

## Talk 3: Regional Platform Perspective



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Intervention Manager – Air Pollution Mitigation

International Centre for Integrated Mountain Development (ICIMOD)

# Advancing Regional Cooperation in the IGP- HF through Science–Policy–Finance Dialogues & National Strategies with regional alignment

**Parth Sarathi Mahapatra**

Intervention Manager-Air Pollution Mitigation, ICIMOD

12 March 2026





## **The Third Pole: The Hindu Kush Himalaya**

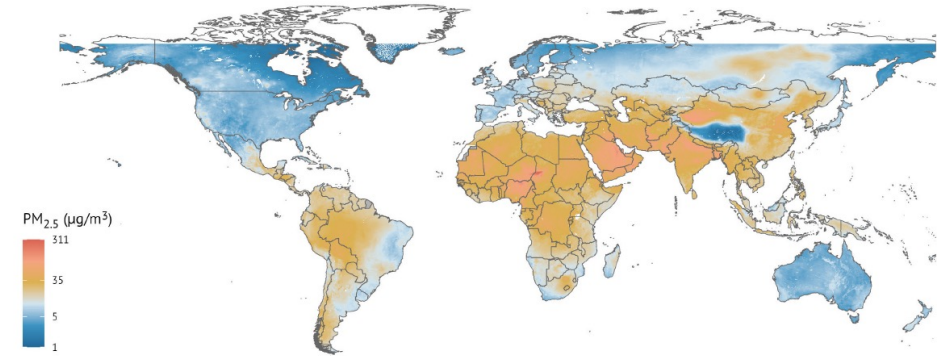
**Global asset for food, energy, water, carbon, and cultural and biological diversity**

3,500 km in length over 4 million sq km; 54,000 glaciers over 60,000 sq km

# IGP-HF an Air Pollution Hotspot

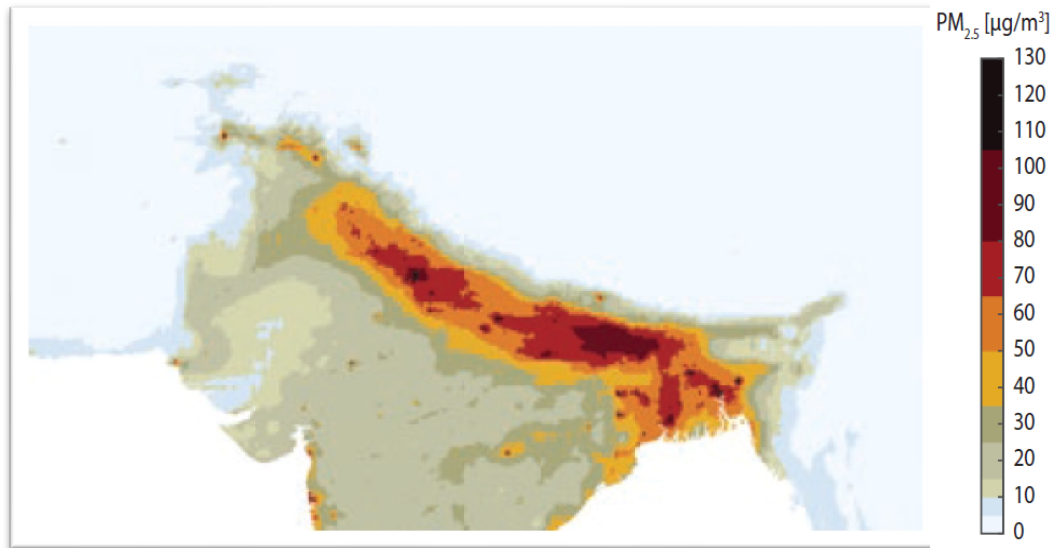
## IGP HF is a global hotspot for air pollution

- 1.9 Billion populations (~23% of world populations) in IGP-HKH region are exposed to poor air quality.
- Episodic events affect the air quality in the region.

