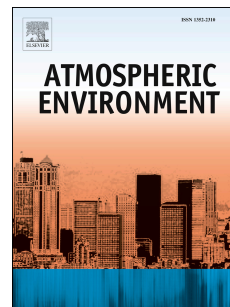


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Managing future air quality in megacities: A case study for Delhi

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11 Abstract

12 Megacities in Asia rank high in air pollution at the global scale. In many cities, ambient
13 concentrations of fine particulate matter (PM_{2.5}) have been exceeding both the WHO interim targets as
14 well as respective national air quality standards. This paper presents a systems analytical perspective
15 on management options that could efficiently improve air quality at the urban scale, having Delhi as a
16 case study. We employ the newly developed GAINS-City policy analysis framework, consisting of a
17 bottom up emission calculation combined with atmospheric chemistry-transport calculation, to derive
18 innovative insights into the current sources of pollution and their impacts on ambient PM_{2.5}, both from
19 emissions of primary PM as well as precursors of secondary inorganic and organic aerosols. We
20 outline the likely future development of these sources, quantify the related ambient PM_{2.5}
21 concentrations and health impacts, and explore potential policy interventions that could effectively
22 reduce environmental pollution and resulting health impacts in the coming years. The analysis
23 demonstrates that effective improvement of Delhi's air quality requires collaboration with
24 neighboring States and must involve sources that are less relevant in industrialized countries. At the
25 same time, many of the policy interventions will have multiple co-benefits on development targets in
26 Delhi and its neighboring States. Outcomes of this study, as well as the modelling tools used herein,
27 are applicable to other urban areas and fast growing metropolitan zones in the emerging Asian
28 regions.

29
30 **Keywords:** Air pollution, PM_{2.5}, Population exposure, Policy analysis, Health impacts, Co-benefits
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