# Environmental Health Literacy

## *An Engaged Framework for Understanding and Action*

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# Roadmap



- Learning Objectives
- What Is Environmental Health Literacy (EHL)?
- The Centrality of Context for EHL
- Engaged Research Collaborations in EHL
- Big Questions in the Field
- Key Takeaways

# Learning Objectives

1. Define environmental health literacy.

2. List three context-driven factors that influence environmental health literacy.

3. Apply an environmental health literacy framework to build multidisciplinary collaborations.

# Health Literacy

- **Healthy People 2010 and Healthy People 2020**: "The degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions."

- **Healthy People 2030**: 1) Personal Health Literacy: "The degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others." 2) Organizational Health Literacy: "The degree to which organizations equitably enable individuals to find, understand, and use information and services to inform health-related decisions and actions for themselves and others."

--Office of Disease Prevention and Health Promotion [ODPHP]
U.S. Department of Health and Human Services

## More on Health Literacy:

- Evolving definitions over 50 Years
- Information focus
- Action orientation
- Policy benchmark in *Healthy People 2010, 2020 (& 2030)*
- Correlates with key social determinants of health
- Original top-down construction privileged scientific expertise
- Recent move toward a critical health literacy that incorporates context

--Huber, Shapiro, & Gillaspy (2012)

## Environmental Literacy

- North American Association for Environmental Education: "The knowledge, skills, dispositions, and behaviors to competently **make decisions** and **act** on local, regional, national and global environmental issues."

- California Environmental Literacy Task Force: "The capacity to **act** individually and with others to support ecologically sound, economically prosperous, and **equitable** communities for present and future generations… [Environmental literacy includes] the knowledge, skills, and understanding of environmental principles to **analyze** environmental issues and **make informed decisions**."

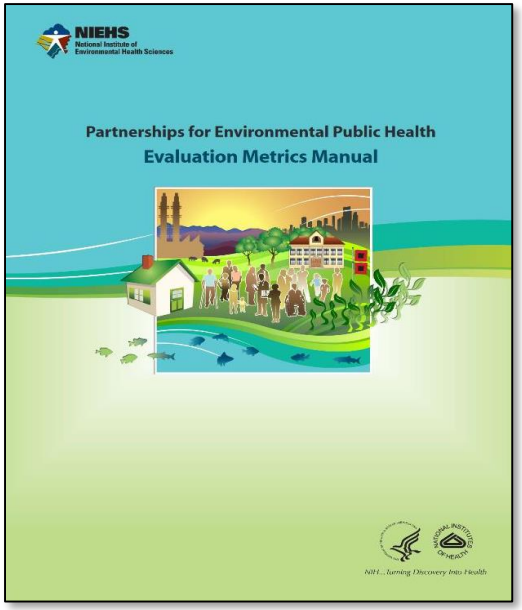
## Early Definition

*Society for Public Health Education (2007)*

"**Environmental health literacy** integrates concepts from both environmental literacy and health literacy to develop the wide range of **skills** and **competencies** that people need in order to **seek out**, **comprehend**, **evaluate**, and **use** environmental health **information** to make informed **choices**, **reduce health risks**, improve quality of life and **protect the environment**." (Reported in Finn & O'Fallon, 2017)

# National Institute of Environmental Health Sciences

## Partnerships for Environmental Public Health




Defines “environmental public health” as “the science of conducting and translating research into action to address environmental exposures and health risks of concern to the public”; includes community-engaged Research-to-Action Grants, as well as research translation and community outreach and engagement arms of multiple NIEHS grantee centers, including Superfund Research Programs (P42), Environmental Health Sciences Core Centers (P30), Breast Cancer and the Environment Research Programs (U01), and Children’s Environmental Health Centers (P50).

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# PEPH EHL Efforts


In 2014, NIEHS PEPH Hosted a Webinar on EHL.


