HHS Public Access

Author manuscript

New Solut. Author manuscript; available in PMC 2021 November 01.

Published in final edited form as:

New Solut. 2020 November ; 30(3): 173–182. doi:10.1177/1048291120947370.

Bridging Silos: A research agenda for local environmental health initiatives

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Abstract

The environment and public health are managed by separate institutions that often operate in isolation from each other. This system is often referred to as managing in “silos.” The resulting lack of coordination, consideration of cumulative effects, and diffuse targets for change contribute to the persistence of many environmental justice problems. There are many barriers to bridging these silos, particularly at state and federal levels. Local collaborations, however, may have greater potential for changing these systems. There has been limited assessment of successful local environmental health initiatives. This paper explores three case studies of local collaboration: lead poisoning prevention in Rochester, New York; promoting a healthy and equitable built environment in Duluth, Minnesota; and increasing consideration of community health in decisions around the ports of Los Angeles and Long Beach, California. It develops a research agenda to inform future collaborations to improve environmental health equity through local systems change.

Keywords

environmental justice; systems change; local policy; health equity; built environment

Introduction:

The fields of environment and public health protection both have common roots in the sanitation efforts of cities nearly two centuries ago.^{1, 2} Today, however, health and environment are managed by largely separate agencies that do not regularly share information, coordinate activities, or work collaboratively in pursuit of common goals. Scholars and practitioners often refer to such institutional “silos” as an impediment to holistic, effective, and equitable public decisions.^{3–5} Environmental agencies pursue achievement of standards that may be insufficient to protect particularly vulnerable communities from cumulative, geographically concentrated risks. Public health agencies tend to focus on education, surveillance, and secondary prevention, with little influence over the “upstream” drivers of disease. Decision-makers in non-health sectors (e.g. environmental quality, transportation, land use, economic development) often fail to consider the health equity implications of their policies. Lack of coordination between these management silos poses a significant barrier to overcoming community-level environmental health inequities resulting from decades of policies that have marginalized low-income and communities of color.⁴ Therefore, addressing the root causes of environmental health problems often requires finding new ways to connect or “bridge” these separate systems. This may leave communities at a loss for “where to start” in raising environmental health concerns, since no

one agency has authority and responsibility to address all the drivers of such problems. At the level of state and national governance, there are steep financial, institutional, and disciplinary barriers to overcoming such gaps. At the local level, however, there may be greater potential to create collaborations, redefine problems, and change systems to better promote environmental health equity.

Across the country, local collaborations have brought together researchers, communities, and governments to address observed environmental inequities in urban neighborhoods. How can we learn from these efforts to promote progress in other communities? This paper develops a social science research agenda for evaluating, promoting, and disseminating lessons learned from this growing body of local experience. In order to inform the research agenda, this paper uses a comparative case study approach to identify themes, lessons learned, and key questions raised by exploration of three diverse case studies of local environmental health initiatives: lead poisoning prevention in Rochester, New York; promoting health equity in the built environment in Duluth, Minnesota; and increasing consideration of community health in managing the ports of Los Angeles and Long Beach, California. Analysis of these diverse cases suggests several key characteristics of collaborative efforts that change management systems in sustainable ways that advance environmental health equity. These cases also indicate ways to better support such efforts in the future. However, significant knowledge gaps remain in understanding the kinds of policy, funding, and practice change needed to promote local collaborations to improve environmental health and equity. Given the promising outcomes in these cases and many other communities, it is important that social scientists refine, apply, and synthesize research on such local initiatives in order to inform academic, community, government, and funding approaches to better support them in the future. This paper aims to frame future research to inform practical solutions in this area.

Background

By the 1990s, the first generation of federal environmental laws had made significant progress in cleaning up the environment.^{6, 7} However, it became increasingly apparent that single-sector management was insufficient to successfully protect complex ecosystems. Collaborative efforts developed in sectors including fisheries, forestry, land use, and watersheds to promote a holistic approach to managing ecosystems.^{8–10} Key features of these efforts included multidisciplinary science, community engagement, and structures to support coordination among multiple institutions.^{11, 12} Social scientists took on the challenge of studying these complex organizations to identify their successes, challenges, and ways to better support them.

