

Impact Studies: Malé Declaration Achievements



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Background

- Work under the 1998 “Malé Declaration on Control and Prevention of Air Pollution and its Likely Transboundary Effects for South Asia” (Malé Declaration) provides an operational platform for gathering and disseminating reliable information on regional air pollution as a basis for envisaged policy development. Coordination of the programme is facilitated by the Secretariat at the Regional Resource Centre for Asia Pacific (RRC AP), located in Bangkok, Thailand.

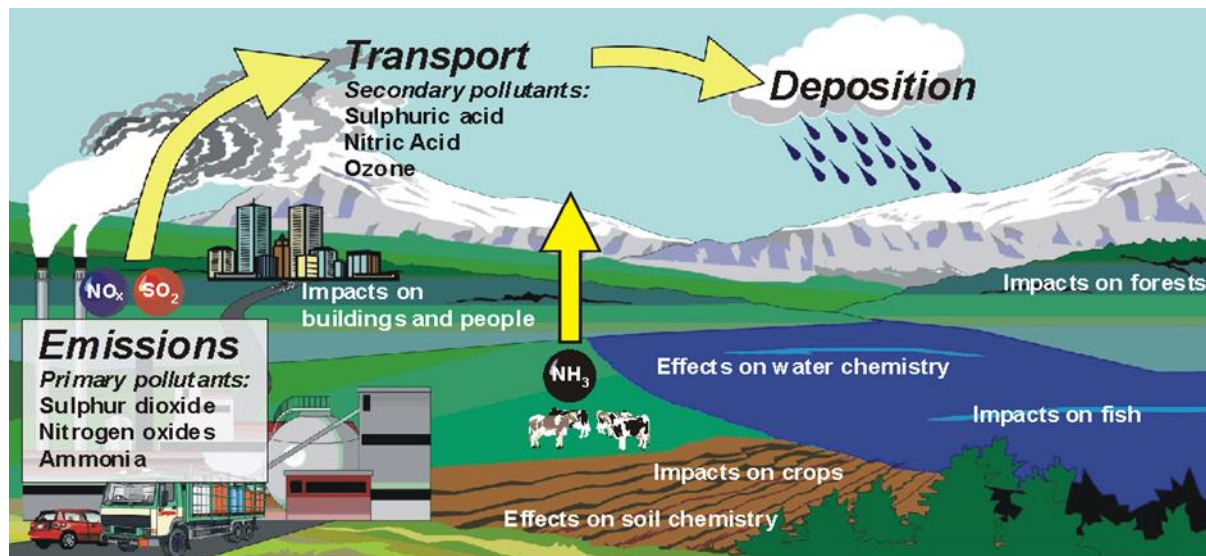


Illustration of the origin and regional transport of air pollution. The secondary pollutants formed from the primary pollutants in the atmosphere can travel large distances making the problem transboundary and requiring international co-operation to solve.

- The WHO Global Burden of Disease published in 2010 identifies especially high risk levels in the developing countries of Asia where air pollution levels are the highest in the world. In South Asia in 2010, outdoor air pollution, mostly particulates, ranked 6th in the 20 leading factors for death where it contributed to 712,000 deaths, whilst indoor household air pollution from solid fuels ranked 3rd contributing over a million deaths.