Later that Year, a Panel of NIEHS Grantees Convened at the American Public Health Association Annual Meeting to Discuss Ongoing Research in EHL.

**EHL Publications Prior to 2014: 2**

**EHL Publications 2014-16: 6**

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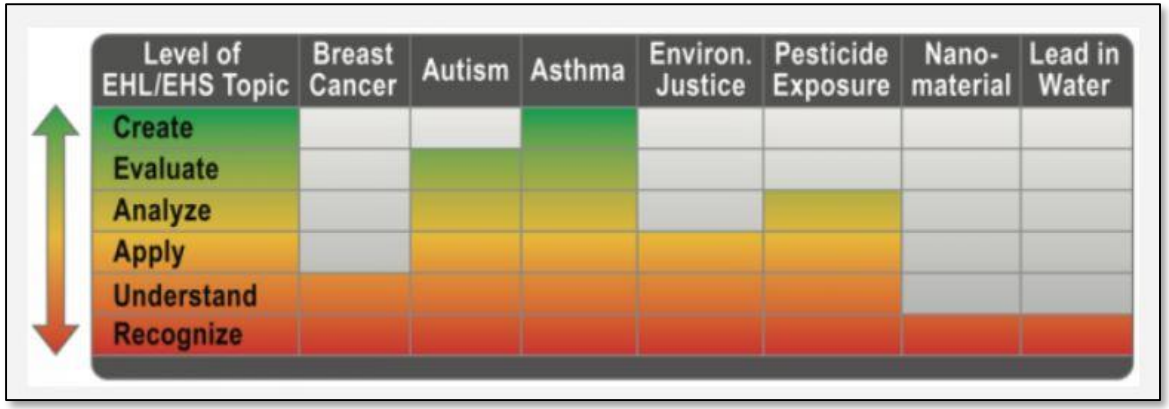
# Evolving Definitions

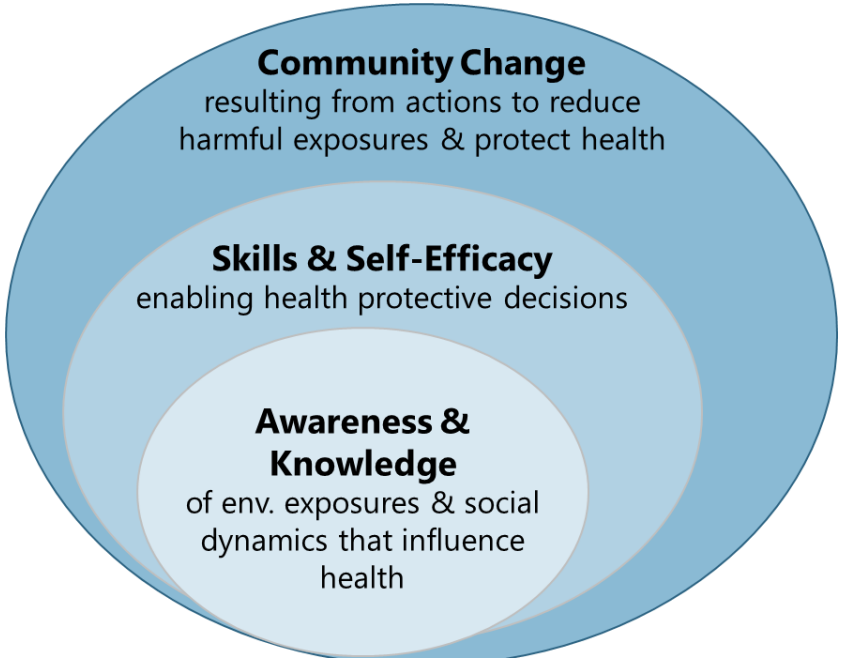
*Finn and O'Fallon (2017)*




**Environmental health literacy** is "an understanding of the connection between environmental exposures and human health"; distinguishes between basic levels of understanding and more advanced EHL that leads to action.