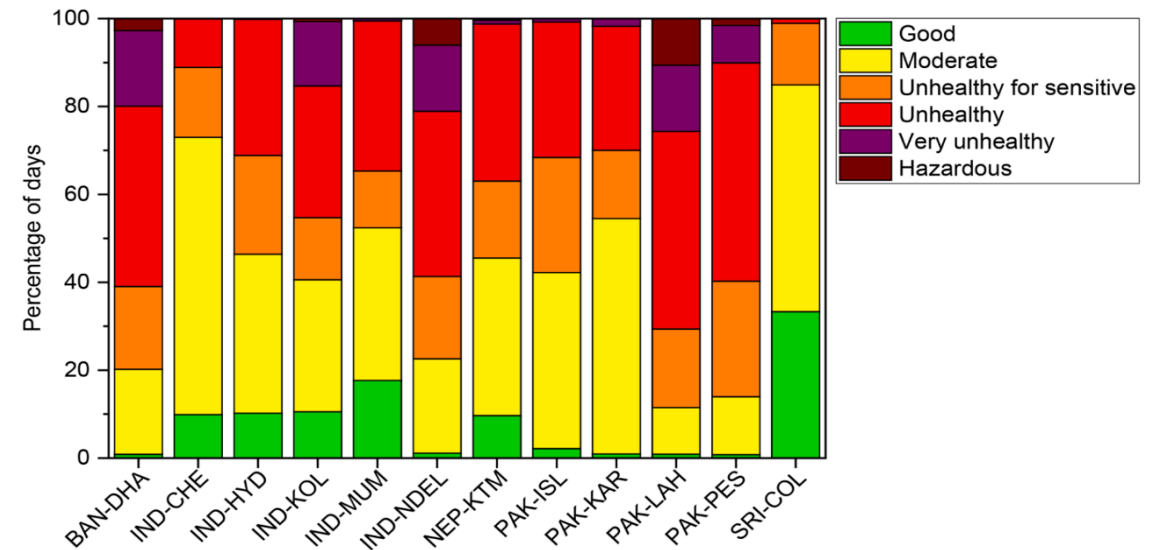


Population-weighted annual average ambient PM<sub>2.5</sub> concentrations in 2023.

Source: SOGA (2025)



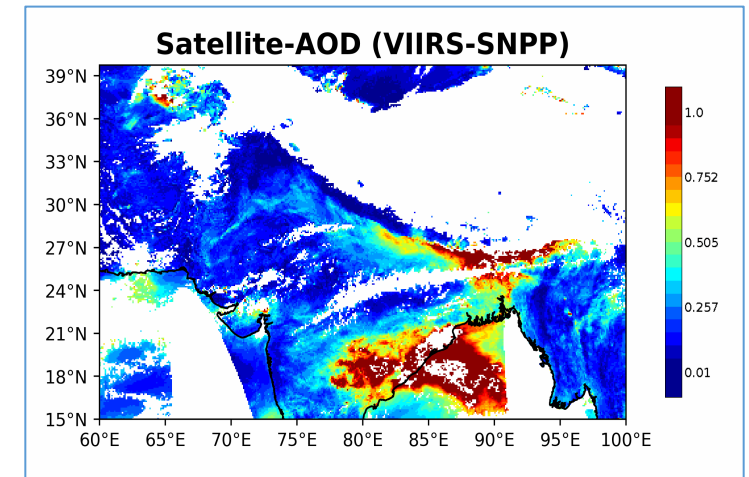
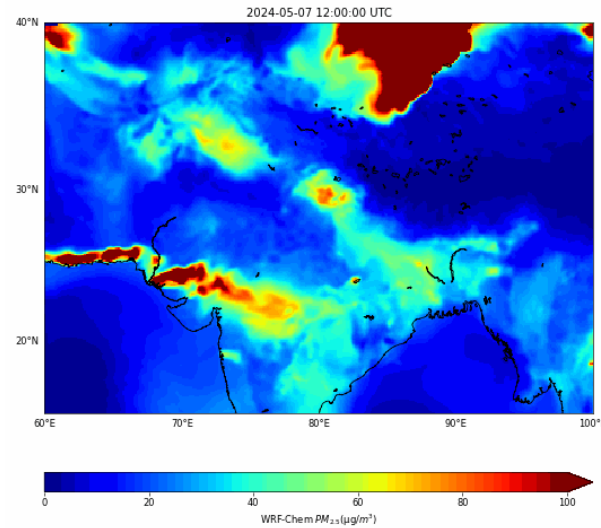
Source: World Bank, (2023)



Source: Dhital, N. B. (2024). Environmental Challenges.