Evaluating the success of collaborative efforts is notoriously difficult.^{13–15} Collaborations often have evolving goals, indirect impacts, very long time horizons, and difficult-to-measure outcomes. The primary approach of social scientists studying collaborative ecosystem management has been systematic in-depth case studies that explore how efforts promote greater multidisciplinary, community participation, and institutional coordination.^{11, 12, 16}

Similarly, public health has increasingly focused on the “upstream” drivers or social determinants of health, including environmental factors, as a more holistic approach to promoting health. Doing so has led to development of concepts like “Health in All Policies” and “Public Health 3.0,” which emphasize the importance of considering public health in decisions outside the health sector (e.g. transportation, land use, education, etc.).^{17–23} Despite this growing recognition that community health depends on multisectoral systems change, institutional support for collaboration is not well developed. It may be due in part to the lack of understanding of what contributes to successful collaboration. Because protection of environmental health relies on coordination between the silos of health, environment, and other fields, understanding how to promote collaboration is particularly important to addressing these problems. This paper takes a first step, using insights gleaned from ecosystem management to identify social science research needs related to local environmental health initiatives. As in ecosystem management, in-depth case studies of existing collaborations are likely to be critical to informing the design, evaluation, and support of these promising initiatives.

Case studies of three local environmental health initiatives

Across the country, communities, academics, and researchers have collaborated to address environmental health inequities in multiple issue areas, geographic settings, and cultural contexts. In order to develop a framework for understanding key features of successful initiatives, three case studies were chosen that shared the following common characteristics:

- Environmental health inequity: the effort involved an environmental exposure — including lead in housing, unhealthy neighborhood infrastructure, and poor air quality — that disproportionately burdened historically marginalized communities.
- Urban community context: environmental health inequities can arise in all kinds of communities. However, the nature of organizing residents, accessing information, leveraging the capacity of existing groups, and developing solutions may be significantly different in urban versus rural communities. To enhance comparability, this study focuses on urban communities with a long history of urbanization, industrialization, and disinvestment.
- Long-standing collaboration: While some efforts may have short-term success, the full impacts of collaborative efforts often emerge over long time periods. In order to fully explore the process, outcomes, and impacts of collaborative efforts, this study focuses on cases that had robust documentation of activity over at least ten years.
- Policies, systems, and environmental change: many local environmental efforts focus on a single project, site, funding source, or educational campaign. The initiatives highlighted here all aimed to change the drivers of and processes for managing environmental health to sustain impact into the future.

Three case studies were selected that shared the characteristics described above while also reflecting geographic, demographic, and topical diversity. As with any study based on a

limited number of cases, the full range of experiences and dynamics cannot be represented. However, such in-depth, multi-method case studies are particularly useful for exploring themes and generating questions for future research.²⁴

Each case study was conducted using multiple methods, including a combination of primary document analysis, review of prior research, and interviews with stakeholders. The cases are briefly described below to provide context for the analysis of how these initiatives leveraged multidisciplinary knowledge, engaged diverse community stakeholders, and structured their efforts to improve environmental health equity.

Coalition to Prevent Lead Poisoning—Rochester

In 2002, rates of childhood lead poisoning in high-risk neighborhoods in Rochester, New York, were more than ten times the national average.²⁵ In the context of failing schools, high rates of child poverty, and concerns about crime, a broad group of stakeholders coalesced around the idea that addressing lead in older housing could make a difference in children's lives and make significant improvements in the community's well-being. Whereas lead was traditionally seen as an issue for the local health department and health care providers, the Rochester Coalition to Prevent Lead Poisoning (CPLP) focused its efforts on promoting changes in housing systems. CPLP worked to raise awareness of the problem, garner support for a policy change, and propose a framework for a cost-efficient local lead law. In 2005, Rochester City Council unanimously passed a local law requiring lead inspections in all pre-1978 rental housing. The law included provisions for ongoing data sharing which allowed CPLP to monitor implementation, effectiveness, and needed changes over time.^{26, 27}

In addition to the local lead law, CPLP fostered collaboration between community, government, and academic partners to sustain, support, and enhance Rochester's lead poisoning prevention efforts over time. As a result of these combined efforts, the number of Rochester children with elevated lead levels had decreased over 90 percent by 2012, 2.4 times faster than in other upstate New York cities.²⁸ This case demonstrates how bringing together diverse stakeholders and reframing the problem of lead poisoning from a "health issue" to a "housing issue" were keys to developing a new, locally appropriate solution to an old problem.