# Evolving Definitions

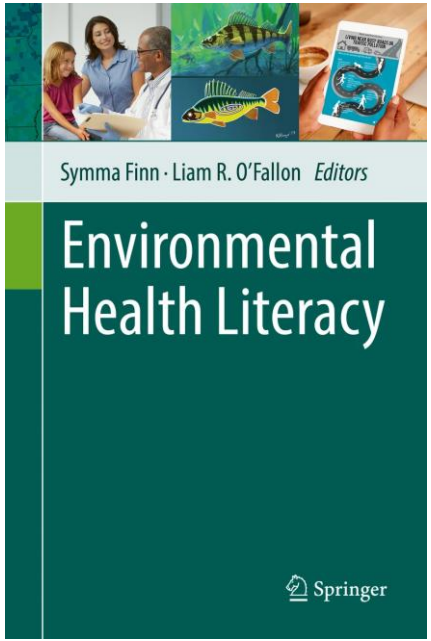
*Gray (2018)*




**Dimensions of EHL**

# Evolving Definitions

*Hoover (2019)*




**Environmental health literacy** is an emerging and evolving multidisciplinary field that seeks to better understand how **individuals and communities make sense of** and **act on** health-related information about environmental hazards**.**

**EHL Publications Since 2017: >40**

# EHL Draws from and Builds on Many Disciplines

## Content

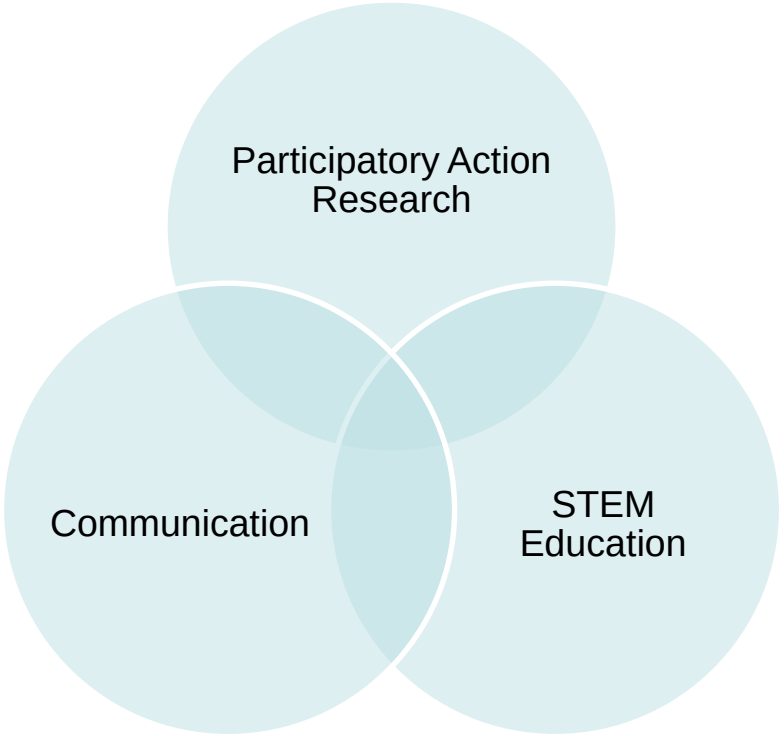
- Toxicology
- Medicine
- Public Health
- Engineering
- Ecology
- Geography
- Policy

## Frameworks

- Health Literacy
- Health Communication
- Risk Communication
- Participatory Action Research
- Science, Technology, Engineering, and Math Education

