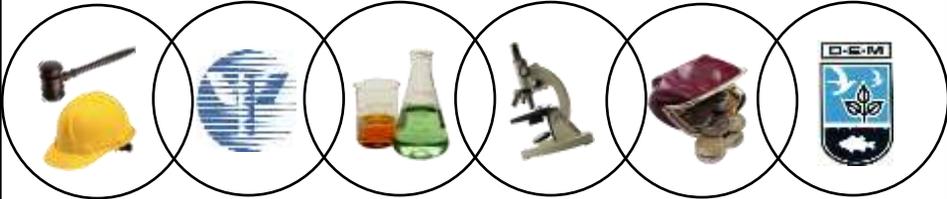





Communicating Risk at Waste Site Cleanups

Social, Psychological, and Economic Considerations and a Paradigm for Moving Forward



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Workshop – May 2012 at Brown University



How might social science perspectives help advance the communication of life and physical science efforts aimed at characterizing human health risks posed by, and restoration of, contaminated hazardous waste sites?

Roughly 35 invited speakers and participants



Joint effort of NIEHS and Brown U SRP

Disciplines Represented

- Community Leaders (Urban, Native American)
- Sociology, Psychology, Economics, Anthropology
- Physical and Life Scientists
- Lawyers, Regulators, and Developers



Exploring How the Social Sciences Can Help Environmental Professionals Communicate More Effectively with Stakeholders

What can the social sciences in collaboration with physical and life scientists contribute that promotes more comprehensive characterization of contaminated sites and can lead to their effective management?

Different communities of researchers from the social sciences also contribute to understanding the full spectrum of issues surrounding the economic, social, and public health impacts and costs of site contamination.

Life and physical scientists do not often consider the contributions of the social sciences to the complete understanding of hazardous waste sites and their management.

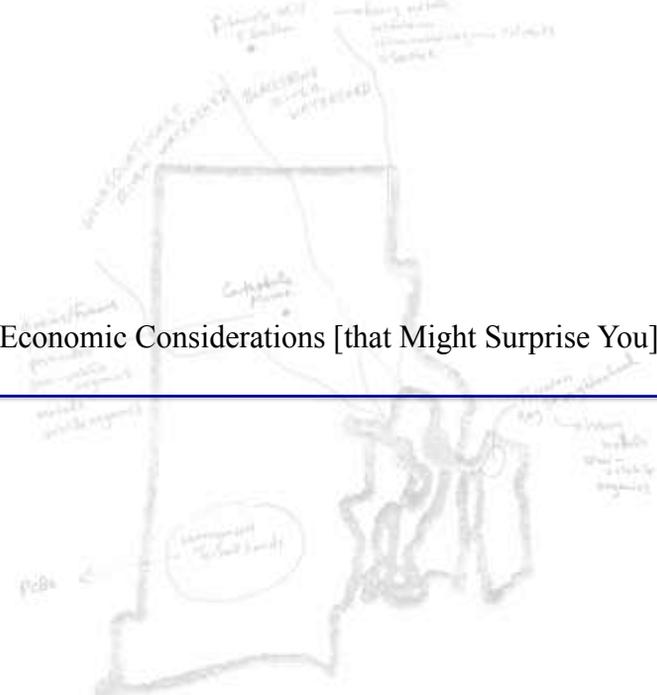


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What Does This Mean to the Community of Environmental Professionals?

- Little attention has been afforded to the **psychological and economic** costs and impacts of contamination and challenges related to these.
 - Consider the impact of the above factors on communicating risk to many different stakeholder groups who have different definitions of key terms from the start.
 - There has been a lot of discussion about more *effective communication*, but is there a more fundamental paradigm shift needed that goes beyond simply translating to the language of the *impacted community* (beyond *simplifying the science*)?

Economic Considerations [that Might Surprise You]



Economic Impacts of Contaminated Sites

Traditional economic principals require that consequences be reduced to quantitative (\$) basis.