Healthy Duluth—Duluth

The "healthy communities" movement has highlighted evidence that people living in poorer neighborhoods often lack access to healthy, affordable food and opportunities to be physically active in their daily lives, which contributes to disparities in obesity and related health conditions.^{29, 30} Local health departments, city staff, and community groups in Duluth recognized these patterns of inequity in the built environment in their community. Despite the city's recognition as the "Best Town Ever" by *Outside* magazine, Duluth's poorest neighborhoods had limited access to trails, grocery stores, or safe walking routes.³¹

Around 2008, stakeholders in Duluth began learning about national efforts to promote healthier community environments and undertook several projects to integrate these concepts in local land-use plans.³² Over time, these efforts expanded to include transportation, brownfield redevelopment, trails, and health systems planning through

several collaborative efforts. Through this work, local organizations integrated health considerations into their plans, activities, analyses, policies, and projects, focusing on increasing opportunities for physical activity and food access. Many communities have engaged in one-time projects or grant-funded programs to improve environmental health determinants, but Duluth's efforts stand out with respect to breadth of scope, collaboration, and sustainability. This work culminated in a 2016 announcement by the mayor of Duluth that health and fairness would be added as core goals of the city's new comprehensive plan.³³

THE Impact Project—Ports of Los Angeles and Long Beach

Most consumer products are shipped from where they are made to their final user through a complex transportation network including container ships, trains, warehouses, and trucks. More than 40 percent of all Chinese goods imported into the United States enter through the ports of Los Angeles and Long Beach in Southern California, making that area a major hub of freight transportation.³⁴ The air pollution, noise, light, and traffic associated with these activities pose health risks to surrounding communities and workers. In 2001, the University of Southern California's (USC) Environmental Health Sciences Center and community partners hosted a town hall meeting in which participants highlighted these concerns.^{35–37} After several years of organizing, these partners formed the "Trade, Health, and Environment Impact Project" (THE Impact Project) to elevate health equity as a central concern in goods management decisions.

THE Impact Project is a collaborative effort by academic and local environmental justice groups to increase consideration of health effects in all decisions related to goods movement in the area.^{38, 39} THE Impact Project aims to support community-based science, build capacity within communities and among academic researchers to knowledgeably participate in decisionmaking, and translates emerging health research to inform goods movement planning. Along with other community efforts, THE Impact Project has succeeded in attracting media attention to these issues, enhancing community participation in decision processes, and promoting analysis of health equity impacts in decisions about highway, port, and railyard expansion. These efforts have influenced ongoing policy processes and outcomes at the local, state, and national level and gave rise to the Moving Forward Network, a national campaign to promote co-learning and collective action by ports-adjacent communities throughout the country.⁴⁰

All three of these cases engaged a longstanding problem – childhood lead poisoning, unhealthy neighborhoods, air pollution – that had plagued communities for decades. Interestingly, all three of these environmental problems had been significantly reduced population-wide before the initiative started: childhood lead poisoning rates were dropping, Duluth was seeing economic redevelopment, and southern California's air quality had improved. These initiatives arose from the recognition that disparities remained, with low-income communities of color bearing a disproportionate burden against a backdrop of overall environmental improvement. By bringing together health, environmental, and community interests to "reframe" these old issues as urgent issues of injustice, these

initiatives were able to bring new energy, resources, and ultimately progress in addressing longstanding community environmental health problems.

Multidisciplinary knowledge, community engagement, and collaborative structures in three local environmental health initiatives

Each of the case studies used different resources, collaborative structures, and processes to successfully access multidisciplinary knowledge, engage communities, and maintain collaborative structures. Doing so allowed them to integrate the “silos” of environmental, health, and community knowledge to develop innovative new solutions at the systems level. This section briefly summarizes the different ways each initiative accomplished these functions and the interrelationships between them.

