



Review

Environmental Research Translation: Enhancing interactions with communities at contaminated sites



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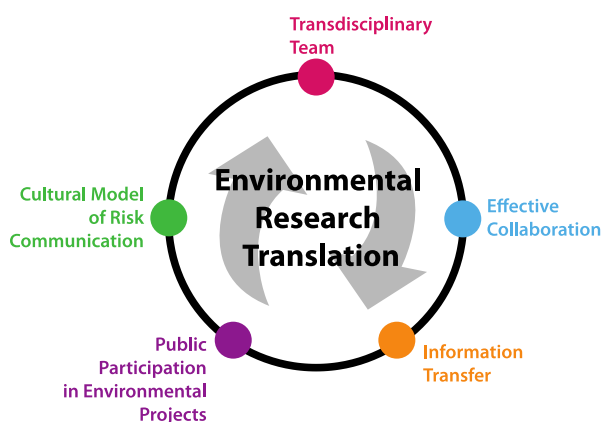
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HIGHLIGHTS

- Review of participatory approaches focused on dynamics at contaminated sites
- Synthesis of selected disciplines to develop a toolkit for environmental scientists
- Proposed Environmental Research Translation framework
- Translational science promoting robust community participation at hazardous sites

GRAPHICAL ABSTRACT



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ABSTRACT

The characterization and remediation of contaminated sites are complex endeavors fraught with numerous challenges. One particular challenge that is receiving increased attention is the development and encouragement of full participation by communities and community members affected by a given site in all facets of decision-making. Many disciplines have been grappling with the challenges associated with environmental and risk communication, public participation in environmental data generation, and decision-making and increasing community capacity. The concepts and methods developed by these disciplines are reviewed, with a focus on their relevance to the specific dynamics associated with environmental contamination sites. The contributions of these disciplines are then synthesized and integrated to help develop Environmental Research Translation (ERT), a proposed framework for environmental scientists to promote interaction and communication among involved parties at contaminated sites. This holistic approach is rooted in public participation approaches to science, which includes: a transdisciplinary team, effective collaboration, information transfer, public participation in environmental projects, and a cultural model of risk communication. Although there are challenges associated with the implementation of ERT, it is anticipated that application of this proposed translational science method could promote more robust community participation at contaminated sites.

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1. Introduction

The impacts of past human activities on water, air, and land pollution and ecosystem degradation continue to present complex challenges to human health and economic development. In the United States alone, there are more than 126,000 Comprehensive Environmental Response, Compensation, and Liability Act (CERLA or Superfund, enacted in 1980), Resource Conservation and Recovery Act (RCRA, enacted in 1976), and other contaminated sites that have not yet reached closure (National Research Council, 2012). These contaminated sites pose a known or potential risk to human health, and jeopardize the ecosystem services upon which our livelihood depends.

Challenges at hazardous waste and contaminated sites are persistent, complex, and multifactorial, and there has been a lack of significant progress in finding holistic solutions that incorporate all affected parties. This can be attributed in part to the lack of collaboration, information transfer, and partnership building among government, the affected community, scientists, site owners, industry and other interested parties. Issues pertaining to public participation in environmental decision-making, collaboration between all stakeholders and the affected communities, and communicating risk to the communities add an additional layer of complexity for which most environmental scientists have not been trained to manage. Traditionally, environmental scientists and engineers are not introduced to the nuances of environmental communication and the social sphere associated with contaminated sites. Hence, they may not be aware of the voices and practices that various stakeholders and community groups use when

discussing environmental issues, and they are not instructed in how to raise public awareness, or work with the communities neighboring contamination (Cox, 2013). This set of deficiencies is likely to hinder the effectiveness of environmental scientists in their efforts to address environmental issues. Understanding how to work with all stakeholders, build partnerships, elicit local knowledge, and increase community capacity can enhance their success.

Communication about environmental issues and solutions is too often restricted to the technical sphere, and thus excludes those who are most affected, such as the communities neighboring contaminated sites (Cox, 2013). Issues beyond the technical aspects of site remediation can hinder the clean up of a site and as a result, a legacy of mistrust can permeate the relationship between regulatory officials, scientists, and the affected communities (Senier et al., 2008; Galvez et al., 2007). Exposure to risks is unevenly distributed across the population, and based on historical reference, the burden of coping with environmental issues has had a tendency to fall upon the most vulnerable human populations (Beck, 1992). Social factors such as socioeconomic conditions, race/ethnicity, gender, and occupation, as well as the actions of government, civil society, and markets, determine who is exposed to what level of environmental health hazards (Martuzzi et al., 2010; Freudenberg, 2004; Morello-Frosch et al., 2002; Williams and Florez, 2002). Efforts to address and resolve local environmental issues are most effective when scientists from various disciplines, regulatory officials, industry, and the affected community are fully engaged working towards a unified solution. To effect meaningful changes in the environments and health of communities, community-based

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