# What Is Environmental Health Literacy?

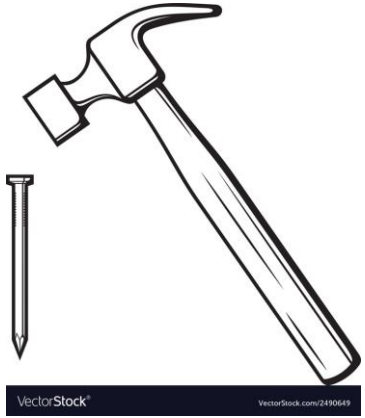





**Dominant Methodological Paradigms in the Field**

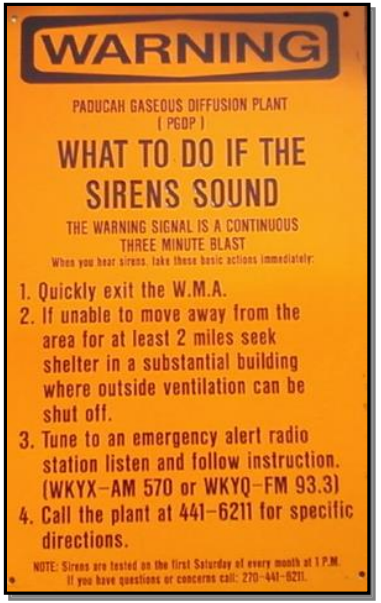
**Health Communication:** the study and use of methods to inform and influence individual and community decisions that enhance health. (Freimuth & Quinn, 2004)

- Models and frameworks for health promotion and campaign development
- Audience segmentation and targeting
- Lessons from decades of campaign-related implementation and evaluation
- Increase knowledge and promote health-protective action



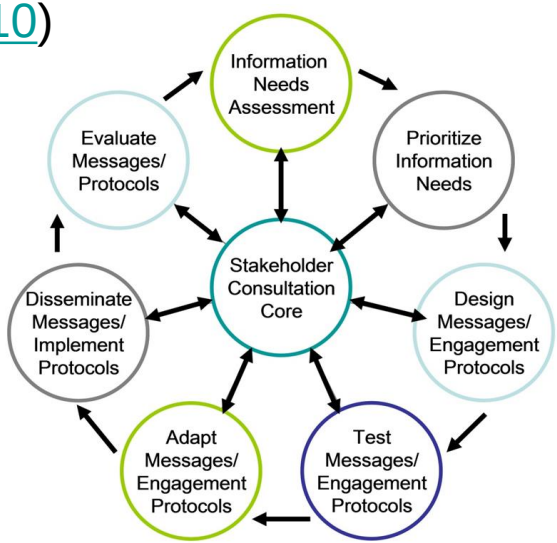
**Risk Communication:** a two-way exchange of information between interested parties about the nature, significance and/or control of a risk. (Covello, 1993)

- Early deficit models followed by National Research Council (1989) calling for democratic dialogue and interactive approaches
- Best Practices focus (Sellnow et al., 2009)
- Recognition of hazard and outrage components (Sandman, 2003)
- Incorporation of organizational sensemaking constructs and an enactment perspective (Weick, 1988)



**Participatory Action Research: Participatory Communication:** "focuses on multi-directional communication - deploying visualizations, interviews, and group work to facilitate dialogue and collaborative decision-making among all stakeholders" (Anyaegbunam, Hoover, & Schwartz, 2010)