Accessing multidisciplinary knowledge

Problems of environmental health by definition span multiple areas of expertise. Solving them therefore requires multidisciplinary knowledge, including understanding localized environmental exposures, the nature and distribution of health impacts, and the values, experiences, and concerns of affected communities. Local environmental health initiatives must have the capacity to access, analyze, and integrate information from these multiple sources in order to inform their problem definitions, strategies, and solutions. Because collaborative efforts are often resource-limited, this may mean making effective use of existing information, rather than generating new information. These initiatives accessed multidisciplinary knowledge primarily by engaging individuals with diverse expertise in their collaborative efforts. Experts contribute their knowledge based on existing information, but can also help analyze and integrate existing information, identify key gaps and uncertainties, and lend credibility and respect to the overall effort. Thus, key questions for future research include how, why, and when multidisciplinary experts interact with these types of efforts.

Public health knowledge.—Each effort accessed public health expertise in different ways. The Rochester Coalition to Prevent Lead Poisoning included local health care providers, public health department staff, and environmental health researchers in several of its working committees. Its Science Committee provided literature summaries on policy-relevant questions and reviewed the scientific basis of CPLP’s positions. In Duluth, clinicians helped establish the initial Fit City Duluth, initiative. Local health department staff played sustaining roles throughout Healthy Duluth efforts. Health system and foundation staff developed a community health survey to fill data gaps and inform strategic efforts to integrate environment and health equity going forward. Health experts also analyzed existing health data and helped frame the group’s campaigns for equitable transportation and food access in terms of health outcomes.

THE Impact Project partners included clinicians and USC environmental health scientists. This group had the unique advantage of local researchers who were actively studying the health effects of air pollution and could provide detailed data and credible insight into community health impacts of changes in emissions from trucks, ships, and railyards.

Although these sources of health knowledge varied, in each case experts involved indicated that they invested time in collaborating because they believed it would help them achieve public health goals their organization had been unsuccessful in accomplishing alone.

Environmental Knowledge.—All three initiatives also tapped into knowledge about environmental conditions. CPLP members included housing agencies and lead inspectors who educated the group on how to prevent, identify, and address residential lead hazards. Several members conducted applied analyses of local housing data to inform solutions, including a “needs assessment” with maps identifying high-risk neighborhoods.⁴¹ The “Get the Lead Out (GLO)” project generated detailed information about locally appropriate ways to address home lead hazards.⁴² University of Rochester faculty provided summaries of national research on lead hazards in housing.²⁶ Healthy Duluth included transportation and land use planners, brownfield experts, and parks and recreation staff, all of whom had detailed knowledge of and access to data on the built environment. As noted above, THE Impact Project had direct access to USC researchers’ data on local air pollution, as well as the ability to interpret government agencies’ data and models. THE Impact Project also supported teams of community members (the “ATeams”) who collected their own data about air quality, truck traffic, and other environmental conditions in their communities.⁴³ Individuals with environmental expertise noted that these collaborations helped frame their longstanding environmental goals in terms of health equity, which increased support for improving physical conditions. The opportunity to reframe these issues in terms of health helped sustain participation by diverse experts and organizations.

Integrating Health and Environmental Knowledge.—In order to inform effective solutions, these initiatives needed to integrate multidisciplinary information in new ways. This is inherently challenging for several reasons. Environmental and health information are often maintained by different government agencies. For example, Rochester is typical of many communities in which information on the homes of lead poisoned children was collected by the county health department, but characteristics of housing likely to pose lead risks is maintained by city housing agencies. One of CPLP’s first challenges was to integrate that separate health and environmental information to inform design, targeting, and cost estimates for policy solutions. This was eventually accomplished by direct data-sharing between the respective agencies. Stakeholders in Duluth found that public health data was only available at county or zip code levels; this made it challenging to overlay health data with neighborhood-level built environment information. In this case, three externally-funded Health Impact Assessments developed new systems for integrating multidisciplinary information. Thus, not only did these efforts need to engage individuals from different sectors, but also they had to create new ways to integrate their knowledge that could inform systems change solutions.

The main knowledge function of the initiatives was to access and synthesize multiple kinds of knowledge to inform boundary-spanning solutions. They relied primarily on existing data, but strategically generated new information to fill identified gaps. Each collaboration combined national research with local knowledge and worked to translate this knowledge in policy-relevant ways. All three initiatives emphasized that their positions were science-

based, bolstering their credibility. They leveraged knowledge about public health and environmental conditions primarily through the participation of local experts. As a former co-chair of CPLP quipped, "... no one could afford to buy the expertise that we got for free."⁴⁴ A better understanding of how to solicit, support, and reward engagement by diverse experts might help future initiatives be more successful.

