

Editorial

The Tsunami: Rethinking Disasters

The tragic consequences of the recent Southeast Asian tsunami reminded us in a profound way of humanity's vulnerability to natural events. In addition to appropriate emergency relief, immediate responses included warnings of infectious disease outbreaks and calls to build a tsunami early warning system in the Indian Ocean. Satellite imagery quickly surfaced showing that some coastal areas where mangrove forests had been removed were more affected than those still forested. Reports later emerged that the tsunami warning system in the Pacific actually detected this event. So, what monitors in the Pacific knew, was a complete surprise in the Indian Ocean (with the exception of some hotel residents who were informed via international hotel telecommunication and immediately fled to safety) for the want of an information infrastructure. Such an electronic infrastructure was apparently unnecessary for Indigenous Andaman Islanders who, as a result of traditional ecological knowledge conveyed by oral tradition, responded to the tremors by evacuating to higher ground.

Behind these anecdotes and other themes is a set of interrelated ideas illustrating how humans and institutions interact with nature, perceive the associated risks, and understand both in relation to disasters (or potential ones). New thinking has emerged in the past decade that provides insight into these issues, described in books with wonderful titles including *Barriers and Bridges to Renewal of Ecosystems and Institutions* (Gunderson et al., 1995) and *Navigating Social-Ecological Systems* (Berkes et al., 2003). Such works challenge the notion that humans and nature are independent of one another, and by extrapolation they challenge terminology and the idea of a "natural disaster," "acting upon us." Rather they argue that understanding vulnerability, and addressing it, can be rewardingly framed in the context of reciprocal responses of human and natural systems. Seen this way, a human disaster is only such when an

event is institutionally unanticipated—a "surprise"—and results in significant human suffering. The degree to which events like volcanic eruptions, earthquakes, hurricanes, or tsunamis, normal (albeit perhaps rare) events, produce a human catastrophe is a function not only of their predictability but of our capacity, willingness, and preparedness to heed learned advice and lessons from past events and the growing body of knowledge on human-natural system interactions. Viewed this way, disasters are therefore neither "natural" nor "acts of God"—while the precipitating natural events might be. Key elements of social-ecological systems theory include matters of resilience (the reciprocal of vulnerability), where a desirable state is maintained by an internal capacity to recover and learn in response to shocks. Such capacity is experiential and learned, and makes for a more flexible and adaptive approach, thus minimizing surprises. Ways of coping with the potential for surprise (institutional resilience), such as through "traditional ecological knowledge," have been lost in many societies. Dislocation from traditional lands, associated poverty, and socioeconomic circumstances not only disrupt systems of traditional ecological knowledge but result in limited options of where to live or how to adjust to an environmental hazard. Elsewhere, choice of response to potential hazards may be based on perception of risk.

Our standard social and institutional frameworks available to reduce the vulnerability of local people give rise to three learned planning strategies: control, prevent, and/or adjust and adapt. Control strategies are structural and are built around notions of resisting events of a predictable magnitude. Prevention seeks to intervene in the sequence of events that leads to the extreme situation. Adaptation is a strategy that uses learning to avoid or cope with the consequences of the extreme. All three strategies have systemic consequences and the mix of their application produces

different degrees of resilience. For instance, addressing the potential disease outbreaks following the tsunami potentially uses all three strategies: spraying for mosquitoes or disinfecting drinking water for cholera (control and prevention); restoring functional sewerage systems and providing vaccinations (mainly prevention); restoring mangroves, collecting narratives concerning the event, and broadening the educational base concerning tsunamis to include the public health sector (mainly adaptation). Social-ecological systems research suggests that human institutions which focus too strongly on controlling natural variables show symptoms of institutional and natural system resilience decline where surprises become inevitable. On the other hand, focusing on learning capacity, particularly that which transcends disciplinary, institutional, and social-cultural boundaries, increases resilience and diminishes surprise and its potential financial and human cost.

A meeting held in Honolulu in this past March sponsored by Asia-Pacific Institute of Tropical Medicine and Infectious Disease, the East West Center, and US National Institutes of Health focused largely on the application of social-ecological systems thinking to emerging

infectious diseases. The results, to be published shortly in this journal, represent a valuable step towards fostering an increased understanding of the artificiality of the human-nature dichotomy, and a deeper, more comprehensive way of dealing with such human health issues.

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