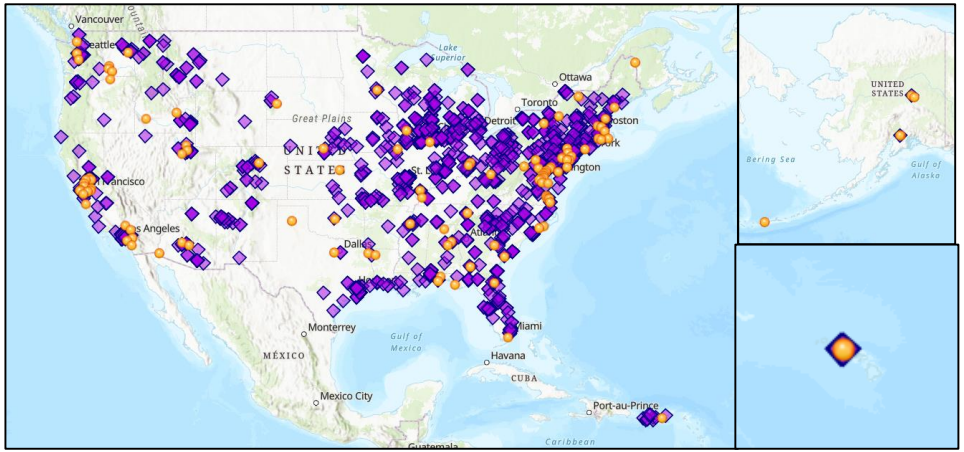
- Encourages the development, implementation, and evaluation of culturally-appropriate decisions and policies
- Assists participants in developing mutual understandings that can help reduce conflict
- Directly addresses social construction of risk
- Supports action through collaboration




**Convergence-Building Model of Participatory Communication**
(Hoover, 2013)

# Available Information, Choices, and Risks Are Often Place-Based

- Contaminants of concern
- Exposure pathways
- Socioeconomic/demographic factors



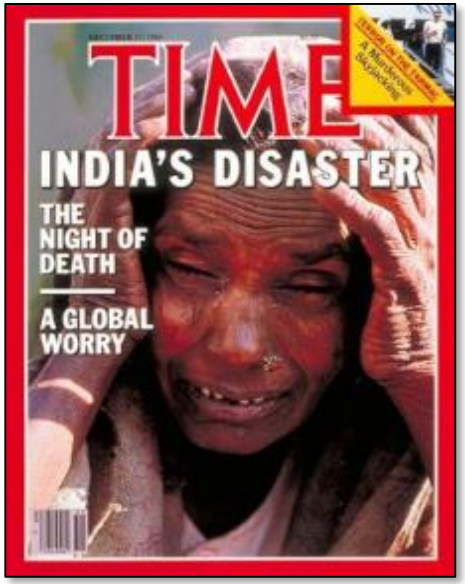

**A United States Environmental Protection Agency map (2023a) illustrates the extent of Superfund cleanup work nationwide.**

# Complex Regulatory Environments

(US EPA, 2023b and 2023c)

- Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)
  - Established liability of potentially responsible parties (PRP)
  - Authorized U.S. Environmental Protection Agency (US EPA) and other federal agencies, states, and tribes to recover damages caused by hazardous substances
  - Created Agency for Toxic Substances and Disease Registry (ATSDR)

**Kentucky's Valley of the Drums (US EPA, 1981)**




**Reactions following the Bhopal, India methylisocyanate release that killed thousands contributed to global calls for increasing community involvement in environmental hazards management. (Time Magazine, 1984)**

- Superfund Amendments and Reauthorization Act of 1986 (SARA)
  - Increases state involvement in the Superfund program
  - Increases focus on human health (e.g., Superfund Research Program/SRP)
- Emergency Planning and Community Right-to-Know Act (EPCRA)
  - Sets requirements for local and state emergency planning
  - Establishes right of public access to risk information on chemical hazards in communities

## Many Agencies, Many Roles

*Hoover, 2017*

- **US EPA** investigates, designates, and oversees environmental cleanup activities
- **ATSDR** investigates and reports about potential public health impacts related to contamination
- **US Department of Energy (US DOE)** is responsible for cleanup of more than 20 Superfund sites resulting from nuclear energy production and waste products


- **State agencies** (DEP, DPH), local governments, and **community advisory boards** (CABs) also are implicated in site monitoring and decision-making

