available at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/envsci

The case for integrated air quality and climate change policies

Tirusha Thambiran [a,b,*], *Roseanne D. Diab* [b]

[a] *CSIR Natural Resources and the Environment, PO Box 17001, Congella 4013, South Africa*
[b] *School of Environmental Sciences, University of KwaZulu-Natal, Westville Campus, Private Bag X 54001, Durban 4000, South Africa*

ARTICLE INFO

Published on line 7 September 2011

Keywords:
Air quality management
Climate change mitigation
Integrated policies
Durban

ABSTRACT

The relationship between air quality and climate change provides a scientific basis for developing integrative policies. Local governments in developing countries are expected to reap significant benefits from incorporating climate change concerns into air quality policies. In Africa, South Africa is also one of the few countries on the continent to have developed robust air quality legislation. South African municipalities or local governments are required to develop and implement air quality management plans (AQMPs), which present opportunities to integrate climate change considerations. The extent to which cities are currently incorporating climate change concerns into existing air pollution strategies, and the opportunities for improved integration of these two issues, and actions to support the implementation thereof, are presented in this paper using the city of Durban as a case study. The results from this case study suggest that in the short-to-medium-term, local AQMPs can be used to support climate change mitigation. These outcomes could be relevant to other countries that use a similar approach to air quality management and require local AQMPs to be developed.

1. Introduction

Air quality and climate change are inextricably linked, with complex interactions and linkages. This relationship provides a scientific basis for developing integrative policies that derive multiple benefits for simultaneously improving air quality and addressing climate change. As the focal points of expected growth in polluting activities (Fenger, 2008), cities in developing countries have the potential to act as 'engines of environmental policy' (Granberg and Elander, 2007, 439), and to drive innovative policy responses to climate change, whilst simultaneously addressing urgent air pollution challenges. Based on recent climate negotiations, early policy development and planning for climate change within air quality management (AQM) policies may position cities to capitalise on opportunities to reduce baseline greenhouse gas (GHG) emissions, lead in future efforts related to the carbon trading market, and thus contribute toward creating low carbon, resilient societies.

On the African continent, South Africa is one of the few countries to have developed robust AQM legislation and air quality monitoring programmes (APINA, 2010). The South African National Environmental Management: Air Quality Act (Act No. 39 of 2004) (the AQA) ensures that cities are well capacitated with authority over air quality through the development of local air quality management plans (AQMPs). Presently, AQM proceeds through the implementation of the most cost-effective actions to reduce air pollution, with the costs of interventions generally increasing until targets for emission reductions are achieved. Opportunities to use air quality interventions in an innovative manner to contribute

* *Corresponding author at*: CSIR Natural Resources and the Environment, PO Box 17001, Congella 4013, South Africa. Tel.: +27 31 242 2368; fax: +27 31 261 2509.
E-mail address: tthambiran@csir.co.za (T. Thambiran).
1462-9011/$ – see front matter
doi:10.1016/j.envsci.2011.08.002

toward creating low carbon, resilient communities are mostly overlooked as the AQA does not provide guidance for the integration of climate change concerns into local AQMPs. South Africa is ideally poised to develop holistic AQMPs that incorporate climate change considerations. This will not only set an example for many developed countries with similar AQM structures but may also provide some guidance for other African countries who are still developing their air quality policies.

The purpose of this paper is to discuss the role that local AQMPs in South Africa can play in supporting climate change mitigation and adaptation endeavours, using the city of Durban as a case study. The extent to which the city currently incorporates climate change concerns into its existing AQMP, and the opportunities for improved integration of these two issues is presented in Section 2 of this paper. In Section 3, key recommendations for decision-makers to consider in facilitating the inclusion of climate change into local AQMPs are presented. Section 4 presents concluding remarks.