Leading risk factors for Death in South Asia in 2010

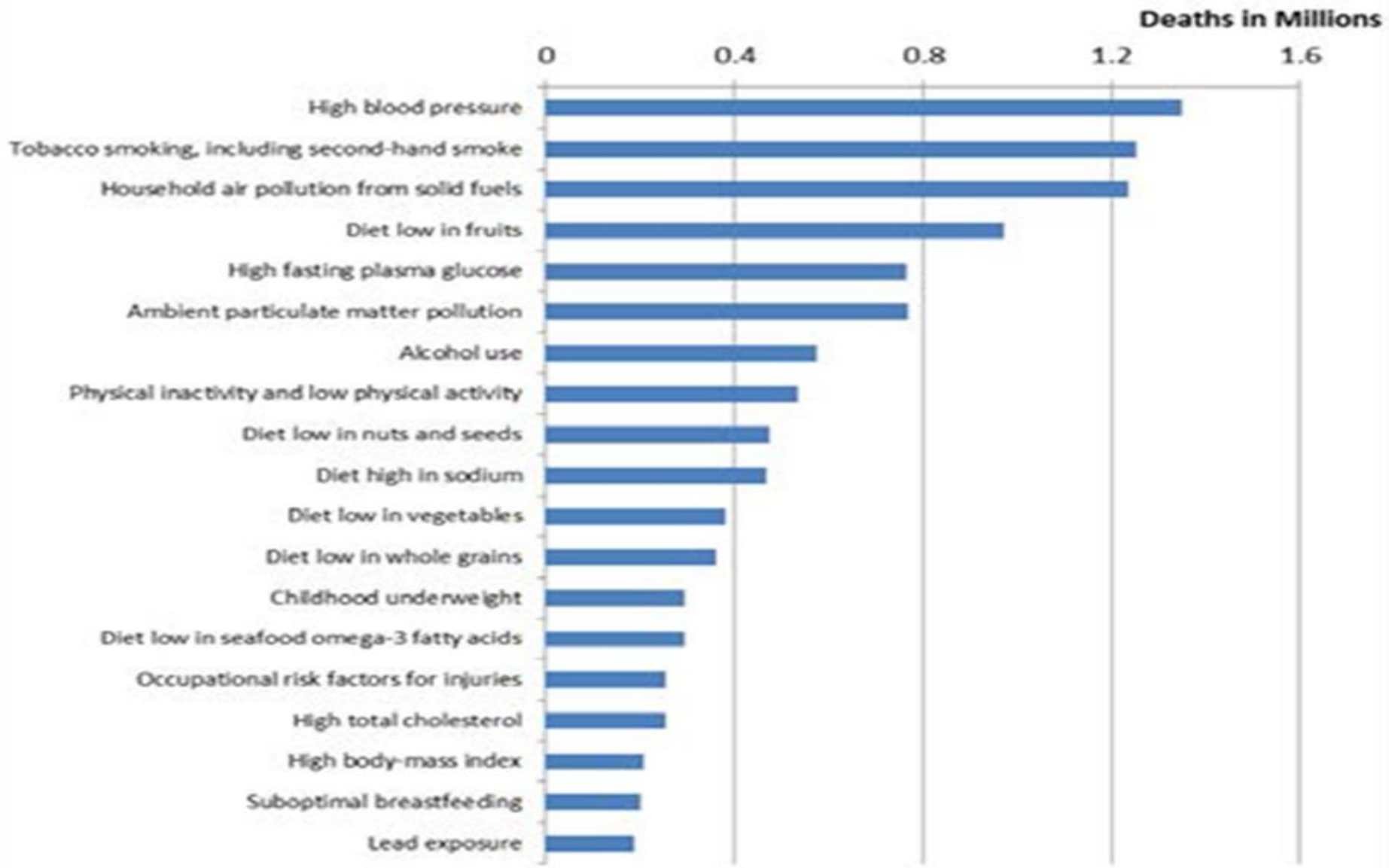


Figure : Number of Deaths Attributable to 20 Leading Risks in South Asia 2010 (Lim et al., 2012)

Health impact studies

- The health studies conducted by the Malé Declaration have helped to address the need for information on the effects of particles on human health in South Asian cities.
- They provide locally-gathered evidence to support actions by governments to control particulate emissions.
- These studies were conducted on the health of children, as the developing lungs of children are more vulnerable to the adverse effects of air pollution than adult lungs.
- Children are more susceptible to air pollution than adults because of higher ventilation rates and higher levels of physical activity. In addition, adverse impacts in childhood can continue throughout their adult lives with health, social and economic consequences.

Human Health Impacts in South Asia

- Successful studies carried the relationship between air pollution (particulate matter (PM)) and the health of school children in **Dhaka, Bangladesh, Kathmandu, Nepal and Islamabad, Pakistan.**
- Regionally, specific data shows that lung function of children is impacted by levels of particulate matter pollution found in Asian cities.
- The Malé Declaration studies are some of the first to have been conducted where **particulate matter concentrations** are at the highest levels found in many large Asian cities.
- The findings of these studies emphasize the **high cost of air pollution to the health** of the community and the need to implement cost-effective measures to reduce emissions of health-damaging air pollutants.

