

Part 2: Visualizing Climate, Health, and Flooding

Anne Johnson: [music] This is Global Environmental Health Chat, the podcast that explores environmental health issues that transcend national boundaries. I'm your host Anne Johnson, and this podcast is produced by the National Institute of Environmental Health Sciences.

As we heard in part one of this two-part series on the NIEHS Climate Change and Environmental Exposures Challenge, climate change affects public health in a lot of ways. The two projects we'll hear about in this podcast drill deeper into what happens when it starts raining [thunder/rain sound] and just won't stop. In a word, flooding. [sound of water flowing]

While flooding brings some obvious immediate health risks, floods can cause subtle and lasting dangers even if you manage to avoid being swept away or losing your house. Mold is a big one. Another risk is that hazardous chemicals that were contained or buried before the flood could be unearthed and spread into new areas.

Our first guest is Dr. Yi Wang, assistant professor of environmental health at the Indiana University Richard M. Fairbanks School of Public Health. His team developed innovative visualizations that identify vulnerabilities related to flooding, as well as air pollution and extreme heat.

Their tool combines information about flood risk with contamination risks and vulnerable infrastructure like houses, schools, and hospitals. They even include data on 9-1-1 calls connected with extreme heat events, and the tool is accompanied by plain-language explanations to help communities understand the trends and their risks.

Yi Wang: So our goal is to you know, identify these hot spots and populations at risk of these environmental and climate change exposures, and we hope that this tool can be used to empower the communities in a way that potentially, in the future, they could use our tool to generate the statistics or the reports that they need for advocacy.

Anne Johnson: The tool currently focuses on an Indianapolis neighborhood known as the Near West. It's what Yi calls a "drivethrough community" because most people just drive right through it on their way from the highway to downtown without ever spending time there. This largely low-income, minority, historically disadvantaged community has a number of superfund and brownfield sites.

Yi says there's a real risk that if these sites become flooded, hazardous materials could leach into the soil or water and put residents in danger. To highlight this risk, he took existing publicly available data sets and put them together in a new way.

Yi Wang: We believe that using these publicly-available data is very important, and you may ask why there hasn't been, you know, similar tools being put together using these data? And the answer is the one that knows how to do it doesn't really care and the one that cares doesn't know how to do it.

Anne Johnson: So Yi put together a team that both cares about the risks faced by the Near West community and has the data and environmental health knowledge to represent those risks in a meaningful way. The team recently brought in people with expertise in mapping and human-computer

interaction to make their visualizations more intuitive and useful for a broad range of audiences. Yi says he can see it being used not only for advocacy and policy in this particular neighborhood, but as a sort of educational case study on climate change and public health.

Yi Wang: This tool could potentially be used for environmental health literacy purposes. You know, we could change this tool to make it for literacy in the general public or to the community members, or even to the STEM education purposes. I think there are a lot of opportunities to develop this tool as an online educational material on environmental health and climate change and environmental exposures.

Anne Johnson: Yi said he's searching for collaborators who might be interested in either leveraging the tool for educational purposes or expanding its coverage to the state or even the national level. [music]

Now we'll turn to another tool that focuses on what happens when environmental contamination meets increasing flood risk. Dr. Amanda Koltz is a postdoctoral researcher at Washington University in St. Louis. When she moved to the city, she got interested in the challenges it was facing around the storage and disposal of radioactive waste in a local landfill. She soon learned that St. Louis is home to many other contaminants, including lead, industrial chemicals and buried petroleum tanks—the types of materials that are common in many cities with an industrial history.

She teamed up with her brother, Steve Koltz, who is a web developer, to put together a website for area residents and decision-makers. Their idea was to make something that showed not only where these potential hazards are around the city now, but to give people a sense of how their risk might change as climate change brings heavier, more frequent storms—and more flooding.

Amanda Koltz: You know, we can identify where the contamination is in the city, but it's much harder to identify how the contamination is spreading. And St. Louis has a long history of industrial activity, like many other cities, but what's unique about St. Louis is that we have all these rivers coming together and so there's this special potential for contaminants being spread around where we don't expect it, and have negative consequences for public health.

Anne Johnson: For example, she said a known contaminated site might be well away from a public park now, but if floodwaters flow through, it's possible that you might wind up with dangerous chemicals or lead in the middle of a playground. Amanda says she's not a hydrologist and there are a lot of factors that influence how such a terrible scenario might play out, but what her interactive maps do is highlight areas where it's a possibility.

Amanda Koltz: So, that way, you know, when we experience a big flood, we can say, well, we already know there's potential contamination in these sites and a flood could cause that contamination to spread into other areas. So in this way, residents in St. Louis can try and identify places where there's more likely to be spread of contamination and they can take that into consideration, or at least on a management level, I'm hoping that it will inspire some action in terms of testing these areas, being proactive about cleaning them up, and decisions about where to build in the future.

Anne Johnson: She said one of the lessons she learned creating the tool is the need to take a holistic approach to think about how people interact with their environment and where people might be exposed to contaminants.

Amanda Koltz: I divided the website into areas where people live in that are relation to potentially-contaminated sites in the floodplain, where people work, and then where the public parks are. And there's a pretty interesting difference; for example, along the Mississippi River in St. Louis city, there are a lot of contamination sites, but not many people live along the river. So in terms of identifying that as a risk area, for the residential population, maybe it's not so much of a concern. But on the other hand, a lot of people work along the river, so those people might be being exposed. So that was a really important lesson: we need to think about not just where contamination is in relation to the floodplain, but where people spend their time, and what different kinds of groups of people are going to be exposed throughout their day.

Anne Johnson: Whether you're looking at flooding in St. Louis, climate change in the Near West neighborhood of Indianapolis, health and resiliency in San Francisco, or extreme heat nationwide, taking a holistic approach and taking advantage of available data sets can lead to innovative and valuable ways of understanding how climate change affects our health.

Thanks to Dr. Yi Wang and Dr. Amanda Koltz for sharing their projects with us, and congratulations to all the winners of the NIEHS Climate Change and Environmental Exposures Challenge.

You can find links to the winning projects, as well as the first podcast in this series, on our website at niehs.nih.gov/podcasts.

You've been listening to Global Environmental Health Chat, brought to you by the Global Environmental Health program of the National Institute of Environmental Health Sciences. [music]