 1992, Kasperson et al. 2005, Eakin and Luers 2006). Vulnerability studies highlight how hazards arise, exposures and susceptibility to the threats are differentially distributed, and people adapt or cope with the threats and their effects in coupled human-environment systems.

At its most basic level, vulnerability can be defined as the “differential susceptibility to loss from a given insult” (Kasperson et al. 2001, pg. 24). Increasingly researchers of vulnerability have adopted a definition that is multi-dimensional, linking exposure to a hazard, the susceptibility (or sensitivity) of people to loss from the exposure, and the ability to resist or cope with the exposure or loss (Dow 1992, Eakin and Luers 2006, Kasperson et al. 2005, Turner et al. 2003).

Integrating vulnerability explicitly into the conceptual representation of hazards as a causal chain linking events and consequences improves its applicability to characterizing and managing impacts related to climate change and other stresses on coastal communities. First, it clarifies that different targets can be affected differently by equivalent exposures. For example, people working in the tourism service sector will experience coastal storms in different ways. Some who work in the service sector may also live near the coast and face the hazards of staying, the challenges of evacuation, and possibly rebuilding. For others, the major impacts may be on their jobs. The economic repercussions for the businesses, the employees, and their households will differ based on their level of preparedness and assets. Businesses without disaster plans that lose key assets such as computer databases may close permanently. Some individuals will have insurance or skills that allow them to take on another work while others may look for different employment. Municipalities also face considerable economic risk if coastal changes result in loss or damage. Federal disaster insurance covers only a portion of local rebuilding costs. Changing financial risks may affect the community bond rating. Thus, when considering the vulnerability of individuals, households, communities, or sectors to environmental, social, or regulatory changes it is important to understand how sensitive they are to such changes. Expanding the causal diagram to illustrate how different targets are affected by exposure adds in key information that coastal managers need.

Second, vulnerability adds the notion of resilience coping (also, often referred to as adaptive capacity or coping). For example, dual-income households may be better able to withstand economic threats (from environmental or regulatory causes) than those who rely on income from a single person’s tourism related employment. Conversely, other characteristics may negatively affect the resilience of individuals, households, businesses, communities, or sectors. For example, while businesses may be able to reopen quickly to serve local populations, tourism-related businesses will be harder hit if an event results in decreased visitation during the peak summer season. Coping actions can be things people do to protect themselves from harm, such as getting help from with friends and neighbors.

References

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