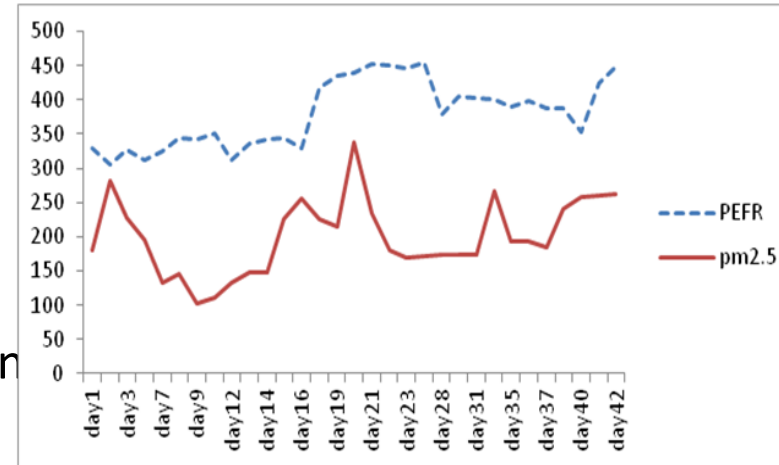


Figure: Research Assistant guiding the children to measure the peak expiratory flow rate (PEFR) in Kathmandu, Nepal

Results of health studies on school children

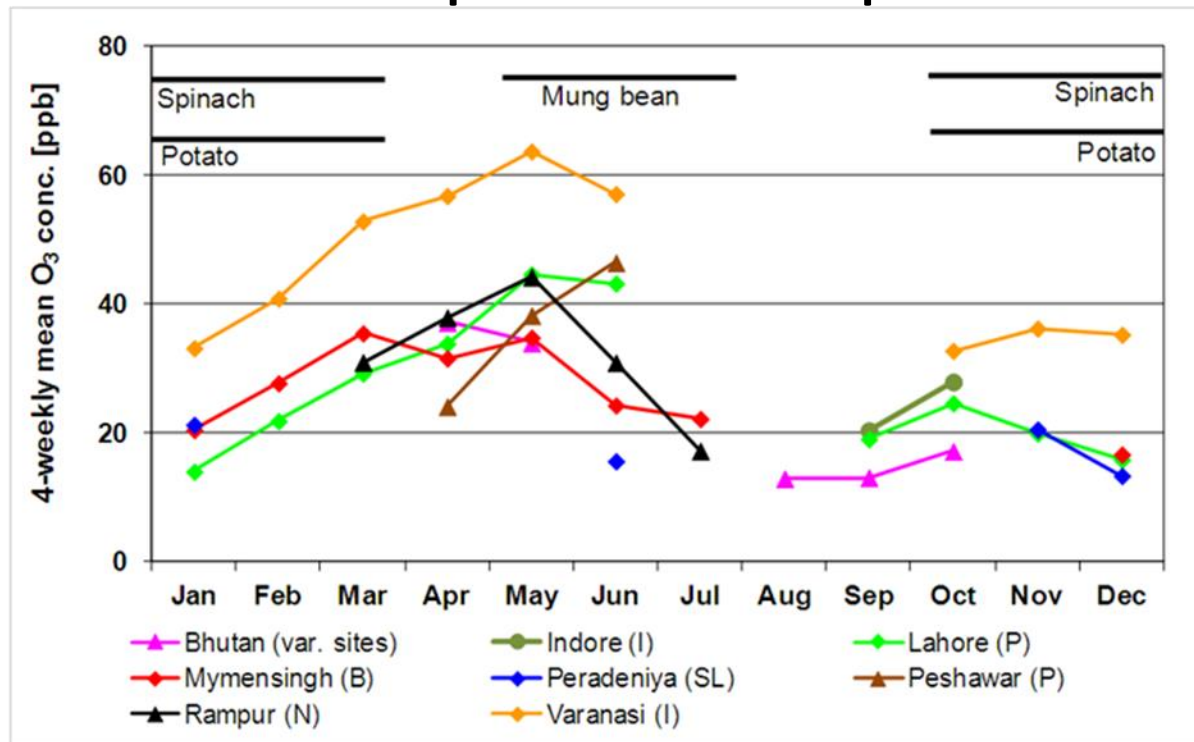
- The results of the studies show very high levels of particulate pollution in all three cities, which consistently exceed the WHO Air Quality Guidelines (AQGs) for PM_{2.5} of 25 µg/m³ expressed as a 24 hour mean (WHO, 2006). The WHO recommended that countries with areas not meeting the 24-hour guideline values undertake immediate action to achieve these levels in the shortest possible time.

