Social Science Collaboration with Environmental Health

Elizabeth Hoover,1 Mia Renauld,2 Michael R. Edelstein,3 and Phil Brown2

1American Studies and Ethnic Studies, Brown University, Providence, Rhode Island, USA; 2Department of Sociology and Anthropology, Northeastern University, Boston, Massachusetts, USA; 3School of Social Sciences and Human Services, Ramapo College of New Jersey, Mahwah, New Jersey, USA

BACKGROUND: Social science research has been central in documenting and analyzing community discovery of environmental exposure and consequential processes. Collaboration with environmental health science through team projects has advanced and improved our understanding of environmental health and justice.

OBJECTIVE: We sought to identify diverse methods and topics in which social scientists have expanded environmental health understandings at multiple levels, to examine how transdisciplinary environmental health research fosters better science, and to learn how these partnerships have been able to flourish because of the support from National Institute of Environmental Health Sciences (NIEHS).

METHODS: We analyzed various types of social science research to investigate how social science contributes to environmental health. We also examined NIEHS programs that foster social science. In addition, we developed a case study of a community-based participation research project in Akwesasne in order to demonstrate how social science has enhanced environmental health science.

RESULTS: Social science has informed environmental health science through ethnographic studies of contaminated communities, analysis of spatial distribution of environmental injustice, psychological experience of contamination, social construction of risk and risk perception, and social impacts of disasters. Social science–environmental health team science has altered the way scientists traditionally explore exposure by pressing for cumulative exposure approaches and providing research data for policy applications.

CONCLUSIONS: A transdisciplinary approach for environmental health practice has emerged that engages the social sciences to paint a full picture of the consequences of contamination so that policy makers, regulators, public health officials, and other stakeholders can better ameliorate impacts and prevent future exposure.

CITATION: Hoover E, Renauld M, Edelstein MR, Brown P. 2015. Social science collaboration with environmental health. Environ Health Perspect 123:1100–1106; http://dx.doi.org/10.1289/ehp.1409283

Introduction

The work of social scientists has improved our understanding of the diverse impacts of such human-caused events as leaking hazardous waste sites, chemical explosions, and oil and gas spills, as well as of human-exacerbated natural disasters. Social scientists have conducted ethnographic case studies of communities suffering environmental catastrophe in order to place environmental health impacts into the contexts in which they are experienced. This includes psychological health, impacts due to the loss of physical health, the difficulty of proving causality in health impact, and community mobilization. Because contamination extends beyond the physical into sociocultural patterns of everyday life, social scientists supplement environmental health research by providing a more complete picture of the impacts on individuals and communities.

Here we discuss a recent innovation in social science work on environmental contamination: the emergent, boundary-crossing effort to integrate social science with environmental health practice. This new approach moves beyond pure research to intervention, reflecting increasing collaboration between social scientists and environmental health scientists to measure exposures, press for cumulative exposure to be addressed, and prepare research data as the basis for health policy. Contemporary research on environmental inequalities is being moved out of isolated disciplinary silos to actively engage across disciplines; to work directly with affected communities to investigate exposures and resulting health effects that have already occurred; and to influence environmental policy to mitigate primary (actual hazard) and secondary (individual, community, and societal) impacts of past exposures and to prevent new exposures from occurring. In this way, the social scientist becomes an actor in events rather than a mere observer.

A fundamental catalyst for social science–environmental health collaboration has been the National Institute of Environmental Health Sciences’ (NIEHS) Community-based Participatory Research (CBPR) and Environmental Health Programs and its more recent umbrella program, Partnerships in Environmental Public Health (PEPH) (NIEHS 2012a). NIEHS’s support of environmental justice and CBPR has contributed to the study of communities affected by environmental hazards. This incorporation of social science to enhance community-level understanding of contamination has also benefited from the community engagement cores that are part of center grants: Superfund Research Program, Children’s Environmental Health Centers, Environmental Health Core Centers, and Breast Cancer and the Environment Research Centers. Conferences have evolved from these collaborations, exploring case studies and demonstrating the importance of team science. Two examples are the 2012 Superfund Research Program workshop at Brown University and the 2011 Environmental Reproductive Health Symposium organized by Native Americans, Alaska Natives, and others (Hoover et al. 2012). This commentary originated at NIEHS’s 2013 Environmental Health Disparities and Environmental Justice Workshop, which included scholars from sociology, anthropology, psychology, and environmental health (NIEHS 2013).