# Generating Evidence: Regional AQ Dashboards

- Objectives:
  - To enhance integrated pollution monitoring and forecasting capabilities in the HKH region.
  - To facilitate the successful implementation and utilization of the outputs from the air quality models and products in the region.
  - Customized as National Dashboard for individual countries
  - To conduct tailored training programs for the stakeholders to make them adept to the dashboard functionalities.



Source: [Air Quality Watch - HKH | Recent](#)

# Generating Evidences – Black Carbon and Ozone



Environmental Pollution  
Volume 275, 15 April 2021, 116544



## Black carbon concentration in the central Himalayas: Impact on glacier melt and potential source contribution ☆

Chaman Gul<sup>a, b, c, d</sup>, Parth Sarathi Mahapatra<sup>a</sup>, Shichang Kang<sup>b, d, e</sup>, Praveen Kumar Singh<sup>a, f</sup>, Xiaokang Wu<sup>g</sup>, Cenlin He<sup>h, i</sup>, Rajesh Kumar<sup>j</sup>, Mukesh Rai<sup>a, b, d</sup>, Yangyang Xu<sup>g</sup>, Siva Praveen Puppala<sup>a</sup> ✉

**BC deposition contributed to ~39% of the total melting in the pre-monsoon season over Yala Glaciers.**

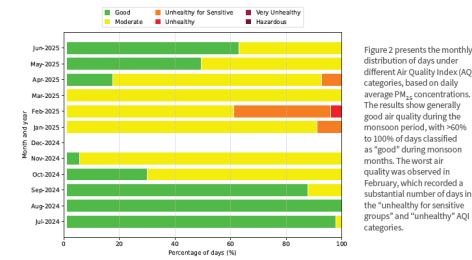


FIGURE 2. PERCENTAGE OF DAYS UNDER VARIOUS AQI CLASSES BASED ON PM<sub>2.5</sub> AT THIMPHU AQMS DURING JULY 2024 TO JUNE 2025.



Atmospheric Environment  
Volume 366, 25 January 2026, 121704



## A year-long observational analysis of atmospheric trace gases and particulate matter in Kathmandu

Dikra Prasad Bajgai<sup>a, 1</sup> ✉, Sagar Adhikari<sup>a</sup>, Arshini Saikia<sup>a</sup>, Bertrand Bessagnet<sup>a, c</sup>, Suresh Pokhrel<sup>a</sup>, Govinda Lamichhane<sup>b</sup>, Deepak Gyawali<sup>b</sup>, Ravi Sahu<sup>a</sup>, Qiangong Zhang<sup>a</sup>

**Ozone levels peak in pre-monsoon season, primarily due to daytime photochemical production.**



Atmospheric Environment  
Volume 216, 1 November 2019, 116897



## Impact of local and regional emission sources on air quality in foothills of the Himalaya during spring 2016: An observation, satellite and modeling perspective

Manisha Mehra<sup>a, b</sup>, Arnico K. Panday<sup>b</sup> ✉, Siva Praveen Puppala<sup>b</sup>, Vikrant Sapkota<sup>b</sup>, Bhupesh Adhikary<sup>b</sup>, Chiranjibi P. Pokheral<sup>c</sup>, Kirpa Ram<sup>a</sup> ✉

**Forest fires resulted into 2 to 3-fold increase in PM, BC and CO concentration on certain days in month of March and April.**