Future steps

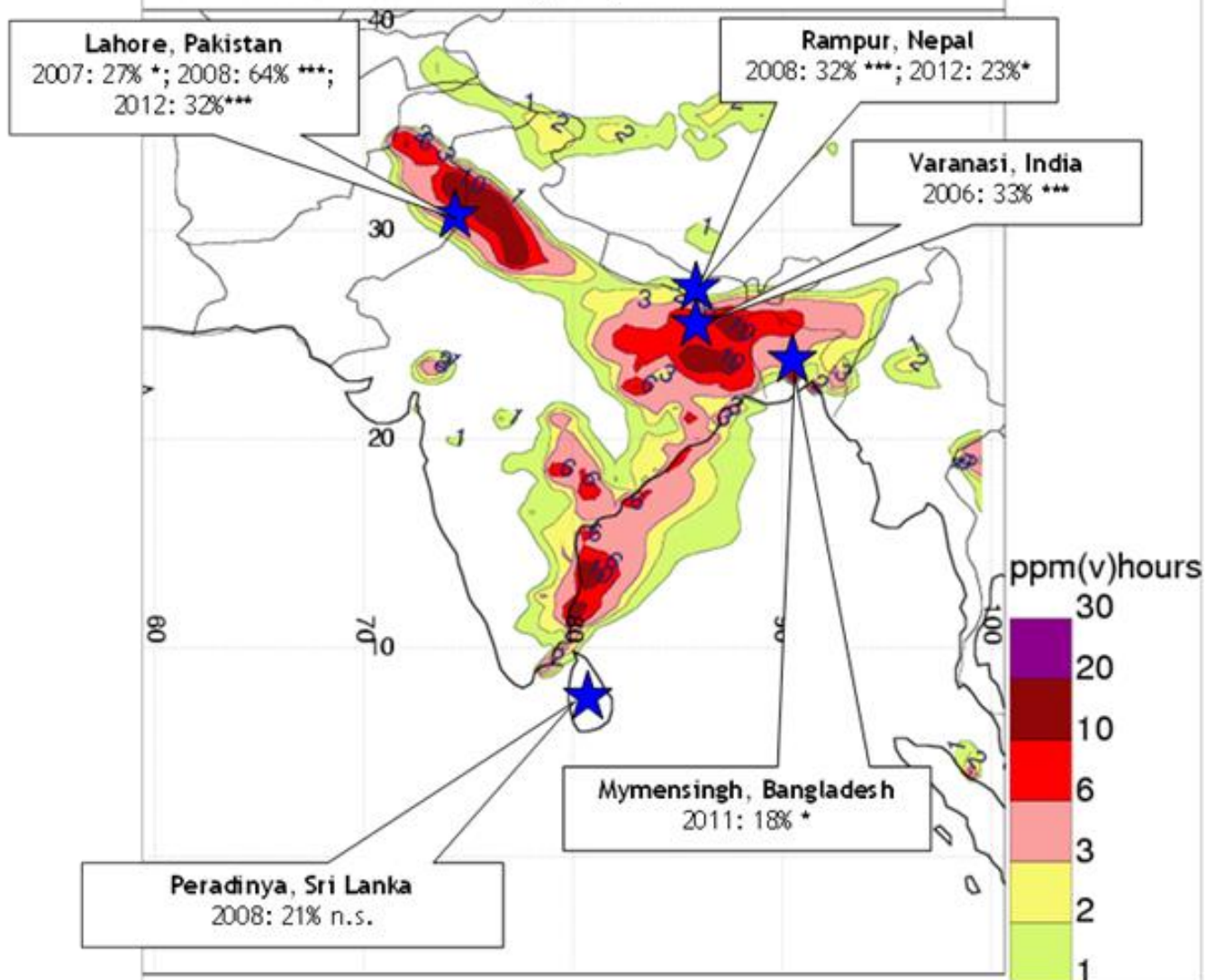
- **The following future steps may be considered:**
- Carefully selected technical studies of the health impacts of PM_{2.5} should be established to inform policy, with an emphasis on analysis of social and economic impacts of air pollution on health to enable more thorough national and regional assessments of impacts, policy options, costs and health benefits of key options.
- A regional study should be conducted to quantify and assess the health costs and associated social and economic costs of ambient concentrations of health damaging PM_{2.5} particles in Malé Declaration countries and reporting to the Governments.

