VISUAL ESSAY 3

GETTING THE LEAD OUT, ONE COMMUNITY AT A TIME

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Understanding and eliminating pollution exposure pathways to communities is part science, part awareness, and part activation. We have been developing and implementing a host of citizen science programs in partnership with communities, particularly revolving around eliminating lead poisoning. These projects have involved multiple novel tools and techniques, but first and foremost they have involved active community leadership and participation (Map My Environment), which have allowed us to help the community to map and potentially eradicate soil lead contamination. Figure 1 is an example of the types of visualisations developed, with pollution hotspots indicated by shifts to the red spectrum. It is critical to break down the long-held assumption, which arises from the educational and classist privilege that universities are the real holders of knowledge, to be applied to "help" communities. We need to reframe this partnership as one where the communities are not only holders of important local knowledge, but indeed are critical to developing and implementing community-based solutions. This reframing can be considered a heritage-making practice – shaping the stories neighbourhoods tell about themselves, understanding their histories in a new light, and bringing new voices and perspectives into the narrative.

Science needs new approaches, and willing partners, to help inform and begin to solve many of our current challenges. One challenge is simply clear communication of the science, with clear messaging provided to citizen scientists to understand the sources and risks of lead exposure in homes (Figure 2). One approach to meaningful communication and engagement adopted by some environmental health scientists from the birding community is "citizen science," where communities co-create research with university faculty and students to make everything more understandable and actionable, from educational material to participating in the research process to activating and disseminating research products that then inform practice and policy. As noted by Davis and Mah in their edited volume *Toxic Truths* (2020),

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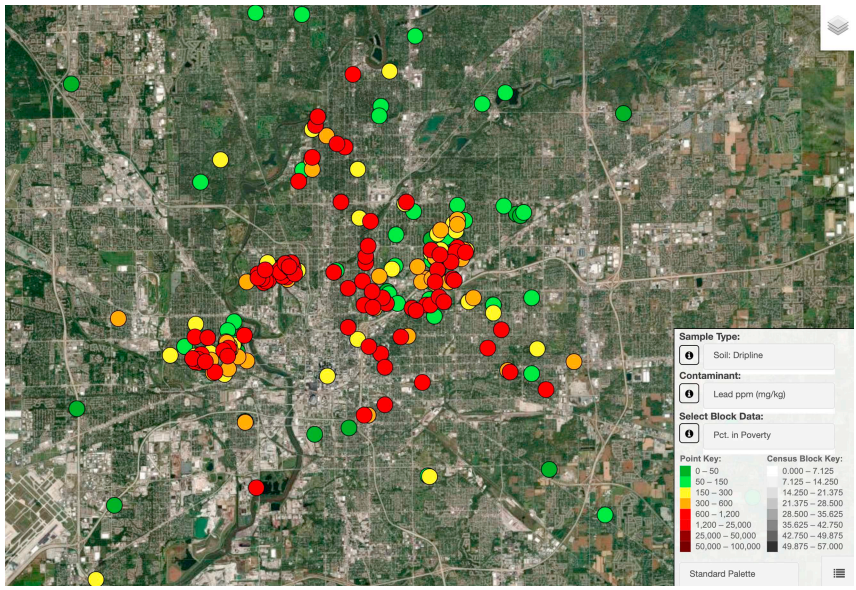

FIGURE 1 An aerial photograph of Indianapolis with shaded (B&W image) or red, orange, yellow, and green (color image) dots. A key in the lower right identifies them as lead pollution hotspots indicated by shifts to darker tones or to the red spectrum.

FIGURE 2 Flyer explaining childhood lead exposure with infographics and a QR code that links to the Anthropocene Household project.

"for decades, environmental justice activists have campaigned against the misuses of science, while at the same time engaging in community-led citizen science," and I argue that some of this misuse centres around exploitative research, where the citizen-scientists themselves were engaged largely as data collection agents for research purposes, and not as research partners themselves.

We have focused our community engagement and co-creation approaches to address one of the massive public health challenges confronting many cities – legacy lead contamination, which permanently impacts the brain development of children (Filippelli and Laidlaw 2010). In its current form, we have robust partnerships with local communities, including faith-based communities constructing testing kits to be distributed in their communities (Fig. 3). Ten years ago, we started off our efforts to understand the environmental legacies of lead contamination from a purely scientific frame – where is the lead, how are children being exposed, and how can we reduce that (Filippelli et al. 2018). We quickly found that communities have many of these same questions. We at the university are hampered in our efforts because we may lack access and participants to adequately address the key scientific questions (Hayhow et al. 2021). Meanwhile, communities are hampered by a lack of affordable access to analytical and technical resources to adequately constrain the community problem. By working together, could both problems be solved? The short answer is yes, but not without facing a bit of a learning curve.

FIGURE 3 Volunteers from a faith-based community partner assemble testing lead kits to be distributed in their communities.