## Aerosol Radiative Forcing Estimation over a Remote High-altitude Location (~4900 masl) near Yala Glacier, Nepal

2019 - Volume 19 | Volume 19, Issue 8, August 2019 | 31 July 2019 | Reach: 8561

Optical/Radiative Properties and Remote Sensing | South Asia

Mukesh Rai<sup>1, 2</sup>, Parth Sarathi Mahapatra<sup>2</sup>, Chaman Gul<sup>2, 3, 4</sup>, Rijan Bhakta Kayastha<sup>1</sup>, Arnico K. Panday<sup>2</sup>, Siva Praveen Puppala<sup>2</sup> ✉

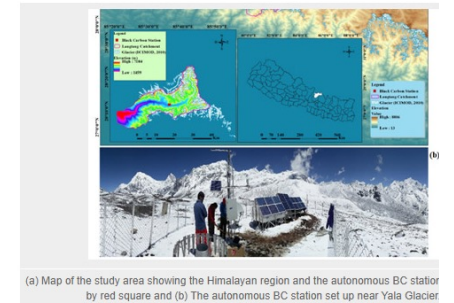
+ Show author affiliations

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Download Citation: RIS | BibTeX



<https://doi.org/10.4209/aaqr.2018.09.0342>

Download: PDF | Supplemental Material

**Pre-monsoon BC mass concentration maxima is attributed to long-range transport.**

Atmos. Chem. Phys., 18, 14113–14132, 2018  
<https://doi.org/10.5194/acp-18-14113-2018>  
© Author(s) 2018. This work is distributed under the Creative Commons Attribution 4.0 License.



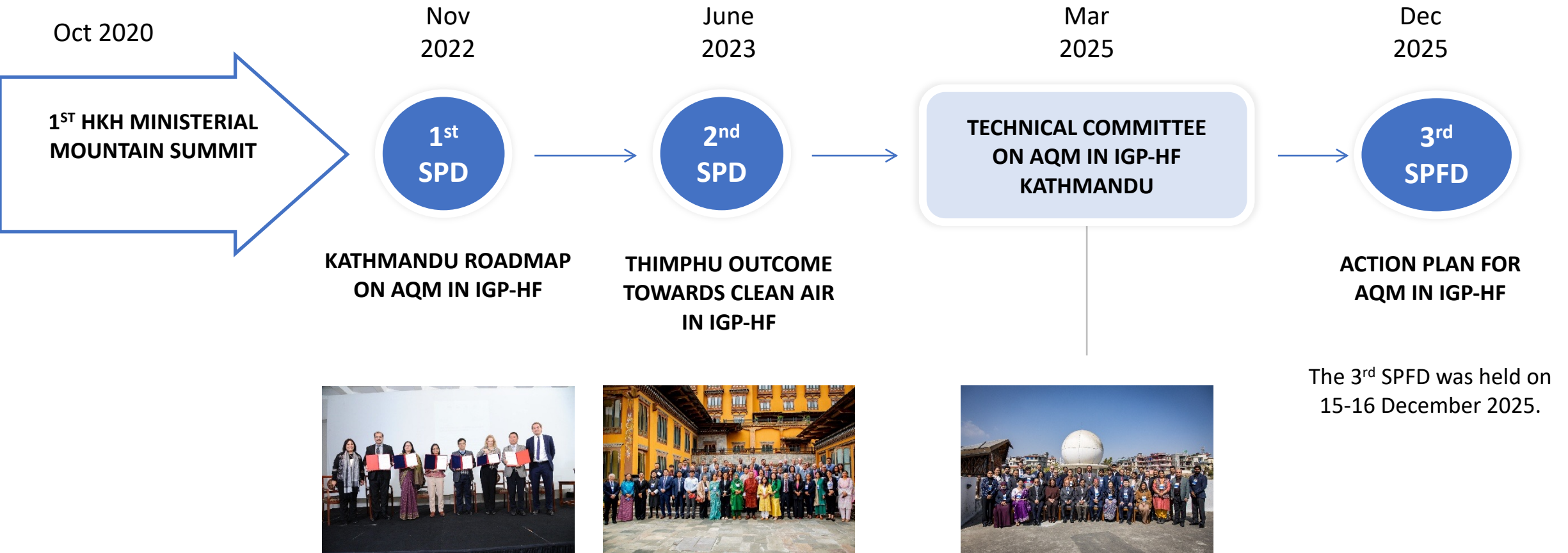
## Observation and analysis of spatiotemporal characteristics of surface ozone and carbon monoxide at multiple sites in the Kathmandu Valley, Nepal

