Communicating about Environmental Health Risks
WHY SCIENCE, EMOTION, VALUES, TIME, AND PLACE ARE IMPORTANT

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1. Background: Why is this important?
2. Characteristics of individuals: emotion, sex, politics
3. Characteristics of systems: place, time, and trust
4. Priorities for improving risk communications: suggestions and questions
Risk communication failures erode trust and decision processes
Understanding risk has practical importance:

- Articulate gaps between different stakeholder or interest group values
- Facilitate risk debates and communications
- Improve decision processes and outcomes
- Reduce local, regional, global conflict
Environmental health risk communications are challenging for multiple reasons.

1. Characteristics of the decision problem
   - Sparse information and deep uncertainty (e.g., about wind climate parameters)
   - Ubiquity of misinformation or misrepresentation of facts (e.g., harm to birds; noisy)

2. Characteristics of decision makers
   - Absent a disaster, communities have other priorities (e.g., financial stability)
   - Diverse values and worldviews
   - Lack of trust in government and industry

3. Characteristics of the socio-political context
   - Inconsistent legal requirements or funding for engagement
   - Different access to power or other social resources
   - History of disadvantage, disenfranchisement
Social Amplification of Risk Framework

Roadmap for this Talk

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How do people think about risk and uncertainty?
Probability isn’t the only concern

**One key to effective risk communication:**
Recognizing there are 2 modes of thinking

<table>
<thead>
<tr>
<th>Analytic System</th>
<th>Experiential System</th>
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</thead>
<tbody>
<tr>
<td><strong>Analytic</strong></td>
<td></td>
</tr>
<tr>
<td>Logical (reason oriented)</td>
<td>Holistic</td>
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<tr>
<td>Behavior mediated by conscious appraisal of events</td>
<td>Affective (pleasure-pain oriented)</td>
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<tr>
<td>Encodes reality in abstract symbols, words, and numbers</td>
<td>Behavior mediated by “vibes” from past experiences</td>
</tr>
<tr>
<td>Slower processing (oriented toward delayed action)</td>
<td>Encodes reality in concrete images, metaphors, and narratives</td>
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<tr>
<td>Requires justification via logic and evidence</td>
<td>More rapid processing (oriented toward immediate action)</td>
</tr>
<tr>
<td>Self-evidently valid (experience is believing)</td>
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Analytic and affective processes work together

• To identify and prioritize experiences that are valued positively (pursued) or negatively (avoided)

• To comprehensively govern the valuation of risk information in order to maintain a particular way of life
Some groups tend to judge hazards to be more versus less risky.
White males generally perceive less risk than any other group.

People with low risk perceptions are more likely to:

- Agree with statements reflecting hierarchical views
- Disagree with egalitarian statements
- Disagree with community-based decision making

Sociopolitical values vary within groups

Vulnerability, control, benefits vary within groups
It is very likely that hot extremes, heat waves, and heavy precipitation events will continue to become more frequent.

On a scale from 0-100%, please indicate your best estimate of the probability conveyed by this statement.

"Political affiliation affects interpretation of probabilities"

Policy implications

• Different worldviews matter
  • hierarchists prefer expert groups
  • egalitarians prefer personal choice

• All want to be involved in decision making

• Some are more willing to trust the judgment of others
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When it comes to perceived risk, place, time, and trust are crucial.
Communications need to address the complexity of the resource-dependent social systems in which risks are managed.

Greater social support is associated with a higher probability of a positive depression screen among fishing households.

Emerging Measures of Wellbeing Suggest Broader (System) Conceptualizations of Loss are Useful for Understanding Disaster Impacts

- Alternative impact metric based on welfare economics (see Markhvida, Walsh, Hallegatte, & Baker, 2020, doi.org/10.1038/s41893-020-0508-7)
- Quantifies disaster impacts on consumption, accounting for asset losses and changes in income

**Risk assessment**
- Assess **damage** to built environment
- Assess effect on **productivity** of economic sectors
- Assess loss of **employment and income** at individual level
- Determine **well-being losses** at household level, relative to initial assets and income

Wellbeing losses in context of socioeconomic characteristics
Communications should enhance partnerships and leverage diverse sets of skills and strengths.