Evidence of wide-spread impacts of ozone on crops in South Asia

- Ambient four-weekly mean O₃ concentrations at various experimental sites across South Asia as monitored with passive samplers

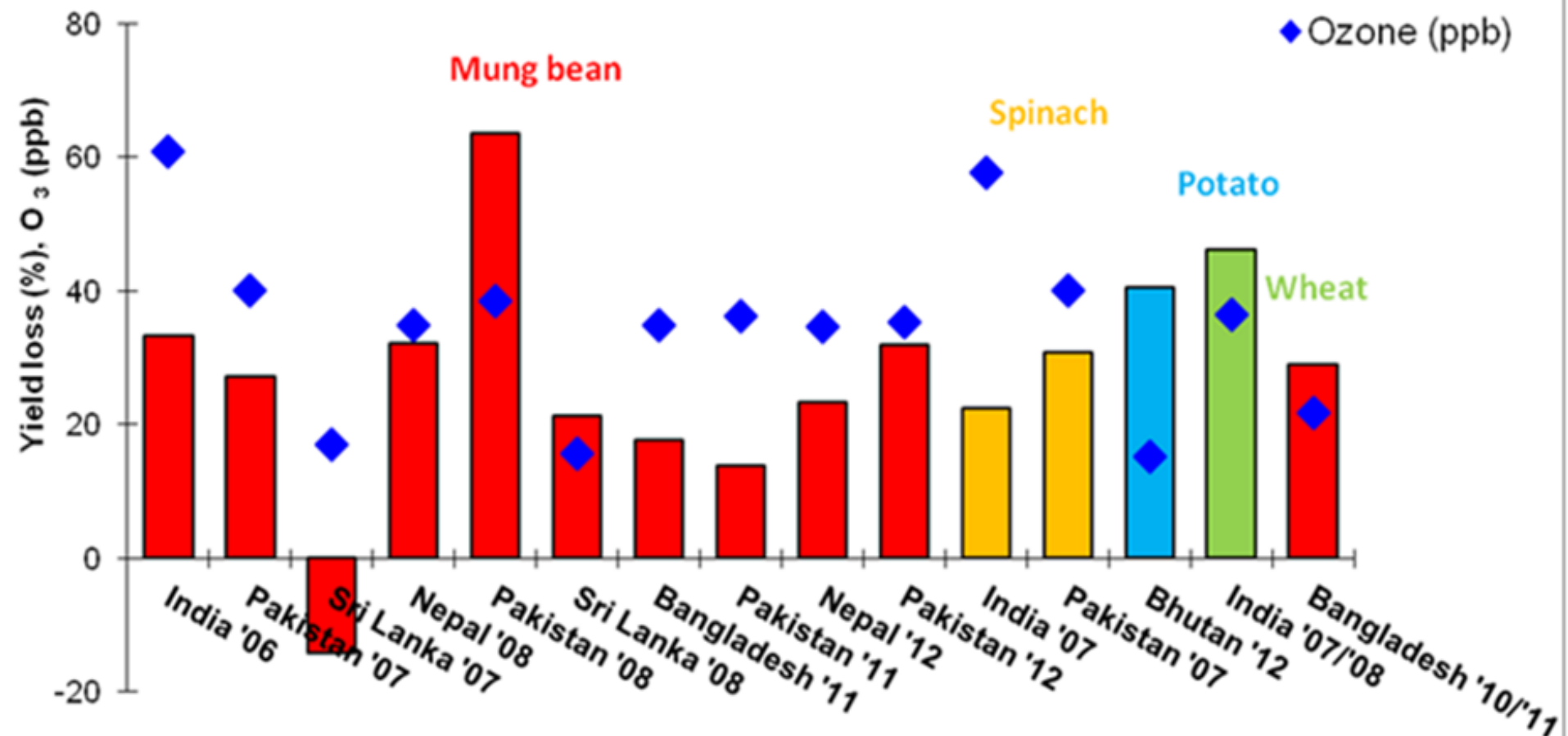


AOT40 calculated for May-July 2000



The Malé Declaration has produced experimental evidence of effects of air pollutant ozone (O₃) at ground level on yields of important South Asian crops, such as mung bean, spinach, wheat and potato.

Ozone-induced yield losses in Malé Declaration countries



Ozone-induced yield losses for Mung bean, spinach, potato and wheat in various South Asian countries as recorded during field experiments conducted between 2006 and 2012.

Crop Impacts in South Asia

- New large-scale experimental evidence of effects of air pollutant ozone (O₃) at ground level
- On yield of important South Asian crops, such as mung bean, spinach, wheat and potato; evidence fits well with modelling-based regional prediction of O₃ concentration fields and the national emission inventory work of the Malé Declaration;
- The Malé Declaration has produced wide-spread evidence of plant-damaging concentration levels of O₃ during main growing seasons of important South Asian crops;
- Standardized risk assessment methodologies have been developed that have been evaluated for their application across the region;

Ecosystem Impacts in South Asia

- Modelling studies and training events under the Malé Declaration have demonstrated that there are limited areas in South Asia which may be at risk from acidification from sulphur and nitrogen pollution such as in the Western Ghats, parts of Sri Lanka and eastern India. In the Himalayan regions of India, Bhutan and Nepal soils that are naturally acidic may also be under pressure from acidifying deposition.
- Modelling results suggest that acidification will not be a major issue compared to other air pollution problems in South Asia but further field research is required to determine the real extent of the problem.