Engaging communities

Meaningful engagement of communities is vital to the success of local environmental health initiatives for several reasons. First, it is ethically essential. As environmental justice advocates have long argued, communities have a right to participate in decisions that affect their health and well-being—especially communities that have not had this opportunity in the past. Local environmental health initiatives can provide a vehicle for community influence on policies, systems, and environments lacking in current decision processes. Second, the voice of communities that experience environmental health disparities can be a source of political power to drive systems change. Third, knowledge about communities' experiences, values, questions, and preferences is critical for designing effective solutions. As one Rochester stakeholder said, "Understanding can't become wisdom without context ... So, the experts need to be embedded in the community to help them gain this understanding."⁴⁵

Community engagement took different forms in each of these efforts. THE Impact Project arose from concerns of environmental justice groups from communities living adjacent to transportation hubs. These groups remained active as partners throughout the initiative. In other cases, the environmental health issue may not be a high priority for residents, in which case the first step may be to work with existing community groups to raise awareness. When CPLP formed, most community leaders thought the problem of childhood lead poisoning was a "thing of the past." After several years of public discourse about lead's prevalence, distribution, and social costs borne by low-income communities of color, there was more direct involvement by community groups. In both Rochester and Duluth, neighborhood groups had limited capacity to participate in meetings and projects. The initiatives in those cities devoted resources to eliciting community input, reaching out to organizations that served vulnerable populations, and building neighborhood groups' capacity. For example, Healthy Duluth members conducted surveys to document residents' experiences, initiated new coalitions focused on neighborhood conditions, and supported efforts to engage residents in ongoing planning processes. Thus, depending on the community's initial level of concern and capacity, the initiatives took different approaches to community engagement, and these approaches evolved over time. In all cases, however, the efforts aimed to advance communities' ability to inform, promote, and participate in solutions to problems affecting their environmental health. This diversity of experiences suggests that future research should explore how effectively different approaches increase communities' long-term capacity to participate meaningfully in systems change.

Maintaining collaborative structures

Finally, the structure of collaborative initiatives affects their ability to influence policies, systems, and environments. Initiatives must coordinate, support, and sustain collaboration

effectively over a period of time to achieve systems change. These three efforts all provided a framework within which participants can build a common understanding of *why* existing systems are failing to protect environmental health equity, *which* local levers (e.g., policies, practices, funding) can be shifted to address these gaps, and *how* they can best impact systems change. Sustaining interactions among multiple partners with shifting priorities, limited resources, and different objectives over time can be daunting. Despite these challenges, all three local environmental health initiatives sustained flexible collaborative structures that were able to change the way existing systems and institutions managed environmental health.

The CPLP relied on the fiscal and physical infrastructure of several different nongovernmental organizations over time. CPLP also changed its structure significantly over the years. CPLP grew quickly after its formation, growing from an all-volunteer organization to three full-time staff supporting seven working committees. It also established by-laws that included guidelines for consensus decision-making and board membership. After the lead law passed in 2005, active membership dwindled, the number of working committees was reduced to two, and CPLP relaxed its bylaws to allow for more informal decision-making. As of 2017, it had one part-time staff member, and the group continued to be active through regular meetings coordinated by volunteers.

In Duluth, an increasingly well-connected network of professionals collaborated on projects to promote healthy built environments over time. A “Fit City Duluth” group initially convened by the city spun off and obtained non-profit status, but was only active for a few years. Its work was picked up by the Healthy Duluth Area Coalition (HDAC), which was hosted by a community arts and culture non-profit.⁴⁶ The HDAC did not have formal membership or decision-making rules, but rather served as a coordinating forum and provided input on the plans, projects, and funding proposals developed by staff and partners. Stakeholders asserted that because of the community’s small size this informal network allowed them to identify opportunities to work together in pursuit of common goals. At the same time, additional convening occurred around related projects, including three Health Impact Assessments and the city’s brownfield planning processes.

THE Impact Project operated on a model of equal decision-making and resource sharing. The partners decided together on the work plans for grant proposals, and the USC administered grants. Meeting sites rotated between the partner groups’ offices, and decisions were made by consensus. This loose structure was sufficient because THE Impact Project had just six organizational members: four community partner organizations and two academic institutions. Each of these groups engaged in work outside of their partnership related to the health impacts of trade through the ports; THE Impact Project provided a venue for sharing information, building capacity, conducting projects, and producing materials all the groups could use.