Khadak Singh Mahata<sup>1, 2</sup>, Maheshwar Rupakheti<sup>1, 3</sup>, Arnico Kumar Panday<sup>4, 5</sup>, Piyush Bhardwaj<sup>6</sup>, Manish Naja<sup>4</sup>, Ashish Singh<sup>4</sup>, Andrea Mues<sup>7</sup>, Paolo Cristofanelli<sup>7</sup>, Deepak Pudasainee<sup>8</sup>, Paolo Bonasoni<sup>7</sup>, and Mark G. Lawrence<sup>1, 2</sup>

<sup>1</sup>Institute for Advanced Sustainability Studies (IASS), Potsdam, Germany  
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<sup>5</sup>Department of Environmental Sciences, University of Virginia, Charlottesville, Virginia, USA  
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# Regional Co-operation for AQM in IGP-HF: Science Policy and Finance Dialogue



# Regional Co-operation for AQM in IGP-HF: Science Policy and Finance Dialogue

THE KATHMANDU ROADMAP FOR

## Improving air quality in the Indo-Gangetic Plain and Himalayan Foothills

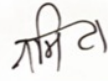
Air pollution is a critical development challenge that demands rigorous application of air quality management (AQM) and planning to inform decision making. Multi-country action on air pollution is critical for significantly improving its air quality throughout the Indo-Gangetic Plain and Himalayan Foothills (IGP-HF) airsheds. Regional coordination between the four countries of the IGP-HF region, namely Bangladesh, India, Nepal, and Pakistan, is critical. To further this coordination, the designated country representatives attending (the Science-Policy Dialogue (SPD) agree to seek the approval of the following proposed points for a regional agreement with their respective governments, upon return from the Science-Policy Dialogue held from 14 to 15 December:

1. Developing a framework for systematically and significantly improving regional AQ in IGP-HF by 2030, in accordance with a country's own national air quality standards and goals; and taking into consideration a transboundary airshed management approach
2. Sharing experiences from applying science-based AQM approaches to design abatement options (e.g., through establishment of a regional analytical capacity for data analysis program for policy effectiveness and policy efficiency modeling), both at the national and subnational level.
3. Meeting regularly with a goal of sharing AQM policy experience, monitoring efforts, and findings from inventory data and modeling results, and implementation experiences. Such coordination efforts help enable regional initiatives and policy harmonization across the region. One such critical coordination event will be a continuation of the AQ Science Policy Dialogue in the IGP-HF, which would benefit from both national and subnational participation.

Signed on 15 December 2022.



**Najneen Perveen**  
Deputy Secretary, Ministry of Environment, Forest and Climate Change, Government of Bangladesh



**Nameeta Prasad**  
Joint Secretary, Ministry of Environment, Forest and Climate Change, Government of India



**Namaraj Ghimire**  
Director General, Department of Environment, Ministry of Forests and Environment, Government of Nepal



**M. Asif Sahibzada**  
Director Environment Policy, Ministry of Climate Change, Government of Pakistan

Kathmandu Roadmap

ICIMOD

THE THIMPHU OUTCOME  
TOWARDS CLEAN AIR IN IGP-HF

## The Second Regional Science Policy Dialogue on Air Quality Management in the Indo-Gangetic Plain and Himalayan Foothills

26-27 June 2024

The Second Regional Science Policy Dialogue (SPD) on air quality management (AQM) in the Indo-Gangetic Plain and Himalayan Foothills (IGP-HF) region arrived at the following understanding and appreciation of issues around air quality improvement:

