Turning Hyperlocal Air Quality Data into Public Policy

In Oakland, detailed maps generated by hyperlocal air pollution monitoring efforts allowed residents and community leaders to focus on key trouble spots in the city and develop unique solutions to reduce pollution. The combination of **strong community leadership and data that gives an unprecedented level of insight can be transformed into clear, data-driven solutions** that reduce harmful air pollution and human exposure to it.

TURNING HYPERLOCAL AIR QUALITY DATA INTO PUBLIC POLICY

West Oakland, California, is a low-income minority community that is overburdened by environmental impacts. In particular, the community lives among and next to multiple sources of air pollution. It is enclosed by three major freeways, downwind from a large marine port and rail yards with high truck volume that travels through residential neighborhoods, and industrial facilities located close to homes.

Since 2015, EDF has worked with a broad coalition of researchers and advocates, Google Earth Outreach, Aclima, West Oakland Environmental Indicators Project (WOEIP) -- a resident-led organization with deep experience in citizen science and advocacy around air pollution -- and researchers from the University of Texas at Austin to measure street level concentrations of black carbon (BC) and nitrogen oxides (NOx) in Oakland.

Google Street View cars outfitted with air quality sensors took over 100 measurements every 30 meters along nearly 400 miles of roads throughout West Oakland and several other areas of the city.

The resulting air pollution maps illustrated elevated levels of black carbon and nitrogen oxides along truck routes that hug blocks with schools, children's facilities, and hundreds of homes. They also showed a high degree of intra-neighborhood air pollution variability. Levels sometimes varied by a factor of five on a single block.

In 2017, Lawrence Berkeley National Laboratory, UC Berkeley, WOEIP and EDF partnered on a project to deploy 100 low-cost stationary monitors to measure black carbon levels over a hundred days. This provided insights into how pollution levels change over a season, over the course of a week and at different times of day.

Community engagement and collaborative partnership

These efforts would not have succeeded without the leadership and involvement of a strong local partner -- WOEIP. These collaborative partnerships redefined the nature of bottom-up data. Data collected in and with the community filled important gaps in data normally collected by public agencies.

Local community members also led efforts to use these new types of data are used to influence public plans and policies. WOEIP used the data to inform the Port of Oakland's plan to transition to a zero-emission Seaport and verify the City's Truck Management Plan. These hyperlocal data have also helped community leaders design West Oakland's Community Air Action Plan, an effort spurred by California's new air quality law (A.B. 617) passed to reduce air pollution in communities struggling with high pollution exposure challenges.

Effective community engagement requires investment in relationship building and long-term commitment, and it can yield productive results. Collaborative partnership and problem solving with community leaders makes monitoring goals more relevant, the monitoring effort more effective, and solutions more targeted and impactful.

A deep and sustained collaboration is key. Partners from outside the community need to demonstrate long-term commitment and avoid "parachuting" in and out, leaving after data is gathered or before the project is completed Engagement strategies should be long-term and include direct contact with community-based organizations to implement data collection, citizen science campaigns, and other programs to co-produce knowledge, build capacity of community members, and ultimately add value to the communities in which monitoring is being done.
A challenging aspect of community engagement is the potential conflict between partner (whether it's the City, NGO or academic) and community members. Open conversations with community

