Technology, Analytics Key to Improving Urban Air Quality

BY STEPHEN GOLDSMITH • JANUARY 8, 2024

granularity necessary to identify differential impacts by community. Augmenting national data with localized sensor information is crucial to pinpoint areas exposed to higher levels of pollutants, which are often low-income and disadvantaged communities of color. When paired with local health information, this additional data can reveal the direct impact of air quality on public health, guiding targeted interventions in over-burdened neighborhoods. Mapping this information allows cities to visualize the intersection of pollutant and source concentrations, community demographics, and health burdens, enabling more effective environmental policies and actions.

The choice of sensors depends on the intended use of the resulting information. In Washington, D.C., local air quality data has traditionally come from large, expensive, continuously run stationary monitors that compute one-hour averages for fixed spots. Despite overall improvement in air quality in recent years, certain neighborhoods, especially those that are predominantly Black, still face disproportionate pollution from buildings, industrial sites and major roads.

The district's Department of Energy and Environment (DOEE) wanted to use technologies that provided an understanding of the problem and encouraged further resident engagement. To do so, city officials reached out to the air quality monitoring company Aclima for assistance in mapping pollutants. Using Aclima sensors, the district ran a two-week pilot program that mapped block-by-block air quality in the historically overburdened neighborhoods of Ivy City/Brentwood, Buzzard Point and Mayfair. These results augment the DDOE **24-hour air monitoring network that measures and maps ambient air quality**.

The initiative kicked off on June 15, with a fleet of electric vehicles driving and taking air quality samples every second and providing a more granular view of pollution. The sensors can identify the exact types of pollution, such as black carbon, nitrous dioxide, total volatile organic compounds and fine particulate matter. During a virtual community meeting, the DOEE team shared pilot results and received input from community members that corroborated the maps and helped pinpoint pollution sources.

Well-visualized data can assist both local activists and public officials. In the **Community Data Health Initiative**, a program at Harvard in partnership with the Environmental Defense Fund (EDF) and the African American Mayors Association, we are working with Baltimore, D.C., Baton Rouge and Detroit to improve health outcomes such as asthma or cardiac events. The project's goal is to identify the sources and impacts of specific pollutants and then to examine what actions mayors can take.

Aileen Nowlan, director of policy for EDF, helps officials take the steps that will improve health by focusing on the connection of data to pollutants and health impact, as well as mitigation steps. For example, Joseph Jakuta, the chief of the Air Quality Planning Branch

in D.C., focuses on the intersection of environment and spatial equity, identifying where air quality endangers vulnerable populations.

The choice of technologies and selection of analytics will depend on the problem to be addressed and the views of diverse stakeholders. The **maps of the air we breathe** can motivate action by telling the story of spatial equity, bad air and resulting medical harm. As the science of detecting bad air quality improves and communities become more aware of the implications, local officials will need to move urgently.

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