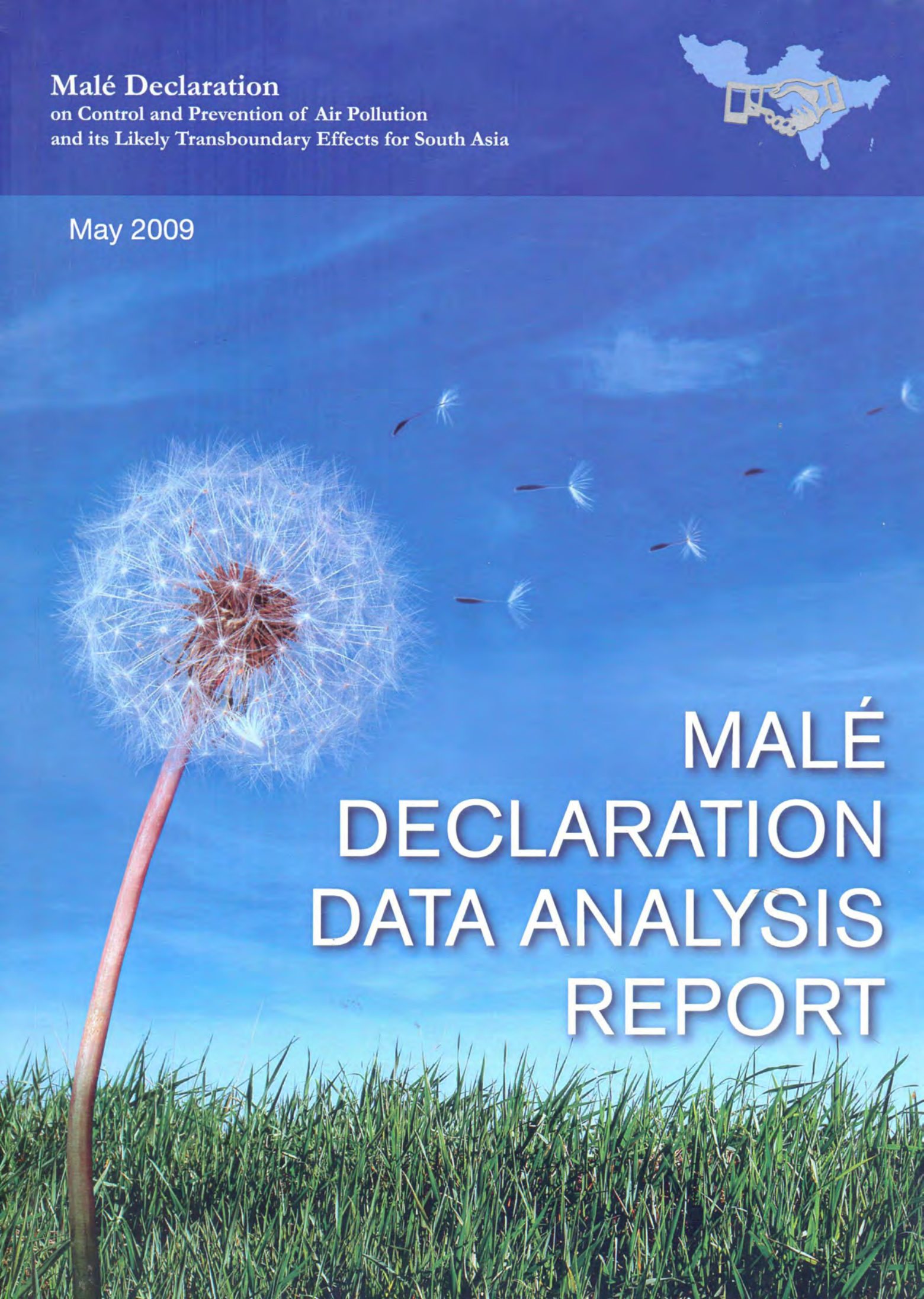
Malé Declaration
on Control and Prevention of Air Pollution
and its Likely Transboundary Effects for South Asia

May 2009



MALÉ DECLARATION DATA ANALYSIS REPORT

Malé Declaration
on Control and Prevention of Air Pollution
and its Likely Transboundary Effect for South Asia

Data Analysis Report

2009

This report has been compiled as part of the Phase III implementation of Malé Declaration on Control and Prevention of Air Pollution and Its Likely Transboundary Effects for South Asia.