In all cases, the collaborative structure’s ability to facilitate participation of diverse participants was a key to its success. This begs the question of why people participated, particularly given that these groups had limited funding to support paid staff, projects, or research. In each case, participants expressed their belief that collaborating could promote

solutions to environmental problems they had been working on for years. As USC Professor Ed Avol said about his involvement in THE Impact Project, “We all had a commitment to improving the public health and reducing the environmental exposures, and THE Impact Project provided opportunities to do so.”⁴⁷ Similarly, in Rochester, community physician Dr. Richard Kennedy noted that working with CPLP gave “... a sense of empowerment because we had so many bases covered. We had so many smart people coming together, I felt like we could do this, and was willing to put the time into it.”⁴⁸ Former Monroe County health director Dr. Andrew Doniger said that CPLP “... was clearly the beginning of a community movement [in Rochester], and our staff were thrilled to be part of that. They felt like they were being listened to after all of the frustration they had felt; now there was a chance that things were going to change.”⁴⁹ Duluth transportation planner James Gittemeier said, “Urban planners have espoused livable communities for decades ... but when we tried to talk about this, it wasn’t as powerful as when public health convened everybody, then the community realized it was a public health issue.”⁵⁰ Thus, the initiatives’ ability to bring people together with the potential to make an immediate impact on a problem of local concern was a key motivator in engaging local experts. This suggests that future research should explore ways that collaborative efforts engage, reward, and sustain the involvement of diverse stakeholders.

All three efforts relied on consensus to guide their decision-making about group positions and actions. In addition to their collective work, their convenings served to share information and coordinate efforts conducted by individual partners. Rather than focusing on creating, managing, funding, and sustaining a new organization, these collaborations made creative use of existing institutions and limited resources to support their convening. As well, each collaborative effort’s structures and processes evolved over time. Thus, future research should go beyond evaluating the funding, productivity, and sustainability of formal organizations and encompass the longterm, indirect, and social impacts of informal collaborative structures as they evolve over time.

Accessing multidisciplinary knowledge, engaging communities, and sustaining collaborative institutions are interrelated functions. Collaborative structures provide a forum within which boundary spanners with different policy experiences can interact to develop strategies and solutions. Engagement of individuals from multiple organizations and perspectives helps provide access to the diverse sources of knowledge. Integrating multidisciplinary knowledge within these initiatives can help reframe old problems in new ways that engender innovative solutions. Assessing how these core functions are accomplished may shed light on why some communities may have more success than others in sustaining successful collaborations – and what we can do to enhance success elsewhere.

Toward a social science research agenda for local environmental health initiatives

All three local environmental health initiatives described here made significant changes in local systems for addressing longstanding environmental health problems. This initial finding suggests that such efforts may have significant potential for advancing local systems

change to promote environmental health equity. In order to build on this potential, we need to better understand what contributes to their success. Exploration of these case studies shows that each was able to foster three key capacities: 1) the ability to access, integrate, and apply multidisciplinary knowledge; 2) effective engagement of communities and other stakeholders; 3) a convening structure that could effectively support collaboration over time. Thus, it is important to understand how local initiatives can develop and sustain these capacities.

The accomplishments of these three initiatives raise questions about how widespread these efforts are, what contributes to or limits their success, and why some communities foster such initiatives while others do not. These questions should be explored through systematic comparative case studies of additional local environmental health initiatives on diverse topics, in different kinds of communities, and with varied outputs and outcomes – including failures. In the field of ecosystem management, systematic comparative case studies developed knowledge that informed the institutionalization, dissemination, and growth of collaborative approaches. Similarly, in-depth analyses of local environmental health efforts in diverse geographies, communities, and issue areas may suggest ways to support their success and expansion.