In this commentary, we begin with the “social science of environmental health” by discussing the contribution of detailed social science case studies of contaminated communities. We then discuss key issues in social science research on environmental health and justice, and identify emerging issues and new directions in research, communication, capacity building, training, and evaluation. These features shape the boundary crossing to “social science with environmental health,” exemplified by a case study of research projects in Akwesasne that was one of the first to incorporate CPBR and social science in environmental health.

Processes of discovery in contaminated communities. Over the past three decades, social scientists have conducted in-depth studies of how laypeople discover and act on environmental problems, typically in the face of a crisis or discovery that has placed the “contaminated community” (Edelstein 1988, 2004) in the public eye. Social scientists understood early on that many cases of contamination are discovered by laypeople,
not by experts. Nevertheless, the public continues to expect government to actively monitor the environment to protect public health, yet public pressure from affected citizens or community organizations is often necessary for recognition and remediation of environmental exposure.

Much of the data collected about environmental impacts come through core regulatory programs, for example, periodic testing by permit holders required for compliance with the Clean Air Act of 2004 or the Clean Water Act of 1972. Regulatory agencies often lack the resources or a clear mandate to review the data, which could result in a lack of enforcement. U.S. environmental law includes provisions aimed to empower citizens as a corrective for such flaws. These include publication of hazards data through “right-to-know” provisions of the Superfund Amendments and Reauthorization Act of 1986, Title III, known as the Emergency Planning and Community Right-to-Know Act (EPCRA; Cho et al. 2008). Citizens can now review these public data directly online, as they can for other key environmental statutes, or request additional information through the Freedom of Information Act.

Environmental laws also provide for extensive rights to public comment and input, and, in some statutes, if violations are found that have not been subject to government enforcement, the public—as “citizens’ attorney generals”—can bring the violator to court.

Despite these opportunities, there is generally an awareness gap. Most citizens remain unaware of hazards unless pushed to investigate by some incident or pattern of problems. Unless nongovernmental organizations (NGOs) or citizens are diligent, the majority of environmental data are never examined for their place-based implications.

Moreover, key environmental data for the health of communities may never be collected if there is no regulatory driver, and cumulative impacts are generally not addressed. Local governments, closer to the problems, may be compromised in their ability to act due to conflicting interests.

When scientists study local environmental exposures, many do not report findings to the study participants. Social science–environmental health collaborations have worked to address this by increasing the amount of report back to research participants, leading to more sound data and the development of more democratic public policies that advance environmental literacy (Brody et al. 2014).

Social science case studies of environmental health and justice. Laypeople’s role as the typical discoverers of hazards, clusters, or environmental health threats, and the impacts of such discoveries, have been documented through a rich legacy of ethnographic social science research and within newer social science–environmental health partnerships.

Ethnographic contributions. The earliest ethnographies detailing environmental health and justice cases are rooted in narrative tales of the experiences of residents from discovery to action.

In 1972 at Buffalo Creek, a poorly constructed, inadequately maintained dam broke, causing a lake of coal mining slurry to sweep down the Kentucky hollow, destroying a poor Appalachian community (Erikson 1976). The flood razed hundreds of homes, killed 125 people, injured many others, and left psychological scars. Sociologist Kai Erikson was asked by attorneys representing survivors to draft a report, and his findings connected individual trauma with collective loss of communality (Erikson 1976). Later, his report became the first book-length community study of a human-caused environmental disaster. Erikson’s innovations placed human-made disaster into the cultural, social, and historical context of the community; addressed the individual mental health and physical health outcomes of affected individuals within the cumulative community effects; and demonstrated that social science can work to help affected people.