National Implementing Agencies (NIAs) and National Focal Points (NFPs)

Bangladesh

NFP: Ministry of Environment and Forest

NIA: Department of Environment Dhaka

Bhutan

NFP and NIA: National Environnent Commission

India

NFP: Ministry of Environment and Forests

NIA: Central Pollution Control Board, New Delhi

Iran

NFP and NIA: Department of the Environment, Tehran

Maldives

NFP: Ministry of Environment, Energy and Water

NIA: Department of Meteorology

Nepal

NFP: Ministry of Environment Science and Technology

NIA: International Centre for Integrated Mountain Development(ICIMOD) Kathmandu

Pakistan

NFP: Ministry of Environment

NIA: Pakistan Environment Protection Agency, Islamabad

Sri Lanka

NFP: Ministry of Environment and Natural Resources

NIA: Central Environmental Authority, Colombo

Coordinating Agencies

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

South Asia Co-operative Environment Programme SACEP) Colombo, Sri Lanka

Stockholm Environment Institute (SEI) Stockholm, Sweden

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LIST OF ABBREVIATIONS

AAS	Atomic Absorption Spectrometry
ABC	Atmospheric Brown Cloud
BDL	Below Detection Limit
Ca^{2+}	Calcium
Cl^-	Chloride
$CaCO_3$	Calcium Carbonate
CO	Carbon Monoxide
CO_2	Carbon Dioxide
EC	Electric Conductivity
GDP	Gross Domestic Product
HVS	High Volume Sampler
HNO_3	Nitric Acid
H_2SO_4	Sulphuric Acid
ICIMOD	International Centre for Integrated Mountain Development
IIAS	Institute of Agriculture and Animal Sciences
IVL	Swedish Environmental Research Institute Limited
K^+	Potassium ion
kW	Kilowatt
LPG	Liquefied Petroleum Gas
Mg^{2+}	Magnesium
Malé Declaration	Malé Declaration on Control and Prevention of Air Pollution and Its Likely Transboundary Effects for South Asia
NFP	National Focal Point
Na^+	Sodium ion
NH_3	Ammonia
NH^{4+}	Ammonium ion
NIA	National Implementing Agency
NO_3^-	Nitrate ion
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NOx	Nitrogen Oxide
NRSPM	Non Respirable Suspended Particulate Matter
O_3	Ozone
pH	Acidity

PM	Particulate Matter
$PM_{2.5}$	Particulate Matter of 2.5 μm or less particulate size
PM_{10}	Particulate Matter of 10 μm particulate size
POPs	Persistent Organic Pollutants
QA/QC	Quality Assurance and Quality Control
RSPM	Respirable Suspended Particulate Matter
SoE	State of Environment
SO_4^{2-}	Sulphate ion
SO_2	Sulphur Dioxide
SOx	Sulphur Oxide
SPM	Suspended Particulate Matter
TSPM	Total Suspended Particulate Matter
UNCED	United Nations Conference on Environment and Development
VOC	Volatile Organic Compound
WHO	World Health Organization
WSSD	World Summit on Sustainable Development

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CHAPTER 1 INTRODUCTION

1.1 INTRODUCTION

The United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro in 1992 produced a major strategic outlook for the 21st century in the Agenda 21. Agenda 21, mentioned a vital issue on Information for Decision Making regarding the importance of improved availability of information on all aspects of environment and development for decision making towards sustainable development. It also emphasizes the need for improved collection and presentation of data and information. Lastly, it emphasizes the necessity of regional cooperation to address "trans boundary atmospheric pollution that has adverse health impacts on human and other detrimental environmental impacts, such as loss of trees and forests and the acidification of water bodies".