Exploring these cases suggests three overarching questions to guide future research on local environmental health initiatives:

1. *How can governments, academics, and funders better support local environmental health initiatives?* These case studies suggest that technical experts participate when they are encouraged and supported by their home institution, given appropriate and rewarding tasks, and convinced that their input will contribute to improving local conditions. Community engagement may be supported by institutional requirements to partner and build local groups' capacity to participate. These case studies showed the important role of academic and local public health institutions that were mission-driven to support partnerships. This suggests that modest but sustained commitments to convening can be extremely impactful. For example, the USC's NIEHS-funded Community Engagement Core provided grant writing, convening, and administrative support to THE Impact Project. Future research should aim to identify how existing institutions can reduce barriers and increase support for such convening functions to help local initiatives attain these three key capacities.
2. *How can local environmental health initiatives better support each other?* The diversity in approaches and experiences of these case studies suggests that each community may need to develop its own unique approaches and solutions. Also, the process of co-learning contributes to the group's cohesiveness and ability to work together to promote systems change. Nonetheless, having models of other collaborative processes (diverse modes of convening, sources of funding, appropriate ways of engaging experts, communities, and governments, etc.) may help inform new initiatives. Within similar issue-areas (e.g. housing, transportation, air quality, etc.), sharing specific projects, technical resources, and solutions may be helpful. However, because local initiatives are usually self-

contained, time-limited, and focused on outcomes, they seldom have opportunities to share their stories. Outside institutions may have an important role to play in facilitating learning between localities. For example, funders of the Healthy Duluth work including the Minnesota Department of Health, the Center for Prevention at Blue Cross Blue Shield, and the Health Impact Project all shared summaries of the local initiatives on their web sites so other communities could access them. Future research should evaluate the effectiveness of existing peer-to-peer learning structures and promote development, implementation, and evaluation of new approaches to dissemination of lessons learned between communities.

3. *How can state and federal actors learn from local environmental health initiatives?* While we may celebrate the successes of local community efforts, it is important to remember that each one also reflects a failure of existing health and environmental management systems to protect community health. As Cummings warns, "... social movement efforts to build progressive cities may create islands of greater equality amid a larger sea of inequality—causing the gap between the politics of progressive big cities and the politics of everywhere else to grow wider, reinforcing polarization."^{34, 345} In other words, relying on local initiatives to address environmental injustices may primarily benefit those communities with sufficient capacity to organize successfully. Academic, government, and philanthropic interests should carefully examine local environmental initiatives as opportunities to identify underlying drivers of environmental injustice and sources of potential solutions at the state and national levels. For example, the successful experience of Rochester's lead law has informed state and national efforts to proactively address lead hazards in rental housing. Localities are laboratories of innovation, but more research is needed on how to better translate their experiences to inform state and national approaches.

One particularly promising area for exploring these questions is local climate change efforts. Local initiatives that focus on climate change adaptation have clear implications for health equity. Efforts to reduce greenhouse gas emissions, however, sometimes focus on technical, physical, or economic changes that could pose burdens on low-income communities. Using a health equity framework to identify the full range of multidisciplinary knowledge needs, promote appropriate community engagement, and structure sustained interactions may help local groups promote action on this complex issue. As well, studying local efforts that have done so successfully may reveal ways that funders, agencies, and researchers can better support their replication.

Conclusion

Local environmental health initiatives have the potential to build bridges between the silos of existing management systems in ways that promote health equity. In order to expand such initiatives, we need a better understanding of the incentives, perspectives, and limitations of diverse participants and the resources that are needed to sustain collaboration. This

exploration of three local environmental health initiatives suggests that there may be common themes, functions, and ways to advance these efforts. Social science research on similar questions in the field of ecosystem management helped build understanding about what contributes to successful collaboration and provided a foundation for sustained support, institutionalization, and dissemination. Further development of conceptual frameworks and systematic case studies of additional local environmental health initiatives will help academic, community, private sector, and governments better support their future growth and success.

Acknowledgements:

This work was supported in part by the National Institute of Environmental Health Sciences through grant P30ES001247. The case studies highlighted in this commentary are presented in greater depth in “Bridging Silos: Collaborating for Environmental Justice in Urban Communities” (available via open access through the MIT Press, 2019). The author greatly appreciates the contributions of the case study participants. USC professor emerita Andrea Hricko’s assistance with the Southern California case study was invaluable, as was the input from additional members of THE Impact Project, the Coalition to Prevent Lead Poisoning in Rochester, NY, and numerous stakeholders involved in the Healthy Duluth efforts. The interview protocols were deemed exempt by the University of Rochester’s Research Subjects Review Board. The content of this manuscript is solely the responsibility of the author and does not necessarily represent the views of the National Institutes of Health, interviewees, or organizations featured in the case studies.

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