Malé Declaration

on Control and Prevention of Air Pollution and Its Likely Transboundary Effects for South Asia

BHUTAN

An overview of progress within the last decade...

BHUTAN
Status of Implementation 2008

Transboundary air polution is an emerging environmental concern for Bhutan

Background

While air pollution is not currently a major issue in Bhutan, it is emerging as an important environmental concern due to rapid urbanization, increasing industrialization and vehicle numbers, and continued dependence on wood-based fuel for energy in winter. Over the period of last five years (2002- 2006), Bhutan has seen an increased of automobiles by 36%. In 2006, there were about 76% more registered industries than 2002, and 4% of those industries are comprised of production and manufacturing industries. Urban population was estimated to be 31% of the country's total population in 2005, compared to 15% about ten years ago. Moreover, due to steady growth in GDP, there has been boom in construction sector as well. Based on FAO's (1991) estimation, an individual consumed, on average, about 1.3 tons of wood for energy. This is noted as one of the highest percita consumption of wood in the world.

Realising the impact of unabated air pollution could have on public health, the Royal Government of Bhutan started taking initiatives to address air pollution since 2000. Major aspects of air quality management in Bhutan are discussed below.

Major Sources of Air Pollution and Impacts

The primary sources of air pollution emissions in Bhutan are:

- Exhaust emissions from diesel and petrol vehicles ; particulate matter from brakes, tire wear - out , and road dust suspended in air.
- Emissions from industrial estates in the foothills along the border with India, especially cement plants, inorganic chemical & mineral processing plants (carbide, ferrosilicon), metallurgy plants, and coal mining and processing plants.
- Smoke from wood stove cooking (bhukaris) and space heating
- Wind-blown dust from building sites, exposed agricultural soil, and roadside construction areas during the dry winter season, in particular the windy pre-monsoon season lasting from March-April.

Thimphu roadside

- Smoke from forest fires during the dry season, and agricultural burning (primarily during the dry winter season and in the pre-planting season).
- Smoke from open fires at construction sites and outdoor recreation areas during the winter season, open burning of waste.
- Smoke from wood-fired heating of bitumen in open pans, for road paving on city streets.

No impact assessment studies have been carried out in Bhutan. However, the recent annual health statistics show acute respiratory infection affects a large number of Bhutanese, on the top of the list of common lilness.

The Malé Declaration in Bhutan

Bhutan joined the Malé Declaration on Control and Prevention of Air Pollution and Its Likely Transboundary Effects for South Asia by signing Phase I of the programme in 2002. Since then, Bhutan has been participating in all subsequent phases of the programme. The National Environment Commission acts as the National Focal Point and the National Implementing Agency for the Malé Declaration. The Malé Declaration programme has helped Bhutan enhance its human resources and infrastructural monitoring capacity, create awareness of air pollution in the country, and collect national baseline information on air pollution.

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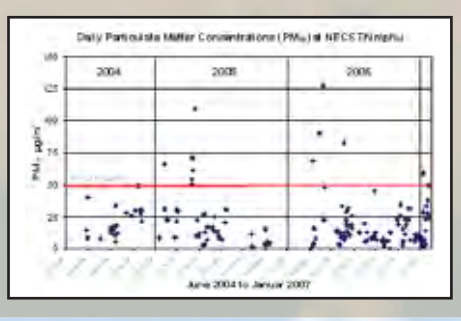
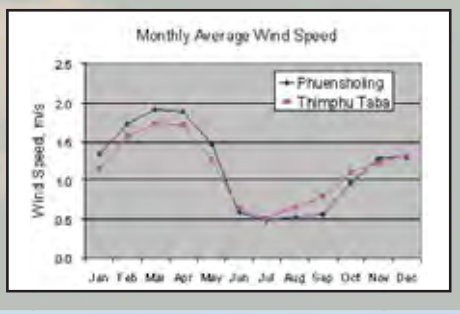
Sumary of Baseline Information

	2000	2008
Nature of the problem	- Vehicular - Industrial - Forest Fires - Indoor air pollution	- Vehicular - Industrial - Forest Fires - Indoor air pollution - Construction sites (due to changes in land use)
Status of monitoring	- No monitoring - Random checks on vehicles	- Vehicle emissions monitoring since 2003 - Regular monitoring of PM in Thimphu since June 2004; monitoring of wet deposition in Bhutan; NO_x and SO_2 monitored on periodic basis at both sites - Industrial emissions monitoring since 2005
Pollutants monitored	- SPM, SO_2, NO_x, CO - None	Ambient: PM (regularly), NO_x and SO_2 (periodically), Ozone Vehicular: Smoke, CO Industries: SPM and SO_2
Number of monitoring stations	3 0	- 2 vehicle emission testing centres - 2 ambient air quality monitoring stations - 1 mobile van for industrial monitoring
Capacity to study air pollution	None	Basic studies can be carried out
AQ Standards notified	Initiated, with data collection	- Issued ambient air quality standards - Revised vehicle emission standards - Issued Industrial emission standards

