

## News

# Air Pollution in Emerging Mega-Cities: Sources, Evolution and Impacts Workshop

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<http://dx.doi.org/10.17159/2410-972X/2018/v28n2a5>

A tri-lateral workshop on “Air Pollution in Emerging Megacities: Sources, Evolution and Impacts” was held from 16-20 April 2018 in Nairobi, Kenya, bringing together early career researchers (ECRs) from the United Kingdom (UK), Kenya and South Africa. The workshop had 51 participants and was coordinated by Dr Kirsti Ashworth, Lancaster University (UK), Dr Nicholas Ozor, African Technology and Policy Studies Network (ATPS, Kenya) and Prof Paul Beukes, North-West University (South Africa). It was sponsored by the British Council Newton Fund (UK), National Research Fund (Kenya) and National Research Foundation (South Africa). The workshop was moderated by Dr Akan Odon, Lancaster University and Dr Rebecca Garland, Council for Scientific and Industrial Research (CSIR), Dr David Odee, Kenya Forestry Research Institute (KEFRI), Dr Paul Young (Lancaster University), and Dr Aderiana Mbandi of Stockholm Environment Institute (SEI) were leaders and mentors.

The main aims of the workshop were to bring together ECRs and experienced researchers to:

- establish the current state of the science and the current and future needs of the atmospheric research community to address the growing issues of air pollution, climate change and their impacts on society in and around emerging mega-cities, particularly in sub-Saharan Africa;
- introduce ECRs to a wide range of techniques and skills required to pursue cutting-edge, transformative research in atmospheric composition and air quality;
- raise awareness of the need for transdisciplinary co-produced research to holistically tackle the challenges of the UN Sustainable Development Goals; and
- facilitate cross-boundary networking and identify common experience on which to build future collaborative partnerships with fellow ECRs, established scientists, policy makers and stakeholders.

Air pollution is rapidly increasing in emerging mega-cities especially in Africa, affecting both health and natural and managed ecosystems, yet it is a field that has received little study. Air quality is an issue of increasing concern to governments and intergovernmental organisations world-wide, exemplified by a recently-passed resolution from UN Environment, signed by all parties, to tackle air pollution. A key goal of that resolution is

to establish global and regional knowledge platforms to bring together all stakeholders with expertise in the field to jointly act.



*Participants of the trilateral workshop, Nairobi Kenya*

This workshop was a highly interactive 5-day event including presentations from local experts from the policy, governance and academic sectors, intensive group activities and discussions, and a highly informative field trip to key sites around Nairobi. Invited guest speakers included Dr Ozor of ATPS who spoke about policy and strategy to combat air pollution, and Profs Gitari and Madara, from the University of Nairobi (UON), who addressed the current state of the science regarding air pollution measurement techniques. They both noted that AQ data in Africa were sparse with little previous or on-going research work. Other guest speakers included Soraya Smaoun (UN Environment) who spoke of current UN initiatives to tackle air pollution across the globe, Drs Osano and Mbandi from SEI who presented several case studies of community participatory research in Nairobi and further afield, and Mr Nthusi (UN Environment) who recounted details of his work of AQ measurements with the UN. High quality posters were presented by the ECRs with Cassilde Muhonja and William Appondo (joint poster) of SEI winning the peer-judged prize for best poster.

The participants enjoyed a field trip to Kenya Meteorological Department (KMD) to learn of the air pollution measurements and sampling techniques employed in Kenya. KMD has three urban air quality monitoring stations at Dagoretti Corner, Jomo Kenyatta international Airport and Chiromo Campus, UON. KMD also operates Mt Kenya Global Atmosphere Watch station

for long-term measurements of both chemical and physical composition of the earth's atmosphere for early detection of climate variability and change in the region. The station is in a data-sparse region within Africa and provides a unique opportunity to monitor background air pollution as well as to conduct research in a pristine continental environment. KMD also operates a mobile air pollution monitoring laboratory van and low-cost AQ station, which has been deployed to monitor air pollution on major roads and industrial areas in Nairobi City. The data from this campaign showed episodes of extremely poor AQ especially in the morning and evening which coincided with known vehicle traffic jams in Nairobi.



*Mt Kenya Global Atmosphere Watch station, Kenya*

The participants also visited Mukuru Viwandani, an informal settlement in Nairobi city to learn how SEI were successfully engaging “community champions” to raise awareness of and monitor indoor and outdoor air pollution within the settlement. SEI Africa office is actively engaged in research, policy engagement and capacity building in the region. SEI involves citizens in AQ measurements through citizen science initiatives that aim at involving the community in making measurements and helping them understand the importance of the data collected. The participants were addressed by Wajukuu Project artists and community champions Mr Joseph Waweru, Ms Freshia Njeri and Ms Elizabeth Njoroge. Knowledge and experience gained through citizen science enabled them to link the widespread respiratory diseases and illness with poor AQ.

On their way back to the conference hotel, participants experienced the Nairobi traffic and associated air pollution first hand.

By the close of the workshop, the participants had shared and gained knowledge and expertise regarding passive, active and continuous monitoring of  $O_3$ ,  $CO$ ,  $PM_{10}$  and  $PM_{2.5}$ ,  $BC$ ,  $SO_2$   $NO_x$ ,

VOC and POPs. ECRs learned how these AQ measurements were used for health, environment, and agriculture impact assessments, as the basis of early warning systems and advisories, and for the fulfilment of multilateral conventions and agreements. The participants proposed that integration of all measurements of AQ to an open access portal, availability of low cost and easily accessible devices that can be connected online in near real time, and a combination of super sites and smaller sites would constitute an ideal AQ monitoring situation. The ECRs were also introduced to the potential of AQ modelling for supplementing sparse data coverage, downscaling satellite data, conducting rigorous impact assessments and exploring possible intervention and mitigation strategies to support policy. ECRs discussed the clear links between many of the Sustainable Development Goals (SDGs) and air quality, particularly in the context of emerging mega-cities. Participants also highlighted the need to identify and engage with other stakeholders; i.e. government, academia, industrialists and civil society, and to use research and innovation to deliver a genuinely transformative science agenda.

The workshop participants will follow up the activities in Nairobi by compiling a newsletter, producing an academic review paper of the current knowledge, gaps and needs of air pollution research in Africa, and developing a joint proposal for collaborative research projects. The participants also aim to make this workshop a regional rotational annual event.

## Acknowledgments

This work was supported by a Researcher Links grant, ID 2017-RLWK8-10493, under the Newton Fund Utafiti partnership. The grant is funded by the UK Department for Business, Energy and Industrial Strategy, National Research Fund Kenya and National Research Foundation South Africa and delivered by the British Council.

For further information, please visit [www.newtonfund.ac.uk](http://www.newtonfund.ac.uk).

## Funding

British Council  
National Research Foundation (South Africa)  
National Research Fund (Kenya)  
Newton Fund