2. Case study of Durban

2.1. Background to air quality and climate change issues

Durban is located within the province of KwaZulu-Natal on the eastern seaboard of South Africa. It occupies ~1.4% of the total area of the province and has the largest port on the east coast of Africa. The city's economy is driven by manufacturing industries and tourism, comprising 9% of South Africa's Gross Domestic Product (GDP) and represents the third largest economy in the country (EM, 2010). The economy has been shaped principally by an energy sector that is dependent primarily on the use of the country's large coal reserves and liquid fuel imported as crude oil. The manner in which energy is generated and consumed is the source of many environmental challenges, including poor ambient air quality and high GHG emissions. Both of these are discussed in more detail below.

2.1.1. Air pollution

Durban has been characterised as consisting of numerous air pollution sources, primarily attributed to the combustion of fossil fuels at industries and in road transport. The AQMP developed in 2007 serves as the foundation to ensure that measures are implemented within these sectors to maintain ambient air quality levels that are acceptable for human health and ecosystems (EM, 2007a).

The city has a modern air quality monitoring network, consisting of 11 air pollution stations. Annual averaged data from these continuous air quality monitoring stations indicate that the ambient air quality experienced in the city is generally within the South African standards for ambient air quality (Fig. 1).

Levels of average annual particulate matter (PM_{10}) and nitrogen dioxide (NO_2) shown in Fig. 1 are indicative of the growing contribution of road transport emissions. Conformity with sulphur dioxide (SO_2) limits is primarily due to the impact of past industrial interventions focused on SO_2 emissions. Although these data indicate compliance in terms of mean annual standards, in recent years the 10-min and hourly limits for ambient SO_2 have been exceeded (EM, 2008). These exceedances were primarily linked to industrial process upsets, flaring incidents and downtime of air pollution scrubbers in industries. The frequency of these exceedances has been a strong focus of the city and industries for reduction. In light of new minimum emission standards being implemented under the AQA, PM and NO_x emissions are also likely to be the focus of future AQM action plans.

2.1.2. Climate change

Climate change concerns have to date been dealt with separately from the AQMP with the majority of research focused on understanding the impacts of climate change on the city and the adaptation measures that will be required. This has been a priority as it has been estimated that in the future (2070–2100) the city will experience varied climate change impacts. These changes are likely to exacerbate the

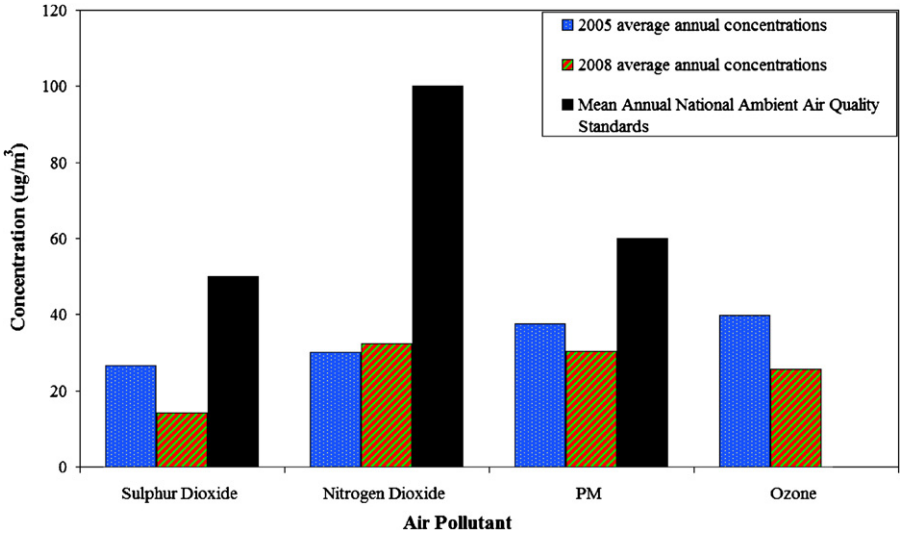

Fig. 1 – Average annual priority pollutant concentrations for 2005 (EM, 2005) and 2008 (EM, 2008) versus annual ambient air quality standards (SA, 2009). There is no annual standard for ozone.