Adeline Gordon Levine’s (1982) Love Canal: Science, Politics, and People recounted the story of a residential neighborhood of Niagara Falls that was developed adjacent to a buried toxic waste site, a fact uncovered by community residents who fought a 2-year battle for relocation, paving the way for creation of the U.S. Environmental Protection Agency (EPA) Superfund program. Levine and her students conducted observations and interviews, attended public meetings and events, and maintained a constant presence in the community to fully document the many impacts of contamination. A significant contribution was the analysis of the role of scientists who choose to work alongside community activists, developing mutually beneficial research questions and analytic strategies.

Michael Edelstein, a social and environmental psychologist, began examining the impact on communities and individuals both from existing and proposed hazardous sites in Contaminated Communities: The Social and Psychological Impacts of Residential Toxic Exposure [Edelstein 1988; revised with new title as Contaminated Communities: Coping with Residential Toxic Exposure (Edelstein 2004)]. Here he examined social and psychological impacts of water contamination in Legler, New Jersey, contrasting it with other cases. What he described as “environmental turbulence” occurs as normal life is replaced by sometimes desperate adaption. People initially try to cope, using their own personal and family resources, and, if that fails, they turn to their trusted social networks, which may also be inadequate. They then call upon institutional networks (i.e., government officials), from whom they expect help. Inevitably, they become dependent on expert researchers and scientists to verify both the toxic threat and its causal link to symptoms.

This dependency is disabling, particularly when these institutions fail to meet victims’ needs, to adequately mitigate the contamination, or to inform residents of environmental safety in their own homes. Edelstein’s concept of “environmental stigma” addressed contamination as a threat to identity. His notion of the “inversion of home” explored how the safe haven of one’s home is transformed into a constant source of danger and fear. He also examined the “disabling” loss of control and distrust associated with both environmental exposure and the social response to it, and the “debilitating” loss of health optimism, yet also charted the “enabling” dynamics that allowed communities to coalesce to act proactively.

Lee Clarke’s (1989) Acceptable Risk?: Making Decisions in a Toxic Environment detailed hazard perceptions after the Binghamton, New York, state office building fire, focusing on the political and economic features that shaped what was purported to be a neutral approach to assessing risk. Martha Balschm’s (1993) Cancer in the Community: Class and Medical Authority also looked at the hazard perceptions of people in a Philadelphia, Pennsylvania, working-class neighborhood, contrasting the individual-blaming approach of the cancer hospital where she worked with the industry-blaming approach of sufferers. Kroll-Smith and Couch’s (1990) The Real Disaster is Above Ground: A Mine Fire and Social Conflict studied social conflicts between different groups of residents dealing with an underground mine fire in Centralia, Pennsylvania. Picou and Gill (1996) examined chronic psychological stress associated with the Exxon Valdez oil spill. Political scientist Michael R. Reich’s (1991) Toxic Politics: Responding to Chemical Disasters compared the Seveso, Italy, dioxin explosion, the Michigan polybrominated diphenyl (PBB) cattle-feed contamination, and the polychlorinated biphenyl (PCB) contamination of cooking oil in Japan. Reich highlighted the long duration of resolution and compensation, and the frequent lack of support from mainstream environmental groups. Robert D. Bullard’s (1990) Dumping in Dixie: Race, Class, and Environmental Quality was the first work to appear in the quickly exploding field of environmental justice. In this and other work, Bullard documented how systematic environmental racism leads to health inequities by excluding certain segments of the population based on race and
class from environmental decision making (Bullard 1990, 1993). In what became a fast-
growing literature, other social scientists have
provided analyses of environmental justice
organizing efforts that highlight community
voices. For example, Roberts and Toffolon-
Weiss (2001) described the processes of social
and political organizing as African-American
and Native-American communities battled a
chemical plant, a nuclear facility, an oilfield
dump, and a landfill in Louisiana.

