



Megacities and Large Urban Complexes – WMO Role in Addressing Challenges and Opportunities

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The 21st Century could amongst others, become known as the century in which our species has evolved from *Homo sapiens* to *Homo urbanus*. By now the urban population has surpassed the rural population and the rate of urbanization will continue at such a pace that by 2050 urban dwellers could outnumber their rural counterpart by more than two to one. Most of this growth in urban population will occur in developing countries and along coastal areas.

Urbanization is to a large extent the outcome of humans seeking a better life through improved opportunities presented by high-density communities. Megacities and large urban complexes provide more job opportunities and social structures, better transport and communication links and a relative abundance of physical goods and services when compared to most rural areas.

Unfortunately these urban complexes also present numerous social and environmental challenges. Urban areas differ from their surroundings by morphology, population density, and with high concentration of industrial activities, energy consumption and transport. They also pose unique challenges to atmospheric modelling and monitoring and create a multi-disciplinary spectrum of potential threats, including air pollution, which need to be addressed in an integrated way. These areas are also vulnerable to the changing climate and its implications to sea-level and extreme events, air quality and related health impacts. Many urban activities are significantly impacted by weather events that would not be considered to be of high impact in less densely populated areas. For instance, moderate precipitation events can cause flooding and landslides as modified urban catchments generally have higher run-off to rainfall ratios than their more pristine rural counterparts.

The urban environment also provides numerous opportunities. One example being the better use of weather and environmental predictions to proactively optimize the functioning of the urban environment in terms of the use of energy, goods and services. Another is the providing of air quality forecasting services to benefit the health of the population.

To address the challenges and opportunities facing megacities and large urban complexes, WMO has established the Global Atmosphere Watch (GAW) Urban Research Meteorology and Environment (GURME). Air pollution questions in urban areas, in particular megacities, is the main focus, building observational and modelling capabilities in developing countries through pilot projects and transfer of scientific expertise. GURME contributes to improving capabilities to handle meteorological and related features of air pollution by addressing end-to-end aspects of air quality, linking observational capabilities with the needs of chemical weather prediction, with the goal of providing high quality air quality services.

Using examples from around the world but with specific reference to Africa, the unique challenges and opportunities related to megacities and large urban complexes, as perceived by the World Meteorological

Organization (WMO) are highlighted.