# Different Perspectives on Risk

**Risk assessment:** Probability and severity

| Probability of Occurrence | No Risk | Minor | Moderate | High |
|---|---|---|---|---|
| (Almost) Certain | LOW | HIGH | CRITICAL | CRITICAL |
| Likely | LOW | MEDIUM | HIGH | CRITICAL |
| Possible | LOW | MEDIUM | HIGH | CRITICAL |
| Unlikely | LOW | LOW | MEDIUM | HIGH |
| Rare | LOW | LOW | LOW | MEDIUM |
| | Severity of Consequence | | | |

**An Example of a Risk Matrix (UCLA, 2024)**

| Probability of Occurrence | No Risk | Minor | Moderate | High |
|---|---|---|---|---|
| (Almost) Certain | LOW | HIGH | CRITICAL | CRITICAL |
| Likely | LOW | MEDIUM | HIGH | CRITICAL |
| Possible | LOW | MEDIUM | HIGH | CRITICAL |
| Unlikely | LOW | LOW | MEDIUM | HIGH |
| Rare | LOW | LOW | LOW | MEDIUM |

Severity of Consequence


**Michiganders Protest the State Accepting Waste from East Palestine, OH Train Derailment (Reuters, 2023)**

**Risk communication:** Hazard and outrage

**Components of Outrage (Sandman, 1988)**

- Is exposure to the hazard voluntary?
- Does the individual have control over exposure to the hazard?
- Is exposure to the hazard deemed fair?
- Is the institution imposing the hazard deemed trustworthy?

# Use of Skills and Competencies Requires Sensemaking Processes

- Retrospective
  - Capacity
  - Commitment
  - Expectations
- Collective

**Dialogue enhances residents' ability to make informed environmental decisions.**

# Engaged Research Collaborations in EHL



**UK-SRC hosted an Appalachian Health and Well-being Forum with NIEHS to learn about community interests and needs.**

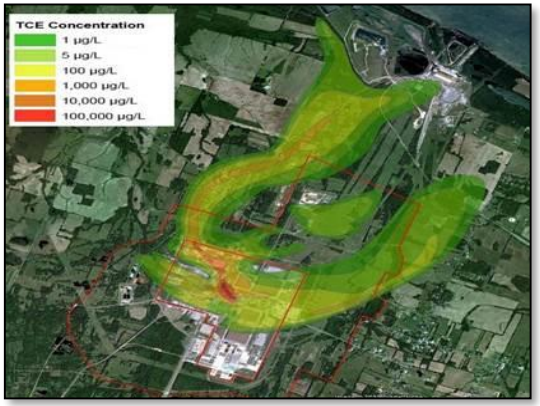
UK Superfund Research Center (UK-SRC) investigators use interviews, focus groups, and projective techniques to assess and address EHL knowledge gaps by:

- Identifying Stakeholder Groups and Information Needs
- Recognizing Convergent and Divergent Values and Information Preferences
- Working with Stakeholders to Develop Targeted, Appropriate Tools and Materials

# EHL at a Kentucky National Priorities List Superfund Site

## What We DID

- Semi-structured interviews
- Stakeholder identification and segmentation
- Empanelled community research process input group
- Developed future use visualizations
- Focus groups
- Community meetings
- Online information portal




## What We FOUND: Stakeholder Groups

- Residents Near the Site
- Regulatory Agencies
- Plant Employees
- EH Advocates
- Healthcare Providers
- Education (Postsecondary)
- Media
- Religious Community
- Wildlife/Recreation
- Tourism
- City Government
- Border County Leadership
- PRP and Subcontractors
- Educators
- Site Citizens Advisory Board

## What We FOUND: Knowledge Gaps


- What chemicals are “out there”?
- What do the chemicals do to health?
- How much groundwater contamination is there?
- How are “they” monitoring the waste?
- Could an earthquake disturb the waste?
- What keeps contamination from moving further south?
- Is a wind farm an option for the site after it’s cleaned up?
- How does the site affect my cancer risk?