Additionally, one of the most important commitments at the World Summit on Sustainable Development (WSSD) in 2002 was the acceptance of the International development goals which includes the collective responsibility to advance and strengthen mutually reinforcing pillars of sustainable development at different levels. Key activities in these fields include development of the State of Environment (SoE) reports as well as effective data collection and processing.

In order to increase regional cooperation on tackling environment concerns such as air pollution, regular assessment on the major components of the environment is imperative. A reliable sound, and up to date information on the present status of the environment and its trend strengthens serves as a basis for enhancing regional commitment to collectively abate environmental concerns.

1.2 AIR QUALITY

The Asian region is inhabited by more than one-third of the world's population, and currently experiencing remarkable economic growth as a consequence of rapid industrialization in the recent decades. However, many countries within the region are facing threats from air pollution which contributes on increasing environmental and health problems related to excessive emissions, especially in areas where much of the energy production is thermal (coal) based and where increasing vehicular emissions takes place such as urban areas having continuously degrading air quality that affects millions of people's lives due to health impacts associated with air pollution. World Health Organization (WHO) estimated the occurrence of about 530,000 premature deaths in Asia every year due to outdoor air pollution. The economic cost of air pollution is estimated to be 2-3% of gross domestic product (GDP) in many of the developing countries of Asia. Obviously, further increase in economic growth due to industrial activities in Asia will increase the pressure on the air quality, which can exacerbate the current impacts. Moreover, air pollution also affects crops and biodiversity through acid deposition, damaging cultural heritage through corrosion, and contributes to climatic extremes and variability. Thus, air pollution is an environmental concern that transcends national boundaries.

Air knows no boundaries and the impacts of climate change and air pollution are generally trans-boundary and global in nature. The impacts can propagate and/or travel from the source of pollution which can be treated as a national concern to a wider scope that has regional and global implications regarding environmental pollution. Thus, the transport of pollutants translates local issues into regional and global concerns that cannot be addressed by a single country.

Since air pollution is of regional and global in scope, it is important that the global and regional communities should work collectively to tackle this problem. It is imperative to initiate regional cooperation to undertake remedial measures, in order to abate trans-boundary air pollution from

becoming more serious and widespread problem. Presently, various global and regional level initiatives have been taken to lessen the impacts of air pollution and climate change.

"Malé Declaration on Control and Prevention of Air Pollution and Its likely Trans-boundary Effects for South Asia (Malé Declaration)" is a regional level initiative and effort taken by the countries of South Asia to tackle air pollution on their region. The basic objective of this declaration is to foster regional cooperation to address the rapidly increasing problem of regional air pollution with focus on South Asia. The Malé Declaration stated the need for countries to carry forward, or initiate, studies and programmes on air pollution in each of the countries in South Asia.

Figure 1-1 Participating Countries

Figure 1-1 shows the participating countries in the Malé Declaration that includes Bangladesh, Bhutan, India, Iran, Maldives, Nepal, Pakistan, and Sri Lanka. Each country has an NFP and a NIA as presented in Table 1-1.

Table 1-1 Details of Participating Countries

S No	Name of Country	National Focal Point	National Implementing Agency
1	Bangladesh	Ministry of Environment & Forest	Department of Environment, Dhaka
2	Bhutan	Environment Commission, Thimphu	Environment Commission, Thimphu
3	India	Ministry of Environment and Forest	Central Pollution Control Board, New Delhi
4	Iran	Department of Environment, Tehran	Department of Environment, Tehran
5	Maldives	Ministry of Environment, Energy and Water, Malé	Ministry of Environment, Energy and Water, Malé
6	Nepal	Ministry of Environment, Science and Technology	ICIMOD, Kathmandu
7	Pakistan	Ministry of Environment	Environment Protection Agency, Islamabad
8	Sri Lanka	Ministry of Environment and Natural Resources	Central Environment Authority, Colombo

Malé Declaration provides the basic framework for the assessment of trans-boundary air pollution and its effects in South Asia. It is dedicated in creating a common understanding of the status of trans-boundary air pollution and its effects among member countries and collaborating organizations, and for providing useful inputs for the assessment of air quality in the region and that this understanding will provide scientific basis for the steps taken to tackle problems brought about by air pollution. Hence, acknowledging that information on the outcome of monitoring activities is made known only through monitored data. It is very important that uniform and regular monitoring of air pollutants be carried out by all the participating countries at the selected locations and the results be compiled in a systematic database.

