Data Usage for Sustainable Development: Citizen-Powered Air Quality Improvement

Concept Note

Overview

Air pollution severely undermines human health and quality of life around the world – and exacerbates inequality as low-income populations are disproportionately affected. To address such a ubiquitous and constant threat, those impacted at the community level must have tools to monitor and share data on local air quality, in real time, with support to understand the impact of factors such as weather, incineration days, or the release of toxic substances through accidents or natural disasters.

This concept note outlines a proposal to extend learnings from a recent citizen-powered air quality data collection and analysis project in Medellín, Colombia to at least two additional locations.

The main goals of the proposed project are to:
- Use sensors to measure air quality in local communities so real-time data is available – and make citizens key to the installation, operation, and maintenance of those sensors;
- Equip citizens with skills to extract the data, and perform data analysis and data visualizations; and
- Provide support for "community anchor institutions" (local organizations like libraries or community ICT centers, whose objective it is to provide access to information) to make this information accessible to communities.

The project will result in new actionable datasets, as well as community-driven data analysis and data visualizations, on air quality at these sites. The project is jointly proposed by partner organizations MAKAIA (based in Medellín, Colombia), which developed and runs the Medellín pilot, and TechSoup (based in San Francisco, USA), which has an international partner network and technology distribution channel that can enable replication around the globe.

Ultimately, this work will enable more a granular understanding of the impact of air quality on health and well-being, which in turn strengthens advocacy efforts to address air pollution through regulation. Furthermore, this project will serve as an example of a citizen-led initiative that can provide data in accordance with Sustainable Development Goals 3.9 and 11.6, both focused on substantially improving air quality for the overall health of citizens and communities.

Justification and Methodological Approach: Why Communities Should Drive Air Quality Improvement

Pollution and air quality information is generated by monitoring stations installed and managed by local governments. Government agencies release data on air quality sporadically, often months after it is collected. It is released in a variety of formats – which may or may not be accessible to impacted communities – and often with limited analysis. As a result, there is poor understanding of how pollution affects quality of life, as well as its implications for community health in both urban and rural areas. Worse, there is increasing evidence that governments hinder access to data to obscure academic, activist, and citizen-science findings that do not fit certain political narratives. We start from the premise, therefore, that citizens must take a central role in air quality analysis and advocacy – and take ownership of environmental data that directly impacts their health and well-being.

Borrowing from methodologies such as Asset Based Community Development and Design Thinking, the following principles guide this project:

- Citizen empowerment: By ensuring that citizens have training in data literacy, sensor installation, operation, and maintenance, this project endeavors to empower them as advocates for policy changes that have a direct impact on individual and community health.
- Leveraging existing community infrastructure: Community anchor institutions – library networks, ICT access points, community centers – are hubs for community engagement, with expertise in categorizing and sharing resources. As such, they are already well-positioned to provide citizens access to tools and information to organize around issues that affect them. This project provides a way for them to meaningfully engage with innovative technologies, such as Internet of Things devices and data visualization tools, and provide trainings that will increase their value to the community. It also provides a means for them to support sustainable development goals at a hyper-local level.
- Open access: All parts of the project – starting with the project plan, including datasets and data visualizations or reports, and ending with the project evaluation – will be made available to interested parties.
- Networked dissemination: Networks such as TechSoup Global Network and others will disseminate the learning and the tools for future implementation. These networks will all last longer than the project timeline, thereby providing an avenue for sustainability and growth.

Project Description: Extending pilot learnings from Medellín

Colombia-based NGO, MAKAIA, developed and is conducting a pilot project in Medellín in which pollution sensors installed in public libraries and community centers provide real time, high-quality data on air quality (more information here https://www.purpleair.com/map). The project team aims to apply learnings from this

pilot to continue expanding the project in Medellín and generate complementary air quality data in at least two additional locations, and to create a culture of data and awareness about pollution and its effects on individual and community health.

Objectives

The pilot in Medellín, as well as the extension to two additional sites, aims to:
- Train citizens to install, operate, and maintain sensors that measure air quality in local communities, so actionable, real-time data is available;
- Equip citizens with skills to extract the data, analyze it, and perform data visualizations that elucidate how pollution affects individual and community health and helps communities advocate for change; and
- Provide support and resources so that "community anchor institutions" (local organizations like libraries or community ITC centers, whose objective it is to provide access to information) may make this information accessible to other communities.

Timeline and implementation

The proposed project will take place over a 12-month timeline and will be implemented in the following phases:

1. Research, planning, trainer preparation: The preparatory phase will establish the project plan and guidelines for evaluation with project partners, gather baseline data to support project evaluations, and launch a project website to support implementation.
2. Data literacy training and kick-off: Phase One is an opportunity for citizens to engage with the concept at a local launch event, learn more about air quality and sustainable development goals, and receive data literacy training.
3. Sensor installation, maintenance, and data collection: Phase Two will train citizens in the installation of sensors, and will provide opportunities to begin collecting and sharing data via a cloud service.
4. Support for community anchor institutions to provide data analysis and data visualization training: Phase Three will consist of data analytics and visualization trainings, and a community event to share results and lessons learned.
5. Project close, evaluation, and toolkit for replication: The project close will include a final evaluation report, an archive of all created work, and packaging the component project parts into a toolkit for replication such that network members can extend it to additional locations and issue areas.

Evaluation and replication

As with the pilot in Medelln, each training session will be documented with photos and a narrative. The project team will create an online archive of community trainings and visualizations that can be freely accessed by other organizations and agencies. Qualitative and quantitative evaluation data will be collected in a variety of media including: video how-tos (see, for example, this video created about sensor installation: https://youtu.be/t82Hp5AA2SU), interviews with participants to understand the

impact of the project over time, a blog series to share information about sensor installation, challenges, visualizations, success stories, and quotes from users.

A toolkit for replication will be made available across partner websites, social networks, and meetings. The toolkit would equip any community anchor institution (e.g. public library, ICT access center, community center, non-profit, or government agency) with everything they need to replicate this project process and contribute additional data to the network of pollution sensors.

Implementing this project in additional locations would allow the project team to develop, test, and improve the toolkit and related materials for the community anchor institutions doing the project. Eventually, that material could be combined with the sensors in a package for distribution on TechSoup's product catalogue, and made available throughout our network.

Impact: Citizen empowerment for cleaner air

This project will empower citizen ownership around environmental data that is typically under the purview of government agencies and often difficult to use and understand. Furthermore, it will enable community anchor institutions to meaningfully engage with innovative technology, such as Internet of Things devices and data visualizations tools, in support of sustainable development goals at the hyper-local level, thereby increasing their community value. Citizens will be better able to understand air quality data and its connection to their individual and community health. Environment and health organizations will have another data source for research and to support their own programs. Community anchor institutions will be better able to offer access to data sources and provide data literacy trainings. Elements of south-south collaboration will be documented and shared broadly.

Core Partners

MAKAIA, a Colombian nonprofit organization is the project leader and implementer, having designed and implemented the successful pollution data monitoring pilot through community anchor organization in Medellín. As project leader, MAKAIA will organize and conduct the train-the-trainer workshops in Medellín. MAKAIA has 11 years of expertise in ICT adoption, working with libraries and other ICT access centers, to promote community engagement through technology.

TechSoup will provide support in scaling the project to other geographies, via the TechSoup network. TechSoup has 30 years of ICT for development experience and extensive experience with libraries, making them well suited to connect with community anchor organizations with expertise in categorizing and sharing information resources. TechSoup's newest division, Caravan Studios, develops and operates innovative technology projects where citizens engage with issues that concern them.