

Community air monitoring and the Village Green Project

Gayle Hagler¹, Ron Williams¹, Bobby Sharpe², Wan Jiao^{1,3}, Bill Mitchell¹, and Kelly Leovic¹

1. EPA Office of Research and Development, Research Triangle Park, NC
2. ARCADIS U.S., Inc., Durham, NC
3. Student Services Contractor at EPA Office of Research and Development, Research Triangle Park, NC

Cost and logistics are practical issues that have historically constrained the number of locations where long-term, active air pollution measurement is possible. In addition, traditional air monitoring approaches are generally conducted by technical experts with limited engagement with community members. EPA’s Village Green Project (VGP) is a prototype technology designed to add value to a community environment – VGP is a park bench equipped with air and meteorological instruments that measure ozone, fine particles, wind, temperature, and humidity at a one-minute time resolution, with the open-source Arduino microprocessor operating as the system controller. The data are streamed wirelessly to a database, passed through automatic diagnostic quality checks, and then made publically available on an engaging website. The station was designed to minimize power use; it consumes an estimated 15W and operates entirely on solar power, is engineered to run for several days with minimal solar radiation, and is capable of automatically shutting down components of the system to conserve power and restarting when power availability increases. Situated outside a public library in Durham, North Carolina, VGP has also been a gathering location for air quality experts to engage with community members. During the time span of June, 2013 through January, 2014, the station collected about 3500 hours of ozone and PM_{2.5} data, with over 90% up-time operating only on solar power. Preliminary comparison with regional regulatory monitoring stations revealed general matching of area-wide trends for PM_{2.5} ($R^2 > 0.6$) and ozone ($R^2 > 0.8$). The design features incorporated in VGP as well as other emerging technologies may enable the generation of additional air quality time series to complement regulatory data and improve community exposure estimates.