In analysing air pollutants there are two mechanisms that should be understood, which are wet and dry deposition. The transport of atmospheric gases and particulate matter (aerosols) and adsorption by the Earth's surface (land surfaces, plant surfaces, building surfaces, water surfaces), without the mediation of precipitation is known as the dry deposition, while dissolution of these species in clouds, fog, rain or snow and eventually rain out or wash out by the falling rain or snow is known as the wet deposition.

The proportion of wet and dry deposition can vary with location and time and related largely with the meteorological conditions. Wet deposition is responsible for 30-50% of deposition fluxes to ecosystems in South Asia. Precipitation chemistry measurements provide information on the exchange of trace materials between the atmosphere and the earth's surface. Dry deposition accounts for 50-70% of total deposition fluxes to the ecosystem. It is therefore important to monitor dry and wet deposition to obtain a complete evaluation of the total deposition in a region, which is necessary for the assessment of the effects of the atmospheric pollution.

One of the goals of the Malé Declaration Network is to provide high-quality data and other information on wet and dry deposition and its composition to the Malé Declaration participating countries. Data from the monitoring stations in each of the eight countries is now being produced quite regularly.

This report presents the data generated by the participating countries over the last five years with a goal to share the results of monitoring as well as to evaluate the data generated specially with respect to trends if any. This report provides an important basis for a common understanding of the present status of monitoring the environment in the countries as well as matters needing future attention.

1.3 MONITORING LOCATIONS

Each of the participating countries has identified monitoring locations that satisfy the criteria given for the establishment of a monitoring site such as it should be located in remote areas away from factors of direct influence among others. The details of the monitoring site in each participating country are presented in Table 1-2.

Table 1-2 Details of Monitoring Locations

S No	Country	Site Type	Location	Longitude Latitude	Remarks
1	Bangladesh	Rural	Kulna	22° 18.975' N; 89° 02.607'E	About 30 km North to the Sundarbans forest.
2	Bhutan	Remote	Gelephu	27°0'N; 90°30'E	350m above sea level close to Jigme Singye Wangchuk National Park and Manas National park
3	India	Rural	Port Canning	22°15'N 88°40'E,	Average annual rainfall: 1750 – 1800 mm Dominant wind direction: N/NE during winter and S/ SW in summer close to Sundarbans
4	Iran	Rural	Chamsari	32° 24'N, 47°31'E	40 km south to the town of Dehlaran and about 200 km south to Ilam, the headquarters of the province
5	Maldives	Remote	Hanimaadhoo	6.78N, 73.18E	Altitude: ~2 m Located in the northernmost atoll of Maldives located about 400 km to the north of the country's capital, Malé.
6	Nepal	Rural	Rampur	27° 38'N; 84° 20'E	At the premises of the Institute of Agriculture and Animal Sciences (IAAS) located about 15 km to the south of the Royal Chitawan national park. Altitude: 164.95 m
7	Pakistan	Rural	Bahawalnagar	29° 57'N; 73° 15'E	Located within the compound of the meteorological observatory at Bahawalnagar, province of Punjab.
8	Sri Lanka	Remote	Dutuwewa	08° 20.952' N; 80 45.751'E	Remote site, in a forest in the north-central part of Sri Lanka

In order to ensure the ownership of the programme, the NIAs were given complete freedom selecting the site with the technical guidance from the Monitoring Committee (MoC). The local communities and the village heads were also consulted during the site selection in most of the countries. The details of the selected site location in some of the countries are given below:

Bangladesh

Figure 1-2 and Figure 1-3 show the installation of passive (diffusive) samplers and bulk sampler at the Bangladesh monitoring site. Figure 1-4 gives the wind rose for the meteorological data available for 2008.