In addition, social scientists have high-
lighted the research roles of affected residents.
In No Safe Place: Toxic Waste, Leukemia, and
Community Action, Brown and Mikkelsen
(1990) conceptualized “popular epide-
miology” to describe lay involvement in
community health studies. The approach
emphasizes concerns of access, trust, confi-
dentiality, data sharing, researcher reflexivity,
and benefits to the people and commu-
nity being studied. Families in Woburn,
Massachusetts, pressured state and federal
departments to investigate a cancer cluster, and
they sued W.R. Grace and Beatrice Foods
for contaminating municipal water wells
with trichloroethylene (TCE) and perchloro-
ethylene (PCE), which were associated with
a large number of childhood leukemia cases.
Residents worked with biostatisticians to
direct 5,010 interviews, covering 57%
of Woburn residences via telephone. The
results showed clear connections between
contaminated water, leukemia, and other
health outcomes. Their efforts put Woburn
alongside Love Canal as a key example of
community-initiated research that engages
partnership between environmental health
and social scientists.

Additional social scientific contributions.
Social scientists who examined the demo-
graphics of communities affected by contami-
nation identified inequalities according to
race and poverty and laid the foundation
for the environmental justice movement.
Bullard’s (1990) earliest work was followed by
extensive work on demographics of hazardous
waste sites (Faber and Krieg 2002; Mohai
and Saha 2007). Social scientists, especially
from geography and urban planning, have
integrated quantitative GIS (geographic infor-
mation systems) techniques into community
mapping projects (Corburn 2005; Huang
and London 2012; Maantay 2002). When
communities coalesce to deal with contami-
nation, there is often a spillover to broader
sustainable community development. In this
realm, urban planners have been central to
the environmental health aspects of transpor-
tation, land use, and food policy (Agyeman
2013). Communications studies scholars have
contributed much toward understanding
science communications processes and how
diverse publics understand environmental
health (Nisbet 2009) and have developed
new models of environmental health literacy
(Zoller 2012).

Economists have examined the rela-
tionship between environmental policies,
exposure, and community action. For
example, when the public is educated about
exposure through federal measures, corporate
firms often experience negative stock price
effects from public response; this can lead
them to reduce their emissions and improve
their environmental performance more than
other corporate firms in their industry (Cho
et al. 2008; Konar and Cohen 1997).

Early psychological work on environ-
mental contamination focused on the Three
Mile Island disaster (e.g., Dohrenwend 1983;
Houts et al. 1988). Similar community-scale
case-control research subsequently appeared,
comparing contaminated and noncontami-
nated places, including stress measures (Baum
et al., 1990), fear of cancer (Hallman and
Wandersman 1995; Wandersman et al. 1989),
and psychological dysfunction (Gibbs 1989).

Much attention has been paid to the
construction of risk, viewed as an outrun-
growth of cognitive evaluation of the severity
of consequence and likelihood of an adverse
event’s occurrence (e.g., Slovic 1993). This
cognitive work facilitated a disciplinary cross-
over into economic research examining risk
cognition on issues such as radon gas (e.g.,
Smith and Johnson 1988). Risk research
was used in conjunction with environmental
stigma, for example, to describe the basis
for resistance in Nevada to the siting of the
Yucca Mountain Nuclear Repository (Flynn
et al. 2001).

Anthropological work has also been
important in examining the impacts of such
disasters as the Chernobyl nuclear disaster
and its impact on Saami reindeer herders in
Scandinavia (Beach 1990; Stephens 1987)
and nuclear waste siting (Stoffle et al. 1991).

Facilitating the boundary crossing. As
collaborations between social science and
environmental health researchers prolifer-
ated, case studies began to provide a more
complete understanding of environmental
exposure that depicted both individual- and
community-level effects while demonstrating
environmental exposure and harm within
landscapes and bodies.

Environmental social science benefits
from research directions at the NIEHS.
NIEHS has made tremendous strides in
environmental health research by incorpo-
rating social scientists. The political climate
in the 1990s paved the way for rising support
for government action on environmental
issues, especially after the People of Color
Environmental Leadership Summit (1991)
and the development of the Principles of
Environmental Justice (EJ) (Bullard 1993).
Additionally, Kenneth Olden, a supporter
of EJ and of community involvement in
research, was appointed as the third director
of NIEHS in 1991. By 1995, NIEHS had
become the first NIH institute to create a
CBPR grant initiative. New programs focused
on EJ and the ethical, legal, and
social implications of scientific research
offered the infrastructure needed for social
scientists and community groups to enter the
NIEHS sphere. Annual meetings brought
together grantees, creating a network in
which environmental health and social
scientists can learn from one another
and developed additional collaborations.
Eventually, social science research became
a requirement for some NIEHS programs and
projects, an essential step for promoting inter-
disciplinary environmental health research
(Baron et al. 2009). NIEHS inaugurated
PEPH (2014) in 2008, providing an umbrella
for community engagement and research
translation across its center programs.