Ofentimes the yardstick is only monetary (e.g., cost of clean water)

Utility theory assigns value to less tangible values (pleasing view)

Relied upon by decision makers to judge desirability of cleanup

- ...And though community representatives all spoke of the importance of economic improvement, it became clear that they and the economists and developers were speaking different languages.
 - For some, it meant job opportunities, but subject to criterion that these opportunities be located “in the community.” For others the economist’s metric of increased values of housing stock posed a threat, since it implied “gentrification” of the community.
- The definition of "community" is a problem right away- is it a block? a city? a state? a particular group among others in a geographical area? If this is not resolved at the outset, there is no possibility of "appropriate communication."

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Current Economic Metrics are Insufficient



There is currently no economic research that addresses the incorporation of social considerations, despite consensus amongst workshop participants that the economic aspects of contaminated site management are misunderstood by many stakeholders.

- Change in Quality (ΔQ) is main variable used to quantify economic impact of contaminated sites.
 - Economists must understand both environmental insult and baseline conditions, **but rarely is such information available from physical or life scientists in any meaningful form.**
 - “Resource equivalency” and “Willingness-to-Pay” are determined and used.
- At the Regulatory Impact Stage
 - Only the engineering costs of remedy are considered for determination of whether the cost of remediation is warranted.
- In Legal Cases
 - Impact analyses are reduced to a minimum that can be defended (Hard to bring in intangibles).

The public may not be compensated for the full damages of contaminated sites because vital information remains siloed in various disciplines and communities.

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Better Engagement with Economists



Can economists recalibrate existing tools and research techniques?

- Stated Preference Studies (i.e., surveys)
- Sadly, the economics community has not yet developed a strong branch in environmental health related issues – experts are hard to find.

In the Meantime, when communicating to the public...

- Those responsible for risk communication must understand that the public may define *economic improvement* much differently than they do.
- The stakeholder community needs to be more aggressively challenged to understand the full spectrum of issues related to economics- don't let them off the hook

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Psychological Phenomena
[that all Risk Communicators should Be Aware of]



- **Stig•ma**

noun

1. a feeling-based, negative response leading to classification of something as undesirable and to be avoided.
2. a mark of disgrace associated with a particular circumstance.
 - Based largely on association with negative outcomes and on biases.
 - A real psychological phenomenon that has tremendous impact on behaviors that often transfer into economic impacts.



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Stigma and Attribution

...communities designated as Superfund or Brownfield sites carried a **stigma**, related to circumstances not of their own making. This stigma carried through the community, leading residents to assign blame for a host of problems (e.g., every illness, birth defect, cancer) to the contamination, whether or not these conditions could be scientifically linked to the contamination. This phenomenon is defined as **attribution**.



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Stigma and Probability Neglect

- The notion that contaminants can be dangerous at high dose but safe at low dose is oftentimes not understood or selectively not applied, even though most people understand this in other concepts, like pharmaceutical dosage.
 - Why?! The difference has to do with perceived outcome, **stigma**, **dread**, **outrage**.
 - Even if probability of cancer is low, there is **insensitivity** to details when a given consequence is dreaded. Coined **probability neglect**.
 - It is not only the public for whom this may be true.

Much attention paid to small probability when it involves dreaded consequences. This explains what is sometimes perceived as an irrational requirement of “total cleanup” of hazardous sites, even when scientific findings say negative health outcomes will be highly improbable.