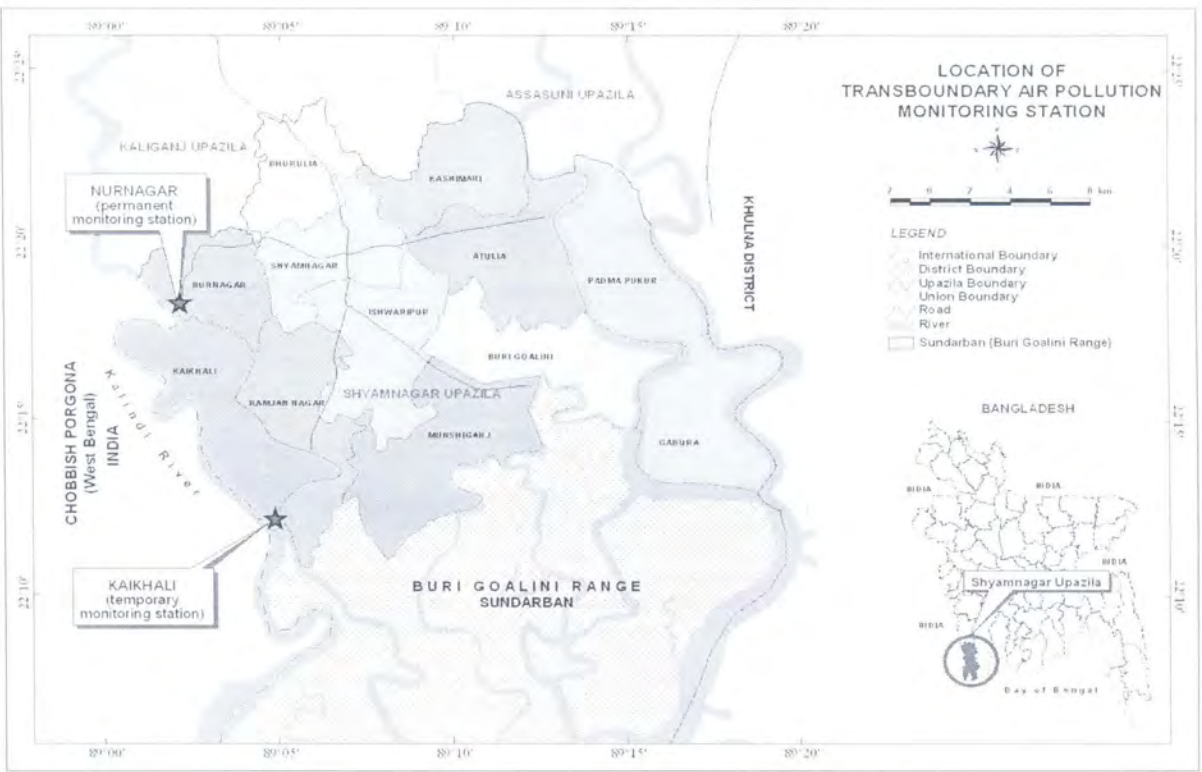


Figure 1-2 Site for monitoring location, Bangladesh

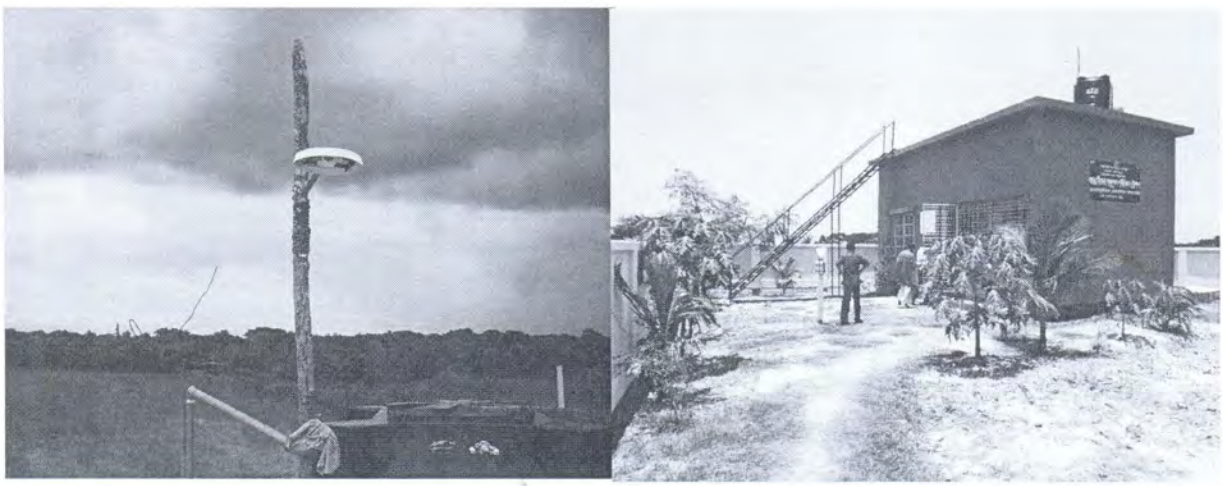


Figure 1-3 Diffusive (Passive) Sampler; Station with bulk sampler

