Clean Air for Ghana

Building on Success

In Sub-Saharan Africa, Ghana focuses on air quality challenges.
Africa is a vast and varied continent, facing many developmental and environmental challenges. Air pollution may not appear to be the most pressing concern for many governments, yet indoor and outdoor pollution combined is currently the most significant cause of premature death, outpacing that of malaria and HIV. Though ground-based monitoring is limited, new methods allow improved estimates of emissions and ambient concentrations of air pollution and corresponding estimates of pollution impacts. The estimated economic cost of air pollution-related deaths is greater than that caused by unsafe sanitation or underweight children. Over 45,000 African children under the age of five die annually due to air pollution (2012 data), which is one of the highest regional child mortality rates in the world. Estimates of the economic cost to Africa of indoor and outdoor air pollution approach US$250 billion annually.

More than half of the world's projected population growth through 2050 will occur in Africa, and the continent is also experiencing rapid urbanization rates. By the end of this century, it is projected that 5 of the 10 most populous cities on earth will be in sub-Saharan Africa. Some of the largest African cities today are projected to nearly double to over 20 million inhabitants by 2030. This growing rural–urban migration and increase in population will likely outpace and challenge the already inadequate infrastructure that exists to manage pollution. At the same time, there is very little quantitative data regarding air pollution levels and very little public awareness of the impacts of pollution on health. There are a handful of personal exposure studies focused on household air pollution, which may be a contributor to the ambient pollution problems in the urban environment.

In sum, very little is known about air pollution sources in African cities, and with a few notable exceptions, national and municipal governments have little human and technical capacity to manage air quality. Recognizing this confluence of challenges, the U.S. Environmental Protection Agency (EPA) engaged with the Ghana Environmental Protection Agency (Ghana EPA) to develop a template for air quality management in African cities—the Africa Megacity Partnership—with the ultimate goal of preventing unchecked air pollution growth in African cities as they expand and develop, and to reduce the health burden on the public. Ghana provides an excellent and instructive case study of air quality management planning in a context of limited data.

**Historical Aspect of Air Quality Management in Ghana**

This recent work in Ghana builds on more than 10 years of successful air quality measurement, focuses on health benefits assessment and making a business case for air quality management, and is establishing a framework that can be applied in other African cities. The Ghana EPA is mandated by a 1994 Act of Parliament to conduct environmental quality monitoring and prescribe guidelines and standards for air, water, noise, and soil/sediment, among others. For the air program, Ghana EPA's approach is to draw conclusions on the priority emissions sources to control; estimate the baseline health and climate effects and other economic implications of those mitigation choices; and enhance monitoring and laboratory technical capacity. While there is much work to be done to improve air quality in Accra, the Ghana EPA has made significant strides. Successes to date are many, with only a few explored here.

One of the highlights of Ghana's air program is its monitoring program, one of the oldest of its kind in sub-Saharan Africa, collecting important information about air pollution and its sources since 1997. Monitored pollution indicators and climatic variables include sulfur dioxide, carbon monoxide, nitrogen dioxide, black smoke, ozone, particulate matter (PM10) and total particulate matter (TSP). This program was enhanced with equipment and training by EPA, the U.S. Agency for International Development, and the United Nations Environment Program in 2005. Since that time, Ghana EPA has increased air quality monitoring sites from 8 to 15 sites in residential, commercial, and industrial areas in Accra. The program currently monitors PM10 and PM2.5. In addition, Ghana EPA built institutional capacity in the chemical analysis of filter packs and in understanding household air pollution, which may be a contributor to the ambient pollution problems in the urban environment.

Another recent highlight is the country's roadmap to vehicular emissions and fuel economy standards (2014–2020). The roadmap outlines plans for cleaner fuels, stringent emissions standards for imported vehicles, ways to ensure proper maintenance of in-use vehicles, and transportation planning and demand management. Ghana has successfully reduced sulfur levels from 3,000 parts per million (ppm) in fuel to 50 ppm and issued new fuel standards, which took effect September 1, 2017.

**Recent Legislative Advancements**

On the legislative front, Ghana recently made three significant advancements.

First, to reduce the importation of over-aged vehicles (older than 10 years), Ghana introduced an age-based tax system for imported vehicles. This tax system imposes graduated penalties on imported over-aged vehicles to deter importers from bringing high-emitting vehicles into Ghana. The Ministry of Transport has also set vehicle testing centers across Ghana to test for emissions and also help gather data for policy decisions.
Then in 2016, Ghana EPA initiated the passage of the Hazardous and Electronic Waste Control and Management Act, which requires those who manages hazardous wastes and other wastes to take steps to prevent pollution. To improve public health, the law also provides for e-waste recycling and prohibits e-waste burning.

Also in 2016, Ghana passed a new Local Governance Act, designed to strengthen local government administration and to abate nuisances such as solid waste and pollution from open trash burning. Recognizing the urgent need for a program to address waste and sanitation issues, the government established a Sanitation Ministry in 2017. The ministry is tasked with ensuring effective implementation of sanitation policies and relevant laws in the country.

**The First Megacity Partnership**

It is within this strong historical context that EPA selected Ghana as its first Megacity Partner. With a solid environmental foundation in place, and a real organizational commitment to make further progress, the Megacity Partnership focused on three major areas: staff training, developing a model air quality management plan (AQMP), and communication planning.