Hazard vs. Outrage and Dread

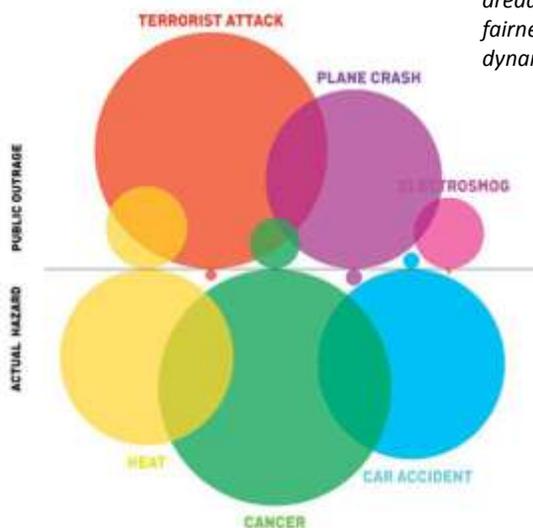


- The public responds more to outrage than to hazard.
 - Outrage (a byproduct of stigma and dread) is a more qualitative psychological phenomena that determines how people experience risk.
 - People's response to risk is not objectively correlated to hazard.
- Outraged people don't pay much attention to hazard data
 - It's pointless to ignore the outrage and focus on the hazard.
- Outrage isn't just a distraction from hazard – both are legitimate and important.
- One goal of risk communication should be to recognize, understand, and reduce the outrage.

Risk = Hazard + Outrage

from "Best Practices in Risk Communication" presentation by Shannon B. Gleason, PE (Nov. 2013) ¹³

RISK PERCEPTION AND ACTUAL HAZARDS



Perception factors (trust, risk vs. benefit, dread, uncertainty, me vs. them, children, fairness, imposed vs. voluntary, etc.) are dynamic – their effect changing over time

For any given risk perception, several perception factors are involved.

from "Best Practices in Risk Communication" presentation by Shannon B. Gleason, PE (Nov. 2013) ¹⁴



Stigma and Social Amplification of Risk



- Consider the **social amplification of risk**.
 - The impacts of accidents do not end with direct damages, but rather, they extend to higher order effects like ripples after a stone is dropped in a pond.
 - These ripple effects can be based on psychological phenomena such as **stigma** and **dread**.
 - These extended damages go beyond what might be viewed as scientifically justified.
 - Currently being used to quantify the economic impacts of terrorism for which indirect damages far outweigh the direct.

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What Does the Call for Better Communication Really Mean?



...one's **worldviews** are highly predictive of attitudes towards different kinds of risk

- Some tend to value commerce and industry, and are inclined to see less risk and want less regulation. Others value group-identity and equality, and distrust commerce and industry as self-seeking sources of inequity.
- When a controversy about a potential hazard (e.g., gun control, climate change, nuclear repositories, or potentially, hazardous waste sites) erupts...
 - People often take positions based on **pre-existing worldviews**
 - Worldviews determine the type of people someone associates with and also the news sources one chooses to accept as reliable, with choices made in favor of what makes them comfortable.
 - It is inherently difficult to change such positions because worldview are **part of one's fundamental psychological identity**.
 - It is not only the public for whom this may be true; scientists find themselves taking positions partly framed by worldview and partly by scientific understanding.

This tendency to adhere to one's worldview, may explain the potential futility of a rational science-based discourse on problems such as hazardous waste cleanup.