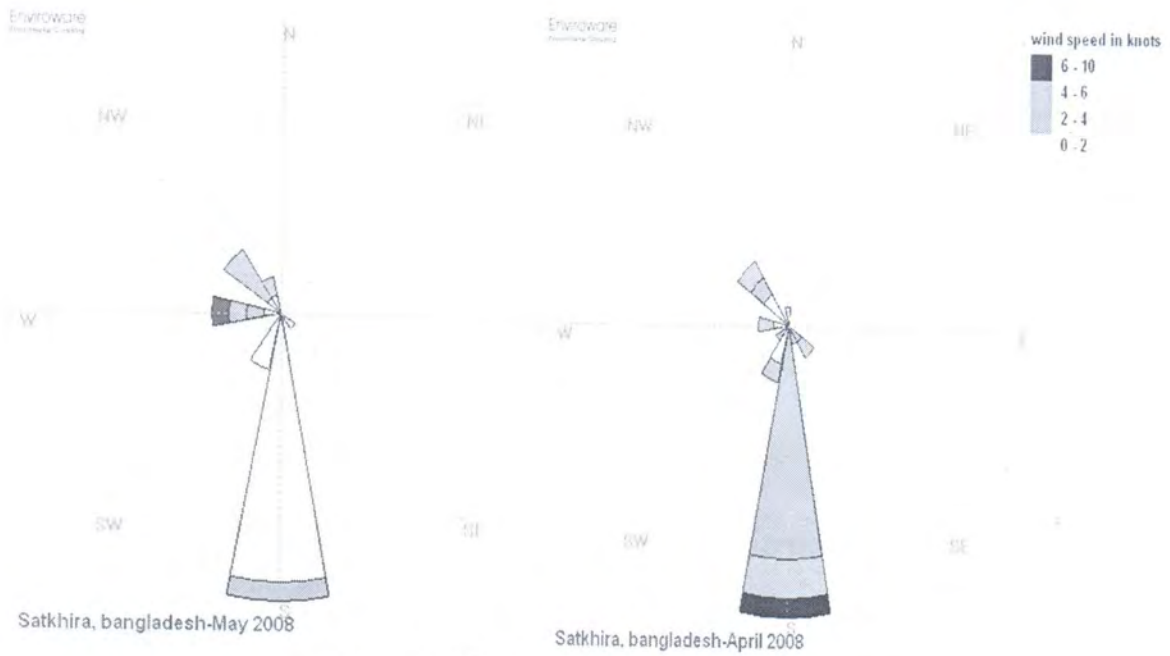


Figure 1-4 Wind rose for met station, Bangladesh

Bhutan

The detailed locations of the monitoring sites in Gelephu, Bhutan are presented in Figures 1-5 and 1-6.