- i. that poor air quality affects health, environment, the economy and social wellbeing of a large proportion of the world's population;
- ii. that air pollution is a global, regional, airshed-level and local challenge that requires action at all levels;
- iii. that the IGP-HF region is one of the most highly air polluted airsheds in the world, where sources of emissions and impacts are cross-border in nature that requires an airshed management approach, with coordination, cooperation and collaboration at regional, national and sub-national levels;
- iv. that the main sources of pollutants are similar across this region – particularly between the neighboring jurisdictions – which include transport, industries, power generation, cooking and heating, crop residue burning, open burning of waste, and wildfire;
- v. that all countries and jurisdictions have made progress in transitioning to clean energy and adoption of less polluting alternatives;
- vi. that with implementation of current and additional policies in each of the countries and jurisdictions, the air quality situation would be substantively better;

- vii. that the benefits of engaging in an airshed approach to AQM planning involving the federal, state and provincial governments, private sector, development partners and communities will be significant for all stakeholders.

The Science Policy Dialogue, therefore, recommends the following actions as the way forward for improving air quality in the region:

- i. operationalise the "Kathmandu Road Map" for Air Quality Improvement through the respective national and sub-national Clean Air Programmes;
- ii. rename the SPD as Science, Policy and Finance Dialogue (SPFD);
- iii. accelerate actions to reduce air pollutant emissions to comply with National Ambient Air Quality Standards as soon as possible;
- iv. consider an aspirational goal of < 35 µg/m<sup>3</sup> for annual PM<sub>2.5</sub> concentrations by 2035 ("35 by 35") for long term Air Quality planning;
- v. constitute a technical committee of experts recommended by governments from the region to meet in between the 2<sup>nd</sup> and 3<sup>rd</sup> Science Policy Finance Dialogues to advise on the preparation for the 3<sup>rd</sup> SPFD;
- vi. propose during the first technical committee meeting, the set-up of working groups consisting of experts/scientists from the concerned agencies (including Academia and Technical Institutions) in the region to develop the AQM strategies, assess

and identify research gaps, and needs. Based on regional and international experiences, the first meeting of the technical committee will also develop a proposal for a regional cooperation structure including the reflection on the creation of regional centers of excellence and expertise;

- vii. share scientific knowledge and information, good policies and practices, through a common platform and during the annual SPFD;
- viii. leverage funding and investments in adoption of green technologies and practices in the main polluting sectors – transport, industries, power generation, waste burning, cooking/heating and agriculture;
- ix. build capacity of relevant agencies for air quality management including air quality forecasting, and implementation of abatement measures through joint training programmes;

- x. propose air quality improvement as a priority theme for regional cooperation;
- xi. draw support from available funding opportunities from funding agencies and development partners including World Bank, United Kingdom Foreign, Commonwealth and Development Office, Swiss Development Cooperation, Asian Development Bank, United Nations Environment Program, KfW Development Bank, Clean Air Fund, and private sector partners and others as appropriate to reflect on developing innovative and financing instruments aiming at supporting national, sub-national and harmonised regional Air Quality Management strategies.