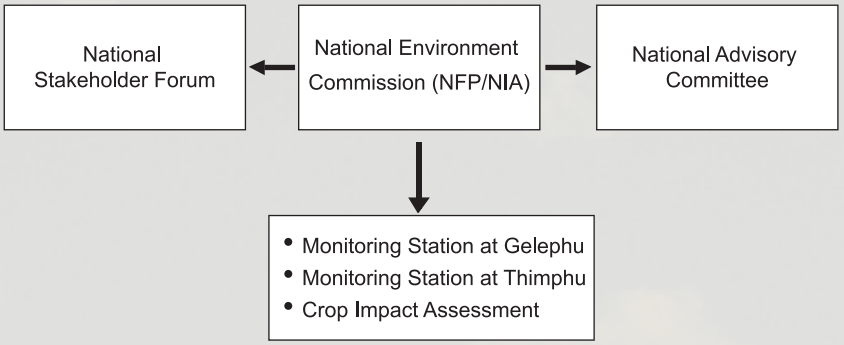




Status of Air Pollution

Since June 2004, the national environment Commissions has been monitoring particulate matter (PM_{10}) in Thimphu. It was observed that the PM_{10} concentration was the highest during the month of March to April, during which the wind speed was also observed to be the highest. Periodic sampling of NO_2 and SO_2 has also been conducted in Thimphu and Bhur in Gelephu using passive sampler. In Thimphu, samples were taken from the central part of the city at the intersection where the traffic flow is the highest. Results showed that NO_2 concentrations at the location ranged from 11 to17µg/m^3, and SO_2 concentrations ranged from 0.7 to 2.4 µg/m^3, Taking into consideration the location of the sample exposures, the concentrations of both NO_2 and SO_2 are relatively low. Bhur reports even lower concentrations of NO_2 and SO_2, with values below the detection limit of 3 µg/m^3. However, there are other areas with densely populated industries in Bhutan like Phuentsholing, Pasakha and Gomtu, which may have higher levels of pollution.

Institutional Arrangement : Bhutan



NFP : National Focal Point
NIA : National Implementing Agency

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Existing Response Measures

LEGAL

1996	Banned import of second-hand vehicles and two-stroke two-wheelers.
1999	Developed road safety and transport regulations, which included emissions requirements for all vehicles registered in Bhutan.
2000	Enacted the Environmental Assessment Act, which requires all development projects (including in dustries) in Bhutan to seek environmental clearance, and allows the National Environment Commission (NEC) and its competent authorities to conduct compliance monitoring.
2002	Required EURO 1 type approval standards for all new imported light duty vehicles.
2003	Established in-use vehicle emission standards and an emissions testing programme.
2004	Developed interim Industrial Discharge Standards.
2004	Adopted the Regulation for Environmental Clearance of Project
2006	Contracted a vehicle testing programme to two private companies, each with testing locations in Thimphu and Phuentsholing

FINANCIAL

2002	Reduced import taxes on vehicle spare parts, and in particular parts relevant to vehicle emissions such as air filters, oil filters and fuel filters.
2002	Reduced import taxes on imports of electrical rice cookers and water boilers
1998-to date	Explored resources for adoption of cleaner technologies and implementation of environmental management practices

TECHNOLOGICAL

2001	Started imports of unleaded petrol.
2003	Started imports of ultra low sulphur diesel fuel (0.025% sulphur content).

Recommendations: The Way Forward

Understanding the Science

1. Strengthen existing monitoring systems, including both infrastructure and human resources, as well as the “Pollution Watch” public reporting system.
2. Expand the existing monitoring network by establishing monitoring stations in highly populated regions and industrial areas.
3. Enhance capacity to conduct bio-monitoring and impacts on health assessment.
4. Integrate the monitoring database into the Environmental Information Management System.
5. Enhance capacity to conduct air pollution modelling in order to analyse national air pollution movements and provide pollution forecasts.

Mitigation and Prevention

1. Carry out awareness programs to educate the general public and policymakers on airpollution issues
2. Enhance the capacity of relevant agencies to ensure effective implementation of prescribed emission standards.
3. Promote eco-friendly technology in transportation, energy and industrial sector through subsidies provided by the Government.
4. Ensure that industries carry out environmental performance reporting, so that considerations for the environment are incorporated into company plans and policies.
5. Formulate and enact a Clean Air Act and other supporting legal instruments.

Coordinating Agencies

UNEP

UNEP Regional Resource Centre for Asia and the Pacific (UNEP RRC.AP) Bangkok, Thailand

SACEP

South Asia Cooperative Environment Programme (SACEP) Colombo, Sri Lanka

SEI STOCKHOLM ENVIRONMENT INSTITUTE

Stockholm Environment Institute (SEI) Stockholm, Sweden

Sida WWW.RAPIDC.ORG

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Bhutan NFP & NIA: National Environment Commission,Thimphu