Atmospheric Environment 295 (2023) 119534

Contents lists available at ScienceDirect

Atmospheric Environment

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

Recurring South Asian smog episodes: Call for regional cooperation and improved monitoring

M. Fahim Khokhar [a,*], M. Shehzaib Anjum [a], Abdus Salam [b], Vinayak Sinha [c], Manish Naja [d], Kirpa Ram [e], Hiroshi Tanimoto [f], James H. Crawford [g], Mohammed I. Mead [h]

[a] Institute of Environmental Sciences and Engineering (IESE), School of Civil and Environmental Engineering (SCEE), National University of Sciences and Technology Islamabad, Islamabad, Pakistan
[b] Department of Chemistry, University of Dhaka, Dhaka, Bangladesh
[c] Department of Earth and Environmental Sciences, Indian Institute of Science Education and Research Mohali, Mohali, India
[d] Aryabhatta Research Institute for Observational Sciences (ARIES), Manora Peak, Nainital, India
[e] Institute of Environment and Sustainable Development, Banaras Hindu University, Varanasi, India
[f] Center for Global Environmental Research, National Institute for Environmental Studies, Tsukuba, Japan
[g] NASA Langley Research Center, Hampton, Virginia, USA
[h] MRC Centre for Environment and Health, Environmental Research Group, Imperial College London, UK

HIGHLIGHTS

- South Asia stands out globally for fine particle pollution.
- The precise nature, sources, and potential transboundary impacts of air pollutants have been understudied in South Asia.
- Imbalanced AQ monitoring capacity is an impediment to regional cooperation that is critical in addressing air pollution.
- Revitalization of the Malé Declaration would be one way to make progress.

ARTICLE INFO

Keywords:
Air pollution
Indo-gangetic plain
Transboundary
Particulate matter
South Asia

1. South Asia stands out globally for fine particle pollution

Air pollution has emerged as a major environmental challenge across South Asian states, affecting human health and causing severe socio-economic disruption. The region accounts for around 32% of global mortality associated with exposure to the exceedingly high levels of poor ambient air quality (Lelieveld et al., 2020). Moreover, the average life expectancy for the region has been estimated to have been reduced by approximately five years with four South Asian countries: Bangladesh, India, Nepal and Pakistan, accounting for 60% of loss of life-years globally (Greenstone and Fan, 2020). The economic toll associated with additional impacts to health, agricultural productivity, mobility, etc. can account for reductions of Gross-Domestic Product (GDP) of several percent for the regional economies (Cheewaphongphan et al., 2017).

Geographically, these four countries share the Indo-Gangetic Plain (IGP) where population, emissions, and circulation conspire to create a shared air pollution problem that calls for regional cooperation (Khokhar et al., 2021). The thick cloud of air pollution is most prominent during the months of October to February. This period of smog/smoke activity is referred to by some as the "fifth season" due to its occurrence on a regular basis and its associated ever-increasing health impacts

Abbreviations: MODIS, Moderate Resolution Imaging Spectroradiometer; TROPOMI, Tropospheric Monitoring Instrument; AOD, Aerosol Optical Depth.

* Corresponding author.
E-mail address: fahim.khokhar@iese.nust.edu.pk (M.F. Khokhar).

https://doi.org/10.1016/j.atmosenv.2022.119534
Received 8 June 2022; Received in revised form 10 November 2022; Accepted 7 December 2022
Available online 8 December 2022