- A potentially greater problem to ecosystems and their biodiversity than acidification in South Asia is eutrophication (excessive input of nitrogen and other nutrients). Nitrogen pollution from the transport, industry and agriculture is linked to health impacts, impacts on ecosystems, crops and climate, as well as the formation of ground-level ozone.
- Despite some progress there is still a need for a comprehensive regional assessment of these issues, especially using studies that have been conducted in South Asia.

IG I 2 adopted and agreed on the location of regional centers:

- Regional Centre on Wet and Dry Deposition Monitoring - India
- Regional Centre on Crops and Vegetation Monitoring - Pakistan
- Regional Centre on Soil Monitoring - Bhutan
- Regional Centre on Corrosion Impact Assessment - India
- Regional Centre on Health Impact Assessment - Bangladesh
- Regional Centre on Emission Inventories – Sri Lanka
- Regional Centre on Modelling Atmospheric Transport of Air Pollution - Iran
- Regional Centre on Pollution Reduction Policies/Strategies –Nepal / Maldives

The Objectives of the Regional Centre:

- 3. The purpose of a regional centre is to advise on any technical problem faced by a country and provide guidance on the smooth operation of Malé Declaration activities and how to maintain high quality data provision. It will also offer training courses to update and enhance the knowledge and capacity in the field.
- The basic function of a regional centre is to exchange knowledge and to support the research and development on air pollution issues in the region on the proposed theme namely: a) dry and wet deposition monitoring; b) soil monitoring c) vegetation monitoring; d) corrosion impact assessment; e) health impact assessment; e) emission inventory compilation f) atmospheric transport modeling; and g) pollution reduction policies/strategies.

Thank you for your attention!