Community health workers provide a link between scientists and communities.

(Photo courtesy of Keith Nicholls)
Changes in public media channel preferences can inform communication strategies.

What is your main source of news?

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Communications should connect the past, present, and future contexts

Environmental Justice
The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

Fair treatment
No group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies. (italics added)

www.epa.gov/environmentaljustice
Indices of Vulnerability Are Intended to Simplify the Use of Many Variables

- Different indices incorporate different numbers, types of socio-demographic variables
  - Simple Example: EJSCREEN Demographic Index = (% minority + % low-income) / 2
- Some indices developed using statistical methods
  - E.g., USC’s Social Vulnerability Index (SoVI) from principal components analysis of 28 variables
- Other indices use qualitative expert input
  - E.g., CDC’s Social Vulnerability Index (SVI) from percentile ranks of 15 variables
- Latent constructs, not directly observable
Indices of Vulnerability Have Questionable Value as Decision Support Tool

• Caution against using vulnerability indices for policymaking due to potential internal and theoretical inconsistencies
  Spielman et al. (2020). Natural Hazards, 100:417-436. DOI: [10.1007/s11069-019-03820-z];

• Need to understand limitations
  • Pulling different measures from different regions or time points will generate a different indicator
  • Emphasis is on describing urban areas/ population centers because they are the largest contributors to any data source
  • Focus is on identifying, rather than explaining
  • Some aspects may be context dependent, such that the same value in different places has different meaning
  • Historical data and may not reflect current or future conditions
Example Approach to Equity Indicators/Metrics

King County Washington (2015)

Determinants of Equity: Identifying Indicators to Establish a Baseline of Equity in King County


One example of pro-equity policies might be:
- Percent of hiring managers that participate in anti-bias training
- Percent of cost burden home owners
- Medium household income
- Graduation rate
- Food security
- Incarceration rate
- Pollution by region
- Perceived neighborhood safety
- Home ownership rate
- Transportation cost burden
- Uninsured adults
- Park access
- Life expectancy
- Incarceration rate
- Obesity prevalence
- Homelessness
- Infant mortality
- Frequent mental distress
Communications should be evidence-based:
On the need for prospective survey panels

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How do we make information more meaningful?
Messages of Hope (evidence based!)

Key lessons learned from health and education research on fostering hope and resilience:

1. Foster caring relationships that promote positive expectations and participation
2. Focus on a broad range of learning styles (experiential, analytic, visual, auditory, etc)
3. Build from perceptions of community strengths (assets-based ecological approach)
4. Ensure inclusionary group practices such as mainstreaming, cooperative learning, and peer tutoring
5. Evaluate with multiple intelligences (e.g., self reflection) and multiple outcomes (change in beliefs or in practices, rather than temperature, SLR)
Priority steps for improving risk communications

1. Enhance partnerships, leveraging diverse sets of skills and strengths
2. Address the complexity of the resource-dependent social systems in which risks are managed
3. Expand meaningful engagement to understand/address the needs and concerns of local communities
4. Connect the past, present, and future contexts to support risk communication efforts
5. Deepen the evidence base to iteratively improve risk communications
Multiple Knowledge Gaps Need to Be Addressed

- What constitutes meaningful engagement?
- How could risk communications effectively address contextual, procedural, and distributional dimensions of equity?
- How might connections between natural and social systems might be disrupted for some groups and not others?
- How can communications integrate multiple perspectives on the opportunities and challenges posed by transitions?
- What frameworks, methods help to integrate diverse types of knowledge?
- What decision support tools facilitate discussions about tradeoffs?
- What data are needed to track how community needs and concerns change over time?
- How would those data inform adaptive improvement of risk communications?