A broad range of Ghana EPA staff participated in the first staff training. That training covered the basics of the iterative cycle of air quality management, from goal setting to inventory development and other baseline assessments to mitigation activities and reassessment and setting new goals over time. Staff were introduced to analytical tools, such as EPA’s Positive Matrix Factorization (PMF) Model and BenMAP, to help understand which sources were contributing to ambient air pollution, and the health impacts of those pollution levels.

The preliminary health benefits assessment estimates that if Ghana moves forward with business as usual, Accra can expect to experience between 10,000 and 17,000 premature deaths per year in 2020, as a result of exposure to ambient PM pollution. Taking action to reduce PM pollution by 50 percent (e.g., by implementing a suite of vehicle, cookstove, and industrial emission policies) could reduce the number of premature deaths by 3,500–7,800 each year. In addition, hospital admissions for asthma could be reduced by approximately 470,000–325,000 per year.

Following this general training and baseline assessment work, EPA delivered more focused training to a subset of Ghana EPA staff who required specialized skills to perform their work. Specifically, the Ghana EPA management identified three staff to be trained in detail in BenMAP (see the article by Amanda Curry Brown et al. elsewhere in this issue for additional information about BenMAP), additional staff who would focus on communications, and four staff, along with the Ghana Health Service, who received extensive training in laboratory analysis. By focusing training on those who are expected to work in each area, and providing on-going exercises and expectations for applying lessons learned to real world work products, the Megacity Partnership is able to deliver real results and build meaningful capacity within the Ghana EPA.

**Lead Phase Out—A Victory for Public Health**

Ghana became party to the Partnership for Clean Fuel and Vehicles Lead Phase Out program in June 2001 and was the first country in the sub-region to develop a program under this initiative. To begin, Ghana EPA conducted a baseline assessment of lead in air, soil, and blood of high-risk groups in Ghana. This assessment found that 82 percent of the study population of 396 persons recorded blood lead levels above the World Health Organization (WHO)-recommended level of 20 µg/dl. This research provided useful data to inform policy-makers, who then took action to phase out lead in fuel by December 2003. A follow-up study on lead in blood of high-risk groups in 2006 found that none of the study population (470) recorded blood lead levels above the WHO-recommended limit of 20 µg/dL. ⁴
The Megacity Partnership is also working with Ghana EPA to find solutions that really work for the Agency. Therefore, when it came time to find a model AQMP, it was important to find an example that would offer the right level of detail and be in a format that would be usable for Ghana EPA. Examples from the United States were limited, with State Implementation Plans not being easily transferable to the African context. Ultimately, EPA offered two examples and converted these into a template for use by Ghana EPA. These were the draft Waterberg–Bojanala Priority Area Draft Air Quality Management Plan (http://www.saaqis.org.za/file-download.aspx?fileid=1139) and the South Coast Air Quality Management District 2016 AQMP (http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/final-2016-aqmp). Ghana EPA then used that template to strategize about the goals for clean air and the activities, new and existing, needed to achieve clean air. The result was a draft AQMP that is currently undergoing internal Ghana governmental review.

A key component of the analytical and planning effort is to consider how best to communicate to both the public and key decision-makers about the impacts of air pollution. In the course of the training on communication planning, and working collaboratively with the Ghana EPA communications team, it became clear that there was also work to be done to communicate within Ghana EPA on some key aspects of air pollution and building communication skills. They determined that, because air pollution is a cross-cutting issue, a broader understanding across the organization was needed to improve the ability to perform key job functions. For example, internal communications and training would enable multiple departments to be able to respond to air pollution and climate-related questions from the public and affected industry and stakeholders. As a result, Ghana EPA developed both internal and external communication strategies.

Finally, though not part of the original Megacity Partnership plan, the team served to bring together a number of different organizations who were working on air quality related activities in Accra. The Global Alliance for Clean Cookstoves is working on a number of projects related to indoor air pollution; the World Health Organization and others are collaborating to mobilize the health sector to improve health data and act on air pollution; and the World Bank Pollution Management and Environmental Health Program has selected Accra as one of seven focus cities to support technical and program development around air quality management planning. The Megacity Partnership has served as a kind of clearinghouse for these various activities, improving communication and data sharing across organizations and helping to prevent duplication of effort.

The project began with an initial scoping mission in March 2015 and is now moving toward the last phases, to finalize the AQMP with a robust communication plan, and identify priority measures for implementation. The Megacity Partnership then expects to transfer the knowledge and templates piloted in Accra to another African city in the next year.

As we look forward, and as interest and action build across Africa, Ghana EPA, EPA, African-based governments and academic institutions, and other multi-lateral donor institutions are considering how to advance the technical and policy aspects of air quality management across the continent. In addition to programs like the Megacity Partnership, focus should be given to building regional based communities of practice, thereby enhancing information sharing and creating a sustainable community of African air quality experts.

**Emmanuel Appoh** is Deputy Director for Environmental Quality with the Ghana Environmental Protection Agency. Sara Terry is the Africa Megacity Partnership Project Manager with the U.S. Environmental Protection Agency’s (EPA) Office of Air Quality Planning and Standards.

**Disclaimer:** The views expressed in this article reflect those of the authors and do not necessarily represent the views or policies of the U.S. Environmental Protection Agency (EPA).

---

**References**