# EHL in Post-Crisis Preparedness Planning

## What We DID

- Proxy case studies of crisis communication best practices
- Technical expert interviews
- Empanelled advisory group
- Stakeholder segmentation
- Developed decision tree and radio “news” triggers
- Focus groups

**Research participants and investigators discuss information needs and knowledge gaps.**

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## What We FOUND: Stakeholder Groups

- Promotoras/Community Health Workers
- African-American Homemakers
- Millennials (College Students)
- Educators
- Public Health Professionals
- Healthcare Providers
- Elderly Men
- New Immigrants

MIND THE GAP

## What We FOUND: Knowledge Gaps

- What are the “national drinking water standards”?
- How is the water tested, and by whom?
- If water isn’t safe for the pregnant, elderly, and children to drink, how can it be safe for me to drink?
- What symptoms should I look for?
- How do I clean my sink after I flush my pipes? My water heater?
- Why should I believe that clear-looking water is dirty?

# EHL and Disinfection Byproducts


## What We are DOING

- Deploying a stakeholder consultation core to inform study communication activities
- Working with community scientists to sample water and air quality in homes
- Engaging in capacity-building for the water system
- Providing individual and community report-back of findings.
- Collecting longitudinal survey data from SCC members and community scientists about individual knowledge, skills, and efficacy regarding water quality AND collecting personal network data to inform our understanding of how research participation influences community-level EHL via changes in social cohesion and resilience

**The research team convened at a Kentucky state park to launch the study**

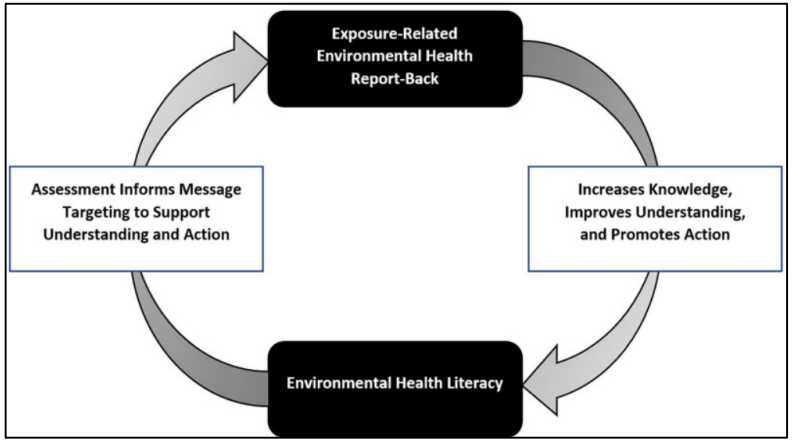
## What We ARE FINDING: Stakeholder Groups

- Residents using the local water systems
- Community activists and advocates
- Water utility leaders
- State and local government officials
- State and local health officials
- Academics
- Journalists

## What We FINDING: Knowledge Gaps


- What causes disinfection byproducts in residents water?
- How are people exposed to disinfection byproducts?
- What health concerns should people “be worried about”?
- Who can people trust for information about potential disinfection byproducts exposure and water quality generally?

- What do people need to know and do to protect themselves and their communities in the face of context-specific environmental health threats?
- Who needs to be engaged to help build those competencies and capacities?
- What is the appropriate unit of analysis?
- What are the appropriate outcomes and measures of success?
- How do fund the work?
- Where do we publish the work?




**Conceptual model depicts the relationship between EHL and exposure-related environmental health report-back (Hoover, 2023)**

# Key Takeaways



- Environmental Health Literacy (EHL) is an evolving multidisciplinary field that seeks to better understand how individuals and communities make sense of and act on health-related information about environmental hazards.

- Context-driven factors that influence environmental health literacy include contaminants of concern, potential exposure pathways, and sociodemographic factors, as well as regulatory complexity.

- Using a participatory EHL framework can help identify gaps in knowledge, available/accessible/understandable information, skills, and community capacity, thereby informing identification of relevant scientific and local expertise – i.e., potential team members – to collaborate in building EHL.

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