Thimphu, 27 June 2024

Thimphu Outcome



# Robust National Plans: Regional Alignment

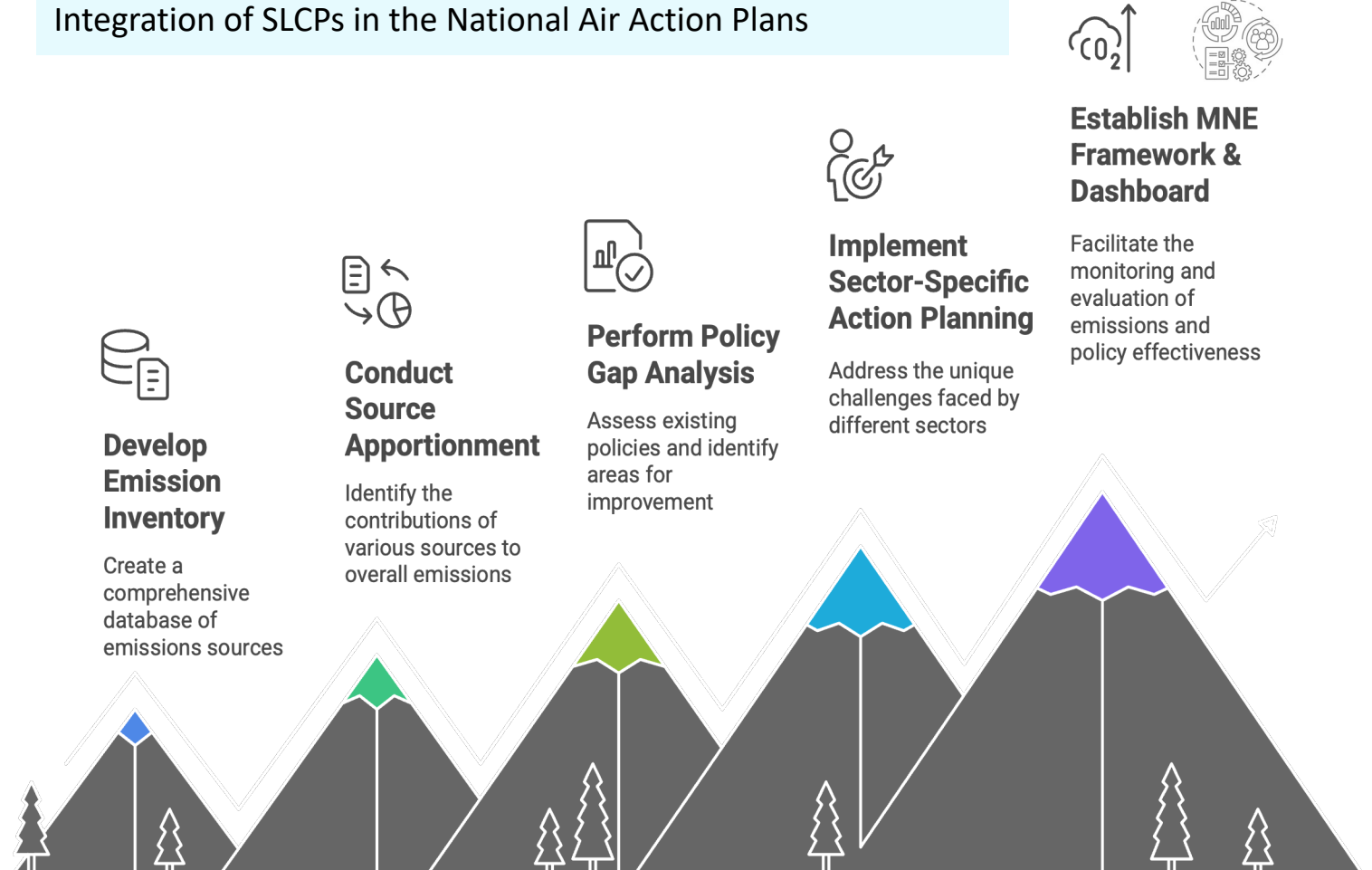


# Comprehensive National Strategies: Nepal & Bhutan

To support the government of Bhutan & Nepal in the development of the National Air Quality Management Action Plan through a comprehensive, evidence-based approach.

- Safeguard health outcomes while ensuring equity and inclusion
- Synergy with Climate & Economy
- Harmonize with regional AQM efforts

## Integration of SLCPs in the National Air Action Plans



# Integrating Super Pollutants and Air Quality Mitigation



**Integrated Monitoring**



**Shared Policy**



**Shared Financing  
Mechanism**

**Case Example: Bhutan (Integrating Bhutan's Clean Air Action Plan with National SLCP roadmap)**

# BAQ 2026

BETTER AIR QUALITY  
CONFERENCE 11-13 MAR • BANGKOK



“climate change and the environment are not at the top of the national agenda, ...research results that are coming out, have to be translated into language which ordinary people can understand and appreciate...”

**Shyam Saran**  
former Climate Change Envoy  
PMO, India