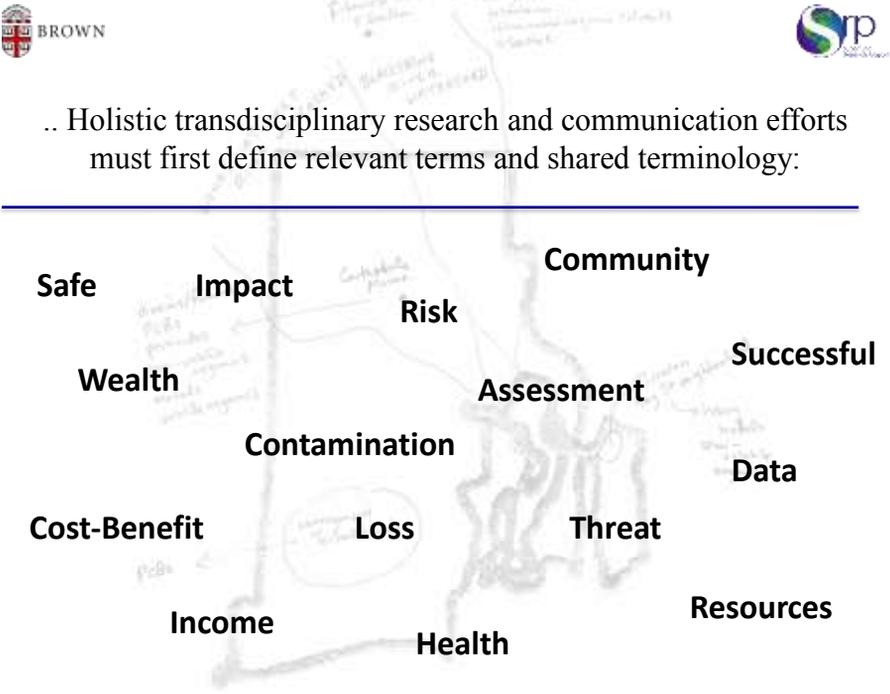
Do worldview effects get overridden or are they amplified at hazardous chemical sites?

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.. Holistic transdisciplinary research and communication efforts must first define relevant terms and shared terminology:

Safe Impact Risk Community
 Wealth Assessment Successful
 Contamination Data
 Cost-Benefit Loss Threat
 Income Health Resources

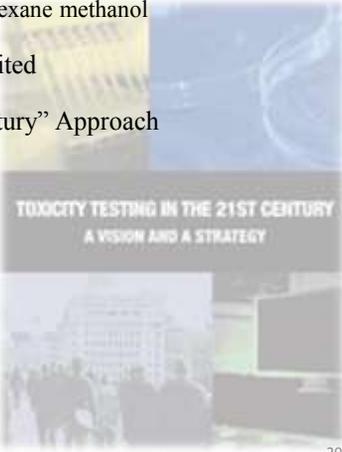


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Improved Understanding of Toxicity

- Developing **shared understanding of chemical risk** requires having reliable information regarding chemical safety
 - E.g., January 2014 spill of 4-methylcyclohexane methanol
- Animal testing is slow, expensive, and limited
- Consider “Toxicity Testing in the 21st Century” Approach



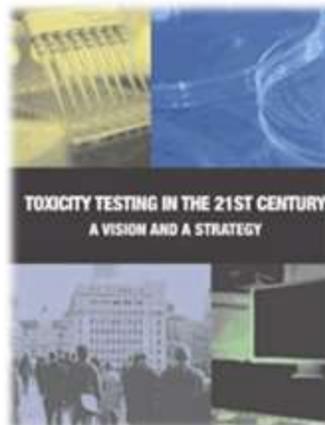


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Curriculum Improvement

- Not common in traditional chemical/life sciences programs to offer students training on chemically related risk.
 - Some emphasis in environmental engineering on risk evaluation
 - The social science considerations above are not part of the discussion.
- Broader discussions of toxicological testing and extrapolation to human health risk are needed.
- Time to reconsider how we educate those who will lead future discussions of chemical risk and its management?



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Does this Necessarily Define a Different Process?

- A team approach to communication is critical, (no one person will be expert enough in all aspects to do it right)
 - Bring together teams who understand better the complexity of dealing with relevant stakeholders.
 - Crucial to leave comfort of scientific discipline-specific analysis, paying greater attention to lessons from the social-sciences.
- Waste site cleanup personnel should emphasize sooner the non-public health aspects of managing sites.
 - Research, decision-making, and waste site cleanup tools need to be better communicated to, and understood by, the community.
- Stakeholders based outside affected communities must better understand what determines underlying community viewpoints.
 - Requires defining relevant terms and language that often have different interpretations across disciplines
- Define a process that is more “open” about all these considerations

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Thank You

NIEHS and the Superfund Research Program

Paul Slovic and Kevin Boyle

Kelly Pennell, Phil Brown, Symma Finn, Beth Anderson