These partnerships led to social scien-
tists publishing in a wide array of journals
such as Environmental Health Perspectives,
Environmental Science & Technology, American
Journal of Public Health, and Environmental
Justice. Beyond that, scientists from different
disciplines brought together through NIEHS
programs held relevant conferences, such as
a 2012 Superfund Research Program
national office conference on the “Social,
Psychological, and Economic Impacts of
Superfund and other Contaminated Sites”
(NIEHS 2012a). This brought together
community representatives, sociologists,
anthropologists, economists, NIEHS, U.S.
EPA, state agencies, lawyers, and developers
to explore transdisciplinary science at the
intersection of psychological, cultural, economic,
physical, and health considerations.

Transdisciplinary environmental health
research has increased awareness of effects
beyond the physical and health consequences
of environmental disaster and contamination
to include community empowerment, ethical
practices of sharing data, and policy implica-
tions. An example is the Household Exposure
Study (HES), a CBPR project that evaluated
exposures to pollutants from legacy contami-
nants, consumer products, and local emissions
(Brody et al. 2009). Silent Spring Institute,
Social science–environmental health collaboration

Social science–environmental health collaboration is an independent research center, collaborating with academic institutions to explore the body burden of exposure (Brody et al. 2009). Community members were engaged at every level, as participants rather than subjects, about their report-backs and their scientific understanding (Adams et al. 2011; Brown et al. 2012). The integration of social science in the HES has facilitated the development of new theories such as the “research right-to-know” (Morrochio & Frossch et al. 2009), “exposure experience” (Altman et al. 2008), and “politicalized collective illness identity” (Brown 2007) that have redefined and restructured exposure studies as a whole, while also increasing public understanding, environmental health literacy, community empowerment, and mutual trust and respect between researchers and study communities.

Social scientists–environmental health transdisciplinarity also develops in CBPR projects without social scientists as formal collaborators. Projects led by environmental health scientists (Haynes et al. 2011; Wing et al. 2008) were framed around a holistic collaboration that highlighted the importance of lay discovery, a facet that social scientists had pioneered in their ethnographic studies. They also focused on the combination of both individual-level and community-level effects, and understood the interactive nature of community development and health improvement in cleanup and mitigation. Indeed, CBPR as a whole can be viewed as essentially social scientific in light of its thorough inclusion of community involvement, community and organizational capacity building, political–economic context, and the centrality of social, psychological, and economic impacts, instead of only physiological ones (Israel et al. 1998; Minkler and Wallerstein 2010). Above all, the increasingly important participation of community members and organizations is a major component of transdisciplinarity. We might even say that CBPR itself has become a social scientific approach. It has also brought social science into the policy framework, coming full circle from merely describing negative outcomes to actually assisting cleanup, mitigation, and exposure prevention.

Social scientists and environmental data

Another important trend is social scientists’ direct involvement in the collection of environmental data, combining social science and environmental science research processes. This is exemplified by Public Laboratory for Open Science and Technology (http://publiclab.org), where co-founder anthropologist and science studies scholar Sarah Wylie uses low-cost community monitoring devices to map oil spills, flood-ravaged hydro-fracturing sites, hydrogen sulfide emissions, and other environmental disasters. Helium balloons equipped with digital cameras, hydrogen sulfide detectors using photographic paper, and thermal bolts to detect water temperature increases are among the devices that are made easily accessible to communities. This enables communities to report environmental deviations that are often unknown or overlooked by regulatory agencies, and compile data that can be used to develop and advocate for policy (Wylie, in press). This growing trend in science–technology–society, also called science and technology studies (STS) encourages social sciences to be more practical and hands-on in the scientific enterprise. In addition, many EJ scholars work with various community groups to offer technical assistance and community monitoring (Conrad and Hilchey 2011; Ottinger and Cohen 2011).

