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Authors: Kelley, Timothy, and Covi, Michelle

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EDITORIAL

Environmental Health *Hazardscapes*

Timothy Kelley[1,2] and Michelle Covi[3]

[1]Environmental Health Program, Department of Health Education and Promotion, East Carolina University, Greenville, NC. [2]Editor-in-Chief, *Environmental Health Insights.* [3]Coastal Resources Management Program, East Carolina University. Corresponding author email: kelleyt@ecu.edu

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The discipline of environmental health may be described as the identification and characterization of hazards and the development, implementation and evaluation of appropriate intervention strategies to limit physical, chemical, biological, sociological and other hazards and associated risks in our environment. Prediction and prevention of potential future hazards and associated risks is also often an important role for the discipline of environmental health.

The term "hazardscape" has been used to describe the net result of both natural and human-made (anthropogenic) hazards and the cumulative risks that they pose across a given geographical area. This includes the interactions among nature, society, and technology at a variety of spatial scales, creating a *mosaic* of risks that affect places and the people who live there. The concept of hazardscape has been used in the social sciences to broaden the consideration of hazards to include sociological and psychological issues such as perception of risks, personal and societal experiences and associated response cultures as well as trust of hazard/risk responses as implemented by governmental or non-governmental agencies. Use of a hazardscape approach includes the "discursive" element (verbal discourse, or how people *talk* about hazards and risks), which may include the collective risk perception of hazards on a community level.[1,2]

In the discipline of environmental health, a hazard may be defined as the physical, chemical, biological, and other condition that may result in damage to human health and/or our environment. Risk may be defined as the likelihood of exposure to a hazard, which may then result in damage. This may be expressed in a diagram where the intersection of overlapping *hazard*, *exposure* and *vulnerability* represents the *risk*.[3] In social science applications, vulnerability may be defined as the susceptibility of individual persons or a community to suffer from hazard exposure in a given geographical location. However, in an environmental health context, vulnerability could be extended to the natural environment and its physical, chemical, and biological components.

During 2012 and 2013, *Environmental Health Insights* contributors have addressed diverse hazards such as dioxin exposure, microbial water quality, atrazine and nitrate, ozone, socioeconomic status, the 9/11 disaster, and others. In past *Environmental Health Insights* editorials, I have attempted to broadly characterize both natural and anthropogenic hazards such as the 2010 Deepwater Horizon (BP) oil blowout and the 2011 Tohuku Japan earthquake and resulting tsunami as well as environmental health resilience to hazards. Could the discipline of environmental health benefit from lessons learned from a hazardscape approach and if so, how could this be accomplished?

The "transdisciplinary" nature of the current discipline of environmental health seems to make it well suited to evaluate hazardscapes from geographical, physical, chemical, biological, sociological and psychological perspectives. (Transdisciplinary may be distinguished from the terms interdisciplinary and multidisciplinary by its use of multiple *overlapping* disciplines that may inform each other concerning environmental health hazards and risks.) The goal of a hazardscape approach appears to be to *contextualize* a topic within a range of hazards and social/economic vulnerability to these hazards. Due to its applied nature, environmental health researchers and practitioners are already engaged to a greater extent with their communities and community "stakeholders" than many other disciplines. However, we should recognize that this is not a unidirectional, academic approach, but rather a discourse about what hazards and risks the community feels are most important, and how they should be addressed.

One concept applied to hazardscapes is that of *marginalization*, or the disproportionate hazard exposure and therefore risks to populations with relatively low socioeconomic status and reduced political power. An example could be location of wastewater treatment plants and/or landfills in geographic locations with human populations of lower socioeconomic status. However, in modern society, those persons with higher relative socioeconomic status may be able to live in higher hazard/risk areas such as shorelines due to their greater access to insurance and political power.[4] When people see hazards as something separate from themselves and their geographic location (sometimes referred to as "acts of God", or "acts of nature"), it may isolate us from our environment and the consequences of our living as an integral part of nature. While vulnerability to hazards may have a strong temporal or historical component (eg, the concept

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of a "100-year floodplain"), this concept may be less useful than previously assumed (eg, three "100-year" floods occurring within a decade, perhaps contributed to by the affects of global climate change).[2,5,6]

The existing "hegemony" (a dominant social/political authority within a culture) may also influence strongly how hazards and related risks are perceived by the community. For example, if the hegemony promotes the idea that a wide range of human choices should be tolerated by a society in order to promote individual and societal freedom, individuals and groups may choose to accept more risks. While some of these risks may be managed through monetary savings or purchasing insurance, it is important to realize that some percentage of the cost is always shared by the society at large.[7,8]

Following some consideration we have identified at least three ways that we believe that the concept of hazardscape may be useful for the discipline of environmental health. Firstly, it is important for us to realize that hazards and risks are a regular, albeit not entirely predictable, part of our environment and that our personal choices affect the hazards to which we are exposed. This includes where and how we choose to live. Secondly, we have the ability to limit our risks by either accepting the losses that we may incur, establishing social support systems (eg, family, friends, churches), that may help us to "weather" hazardous events or purchasing insurance that is adequate to cover our losses (although some of those losses will be shared with our larger community). Finally, we should recognize that environmental hazards and risks are not distributed equitably among all socioeconomic levels and explore and consider ways of more equitably distributing hazards and risks to build a more just society. By improving the lives of the poorest and most underserved among us, we all become more resilient. This is particularly important in our rapidly changing global environment.

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TK, MC jointly conceived the concept and wrote the manuscript. All authors reviewed and approved of the final manuscript.

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