ELEVATED BLACK CARBON LEVELS

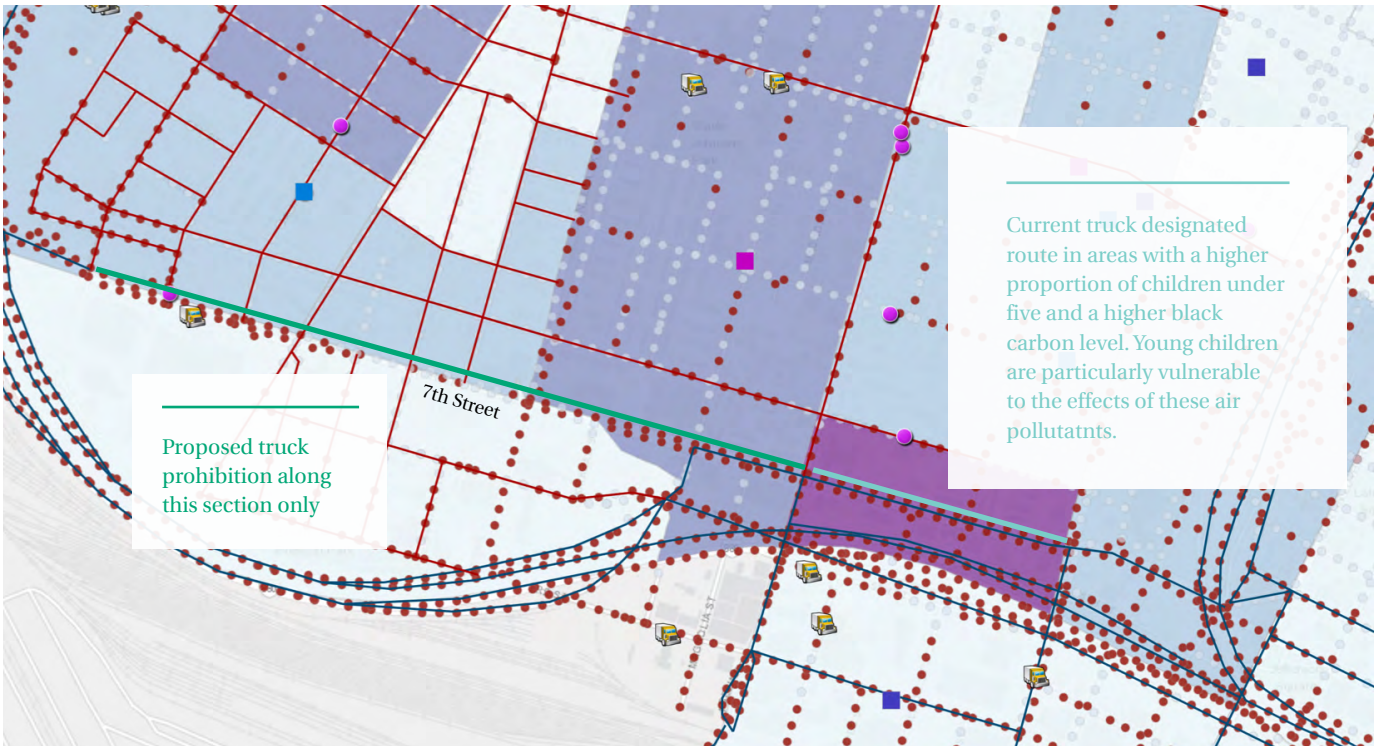
members to hear their perspectives are necessary to understand the root causes to air pollution problems in the community and how to fix them. Open dialogues also enable community and outside partners to converge on shared vision which sets the foundation for a productive collaboration.

Pioneering the use of new hyperlocal data

WOEIP led the steering committee to use insights from hyperlocal air pollution data and incorporate it in the planning process. WOEIP and other local leaders are using the data to highlight "impact zones" (map above) and develop emission and exposure reduction strategies that span truck management and electrification to improved land use zoning and permitting to create greater buffer between industrial and residential areas.

For example, in Zone 3 (see map on next page 3) shows elevated levels of black carbon and nitrogen oxides along much of 7th Street in West Oakland -- a main street flanked by residential homes. Though the City of Oakland has proposed to expand truck prohibition

HIGHLY POPULATED TRUCK ROUTES



Oakland Schools
- Elementary
- Charter
- High
- Middle

Population Under 5 Years Old
ACS 2016/5 yr estimates
- > 20%
- > 10-20%
- > 5-10%
- Less Than 5%

City of Oakland
- Prohibited Truck Routes
- Designated Truck Routes
- Truck Magnets

Black Carbon Levels
(micrograms/m3)
- > 0.5 (above median black carbon level)
- 0 - 0.5
- Child Care Centers

along one part of this street, another section, where residential homes have a relatively high proportion of children under five, would remain a designated truck route. There are also several childcare centers and schools nearby. With this information, the city is now considering revisions to its truck regulations, including banning truck traffic on a stretch of road that officials had previously thought could handle the traffic.

The detailed air pollution map also shows that while black carbon pollution tends to concentrate in areas designated for industrial uses, elevated levels can be observed in adjacent residential zones, pointing to the spillover impact of industrial facilities amidst residential neighborhood. (see map below)

In addition to the emissions from their core operations, many of these facilities also attract a lot of heavy duty trucks that contribute to localized pollution. Through the Community Action Plan, leaders like WOEIP have advocated for the City of Oakland to relocate heavier industrial businesses away from West Oakland and prohibit new truck auxiliary services within the community.

The map above shows truck routes flanked by residential homes in areas with relatively high children population density

LAND USE ZONES

Black Carbon Levels
(micrograms/m3)

- > 0.5 (above median black carbon level)
- 0 - 0.5

Truck Magnets

West Oakland and Downtown Oakland Zoning
City of Oakland 2018

- Residential
- Residential-Business Mix
- Industrial
- Special and Combining
- Open Space
- Central Business District

The map above shows land use zones in West Oakland, locations of truck-attracting businesses and areas of elevated black carbon