Toward a transdisciplinary approach

What emerges from our commentary is a new transdisciplinary approach for environmental health practice that fully engages the social sciences to paint a full picture of the consequences of contamination so that policy makers, regulators, public health officials, and other stakeholders can better ameliorate impacts and prevent future exposure. These transdisciplinary collaborations replace the solo researcher with actively engaged CBPR teams through a series of negotiations and recursive interactions between disciplinary practices that bring together social scientists, environmental health scientists, and community groups and residents (Petts et al. 2008). This reflexive and iterative research process moves beyond multidisciplinarity, in which researchers maintain their respective disciplinary methods and perspectives, to a truly interdisciplinary form that fully integrates and engages with the overlaps and intersections between disciplines to ensure that all facets are investigated (Russel et al. 2008). Furthermore, these projects give communities data to fully comprehend their exposure experience, to pressure government agencies to respond to and remediate environmental harm, and to bring about policy change that is proactive and precautionary to prevent other communities from experiencing similar problems.

As demonstrated in the case study below, social and psychological collateral impacts are inextricably linked to contamination and individual and community well-being. Even when excellent environmental health research studies are conducted, social science methods are necessary to fully understand and mitigate the impact of environmental contamination.

**Akwesasne: a case study at the intersection of CBPR and transdisciplinary environmental health research**

The nearly 15 years of environmental health research conducted in the Mohawk community of Akwesasne provides a prime example of community/social science/environmental health collaboration. Research was undertaken as a partnership between the Akwesasne Mohawk organizations Akwesasne Task Force on the Environment (ATFE; http://www.northnet.org/atf/atfe.htm) and First Environment Research Project (FERP), and the State University of New York at Albany (SUNY) (Schell and Tarbell 1998). Hoover (2010) examined the history of this project to evaluate its CBPR approach and to elaborate on how this model can influence future studies.

Akwesasne, whose territory is bounded by New York State and the Canadian provinces of Ontario and Quebec, is downstream from a number of polluting industries including General Motors (GM), Alcoa, and Reynolds Aluminum (now Alcoa East). In 1981 two sludge pits filled with PCB-contaminated waste were discovered behind GM, adjacent to the Raquette Point region of the reservation (Hoover 2013). By 1984 the entire 270-acre GM property was declared a Superfund site. Following tests done by a New York State wildlife pathologist that found high levels of PCBs in fish and aquatic wildlife, an official three-part health risk assessment was undertaken to examine contaminant levels in fish, wildlife, and breast milk (Forti et al. 1995).

The impetus for undertaking scientific research to determine community impacts came from the Mohawk themselves. Mohawk midwife Katsi Cook insisted that state and university officials work with Akwesasne as equal partners to investigate contamination levels and, later, health impacts. Akwesasne community members recognized the limits of conventional health risk assessments and therefore sought to incorporate social science research in risk assessment and management (Arquette et al. 2002). As a result, decision makers were able to supplement scientific data with a more holistic and comprehensive evaluation of impacts on health, incorporating the knowledge and experience of the at-risk population (Arquette et al. 2002). The SUNY Superfund Basic Research Program (SBRP) worked directly with the affected community to achieve this outcome throughout the 1990s and early 2000s.

With the help of their community partners, the SBRP established a connection between fish consumption and PCB levels in Mohawk women’s breast milk and in men’s blood (Carpenter et. al 2002). Fish advisories against the consumption of local fish were issued by the tribal governments and the New York State Department of Health as a protective measure, but interviews conducted with Akwesasne community members indicated that the loss of fishing affected traditional
cultural and social systems and exacerbated diet-related health problems in the community (Hoover 2013). This demonstrates how the auxiliary impacts of risk avoidance recommendations such as fish advisories must be considered. Combining environmental science with social science data allowed the Saint Regis Mohawk Tribe Environment Division (2013) to issue a more nuanced, revised fish advisory. While the advisory works to prevent the consumption of fish from certain species or locations, it provides instructions on how to consume other fish in a healthy manner.