One key lesson learned from our own work on lead contamination is that university-community partnerships have to be like all healthy relationships – supportive, nurturing, trusting, and reciprocal. The needs of each partner are different. Universities produce knowledge and train students, and thus a partnership needs to result in products that are of value to them, such as publications and student theses. Neither of these products have inherent value for communities, who may instead value actionable data to improve the community. Thus, universities must approach these partnerships as not just opportunities to do research **on** communities, but rather **with** and **for** them.

When community partners are brought into the team from the conception phase, they bring with them their heritage of the place, and often new approaches and viewpoints that are relevant and effective within the community context. A naturalist term for including these perspectives is "traditional ecological knowledge," which pertains to urban communities, with their own ecosystems of organisations, leaders, and environments. It is the cultural and community heritage and history of the place that provides rich opportunities for exploration and engagement, including translating scientific practice into workable approaches for both assessing environmental issues and extrapolating the results of research practices into tools that are useful to the community. For example, community voices might bring more straightforward approaches to environmental sampling, such as doing away with the lengthy and often confusing sample labelling protocols used in many laboratories for a simpler and more effective scheme (Fig. 4).

FIGURE 4 Plastic vials for lead testing to be distributed to community citizen scientists.

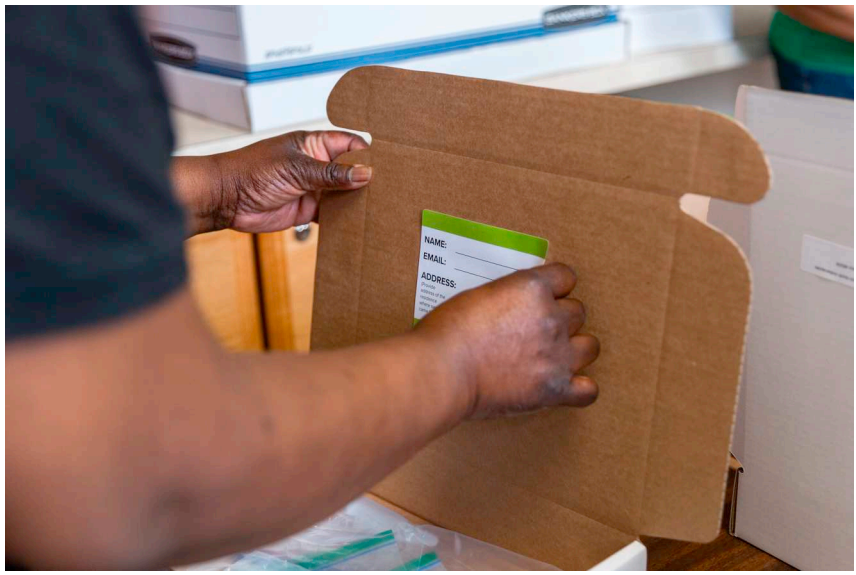

FIGURE 5 Volunteers assemble a lead testing kit box.

Working together with community partners has its own benefits, especially when it comes to accessing difficult sampling locations and mobilising a team of community volunteers to package and distribute sampling kits—one example is "kit construction parties" held as part of our home sampling efforts (Fig. 5). Community members have access to their own backyards, can take samples themselves, and can deliver those samples to central locations, such as churches, for collection by researchers.

Communities often lack the expertise and technologies to confront some of the environmental challenges that they face, leaving them with few options. Universities, on the other hand, have ample expertise and resources (Fig. 6) and are often literally blocks away from these same under-resourced neighbourhoods, but often narrowly view environmental problems as those that can be solved by scientific research alone. The very fact that legacy contaminants continue to overburden many communities is not a scientific problem per se, but rather one that requires the voices, talents, and actions of those communities – without those perspectives, no amount of science will solve the problem. Partnerships can effectively bridge that knowledge chasm, bringing tools and resources to bear to solve problems. Additionally, students can learn more about how to apply their training to real-world environmental problems.

Educating the next generation of young learners is critical to overcoming the intergenerational burdens of community contamination. Young people are additional research partners and citizen scientists, bringing their own unique worldviews to many of these issues. In an informal setting, youth are more open and free to express their ideas, and their emotions, about the environment surrounding them – especially

FIGURE 6 Lead testing samples analyzed in the lab.

FIGURE 7 Project leaders (including the author) present information about lead contamination to community members.

if conducted in the actual environment of natural space as opposed to a classroom (Fig. 7). Furthermore, teachers sometimes grapple with implementing technical curricula that are relevant to some communities, and by providing opportunities for children and teachers to learn about and confront real problems in their neighbourhoods. One example is education about the history of racist policies such as redlining and zoning that contributed to the cycles of disinvestment and disproportionate impacts of pollution in the first place, thus engaging with the troubling heritage of contaminated communities. By engaging with their community heritage, emerging learners can find relevance, value, and agency in the concepts that they learn in school.

All images, except the soil lead map, are courtesy of Liz Kaye, Indiana University.

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