Environmental health studies conducted by the SUNY team and the Akwesasne community under a second SBRP grant focused more on specific health conditions linked to the local contamination. These projects produced more than a dozen papers demonstrating myriad health impacts linked to PCB body burden in adolescents and adults (e.g., Codru et al. 2007; Schell and Gallo 2010). In each of these projects, ATTE members collaborated with SBRP research team scientists at SUNY Albany to design the studies, and Mohawk women were trained to collect data from community members, reshaping the research process to include community members as co-producers of knowledge rather than passive subjects (Schell et al. 2007). Some scientists from the project have since gone on to conduct additional CBPR projects with indigenous communities (e.g., Carpenter et al. 2005).

This series of Akwesasne studies was one of the first examples of a large-scale CBPR project. For the Mohawk, it was the first time environmental health researchers directly reported personal data back to individuals. Mohawk participants were interested in having a social scientist explore the perceptions of these studies by both community members and scientists. In the resulting report, Hoover (2010) found that scientists cited the benefit of better quality participation by the community and the greater degree of learning about Mohawk culture, but also cited the greater amount of time the study and subsequent publications took because of continuous negotiation with their community partners. Mohawk fieldworkers appreciated the opportunity to work in the community and learn transferable skills such as phlebotomy and conducting psychological surveys. Study participants generally appreciated the scientists’ effort to provide data feedback, but had suggestions for more socially and culturally relevant means of report-back, including gathering family groups together for a more interpersonal explanation of results (Hoover 2010). These findings have been received with interest from the SUNY team for possible incorporation into future study report-back.

Despite tremendous progress made by CBPR in this case study, more can be done, such as deeper incorporation of social science research to help elucidate the community’s eco-historical context and to help foster positive influences on lifestyle, landscapes, and lifestyles that mitigate contamination.

Conclusion
This commentary demonstrates the development and importance of social science–environmental health collaboration for improving environmental health science by focusing on the multiple scales of socioenvironmental impact. These new models of environmental health investigation need to be explored, evaluated, and expanded so the field can continue to develop and refine new research approaches. It is clear that toxicology, epidemiology, exposure science, and environmental engineering cannot do the job alone in studying, remediating, and preventing contamination. Social scientists, whose mission is to understand human interaction and organization, explore how contamination comes in large part from human-caused activity and how it affects social, economic, and political aspects of everyday life beyond the physical environment and bodies.

Take, for example, the recent exploration of environmental health research on flame-retardants. As Corder (in press) shows, the bioaccumulation, mechanisms, and health effects require a history of the chemical industry’s efforts to expand the use of flame retardants, the tobacco industry’s work to avoid fire-safe cigarettes, and the efforts of a multi-party alliance of scientists, firefighters, manufacturers, and advocates to reform flammability standards and to work on chemical bans and regulations.

Conversely, the successes of social science–environmental health collaboration can be used to rethink the potential of social science to be more policy oriented and applied, in addition to being more theoretical. The repertoire of social science skills needed to conduct this work includes ethnographic interviews and observation among communities, industry, scientists, and advocacy offices, as well as technical understanding of the relevant science.

The elements addressed in this commentary are congruent with NIEHS’ Strategic Plan (NIEHS 2012b), which emphasizes translational science; pursuing CBPR; understanding how nonchemical stressors, including socio-economic and behavioral factors interact with other environmental exposures; emphasizing health disparities; highlighting communications and engagement; developing collaborative and integrative approaches; fostering cross-disciplinary training; expanding environmental health literacy; studying the ethical, legal, and social impacts of environmental health research; and evaluating economic impact of policies, practices, and behaviors. Although NIEHS has incorporated these team science efforts, other agencies have been less engaged, and it is important to get them committed to such work. To complement this expansion, both fields need interdisciplinary training grants and individual pre- and post-doctoral fellowships that emphasize social science–environmental health collaborations, including at nonprofit organizations. Social science–environmental health partnerships need to initiate a traveling externship, similar to the Superfund Research Program’s KC Donnelly Externship (NIEH 2015), where young scholars and community organization members can work with others doing social science–environmental health research. Networking must proliferate through more conferences. NIEHS could broaden funding opportunities for social science research, and Environmental Health Perspectives could create a special issue or section on social science approaches.

Increasingly there has been less of a distinction between exposure and health effects research and community ethnography. Transdisciplinary CBPR advances environmental health sciences as a whole while increasing the public’s understanding of and participation in science, trust in the research collaboration, ability to empower and sustain community-based organizations, and policy advocacy that will help to mitigate exposure.

References
Adams C, Brown P, Morello-Frosch R, Brody JG, Rudel RA, Zota A, et al. 2011. Disentangling the exposure experience: the roles of community context and report-back of environmental exposure data. J Health Soc Behav 52:180–196.
Agyeman J. 2013. Introducing Just Sustainabilities: Policy, Planning, and Practice. London:Zed Books.
Altman R, Morello-Frosch R, Brody JG, Rudel R, Brown P, Averick M. 2008. Pollution comes home and pollution gets personal: women’s experience of household chemical exposure. J Health Soc Behav 49:417–426.
Arquette M, Cole M, Cook K, LaFrance B, Peters M, Ransoms G, et al. 2002. Holistic risk-based environmental decision making: a Native perspective. Environ Health Perspect 110(suppl 2):259–264.
Balshem M. 1993. Cancer in the Community; Class and Medical Authority. Washington DC:Smithsonian Institution Press.
Baron S, Sinclair R, Payne-Sturges D, Phelps J, Zenick H, Collman GW, et al. 2009. Partnerships for environmental and occupational justice: contributions to research, capacity and public health. Am J Public Health 99(suppl 3):S517–S525.
Baum A, O’Keefe MK, Davidson LM. 1990. Acute stressors and chronic response: the case of traumatic stress. J Appl Soc Psychol 20(20):1643–1654.
Beach H. 1990. Perceptions of risk, dilemmas of policy: nuclear fallout in Swedish Lapland. Soc Sci Med 30(6):729–738.
Brody JG, Dunagan SC, Morello-Frosch R, Brown R, Patton S, Rudel RA. 2014. Reporting individual results for biomonitoring and environmental
communities: a partnership approach. Am J Hum Biol 19:511–524.
Schell LM, Tarbell AM. 1998. A partnership study of PCBs and the health of Mohawk youth; lessons from our past and guidelines for our future [Commentary]. Environ Health Perspect 106(suppl 3):833–840.
Slovic P. 1993. Perceived risk, trust, and democracy. Risk Anal 13:675–682.
Smith VK, Johnson FR. 1988. How do risk perceptions respond to information? The case of radon. Rev Econ Stat 70(1):1–8.
Stephens S. 1987. Lapp life after Chernobyl. Nat Hist 96(12):33–40.
Stoffle RW, Traugott MW, Stone JV, McIntyre PD, Jensen FV, Davidson CC. 1991. Risk perception mapping: using ethnography to define the locally affected population for a low-level radioactive waste storage facility in Michigan. Am Anthropol 93(3):611–635.
Superfund Amendments and Reauthorization Act of 1986 (SARA). 1986. Public Law 99–499.
Vogel SA. 2012. Is it Safe? BPA and the Struggle to Define the Safety of Chemicals. Berkeley, CA:University of California Press.
Wandersman A, Hallman W, Berman S. 1989. How residents cope with living near a hazardous waste landfill: an example of substantive theorizing. Am J Community Psychol 17(5):575–583.
Winger S, Horton RA, Muhammed N, Grant GR, Tajik M, Thu K. 2008. Integrating epidemiology, education, and organizing for environmental justice: community health effects of industrial hog operations. Am J Public Health 98:1390–1397.
Wylie SA. In press. Corporate Bodies and Chemical Bonds: Transforming Energy and Health Futures through “Civic” Scientific and Social Scientific Study of Shale Gas Extraction. Durham, NC:Duke University Press.
Zoller H. 2012. The narrative politics of health, risk, and illness in environmental health campaigns. J Appl Commun Res 40(1):20–43.