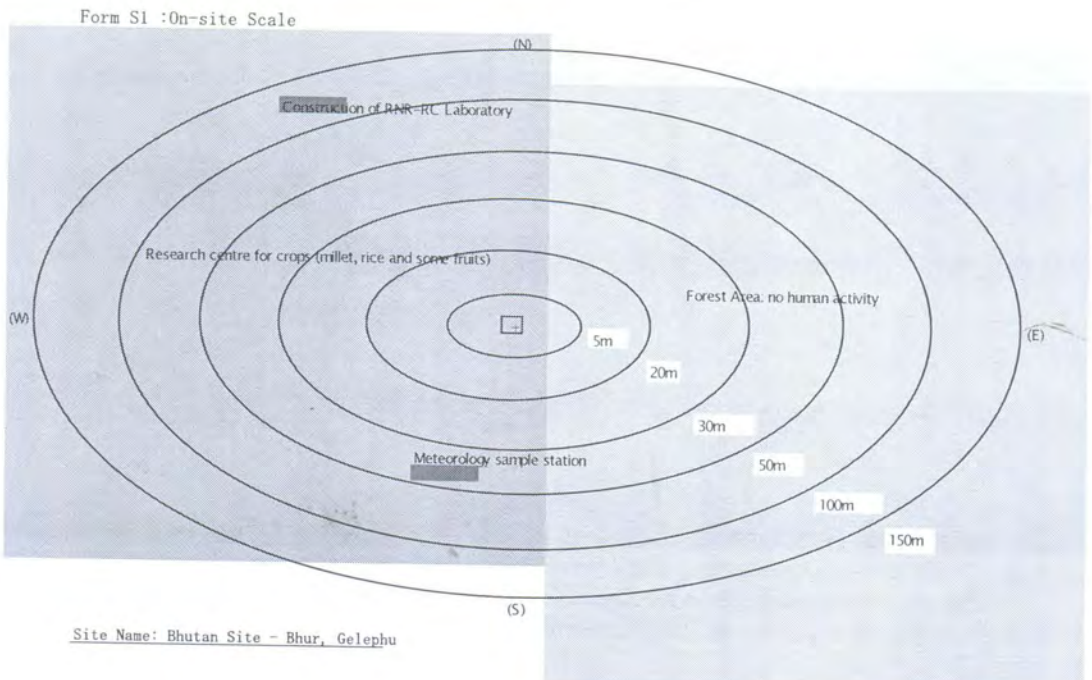


Figure 1-5 Urban site – Bhur, Gelephu – Bhutan

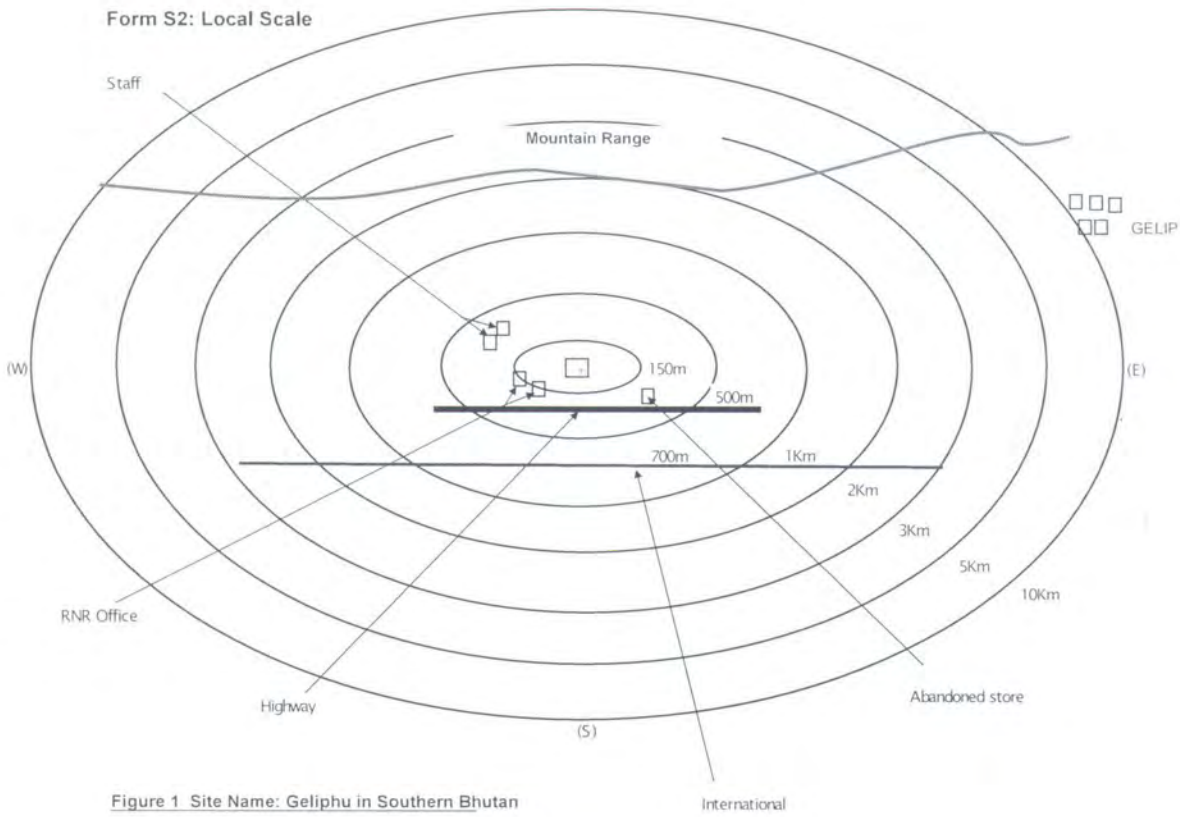
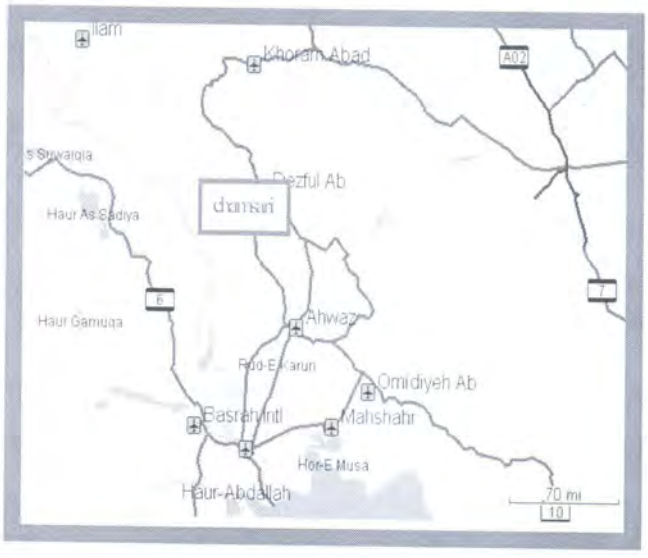


Figure 1-6 Gelephu in Southern Bhutan

Figure 1-7 Wet monitoring, Bhutan

Iran

Iran's first monitoring station is located at Chamsari, near to the Iraq border, in the southern part of Ilam Province. A map of the monitoring site and its surroundings is provided in Figure 1-8. Chamsari is located 40 km south of the town of Dehlaran and about 200 km south of Ilam.



Chamsari is known to be a deposition-monitoring site that was established in a military area. There are two small villages at a distance of 5-7 km to the north and northwest of the monitoring site respectively. The villagers utilize liquefied petroleum gas (LPG) for cooking and there were no occurrences of biomass burning reported within the villages. Additionally, Two Oil wells located approximately 12 and 15 km, to the north and south of the site, respectively. The oil wells are equipped with flares.

Lastly, there are no meteorological stations within a 50 km radius of Chamsari. Summer temperatures at the site exceed 50°C.

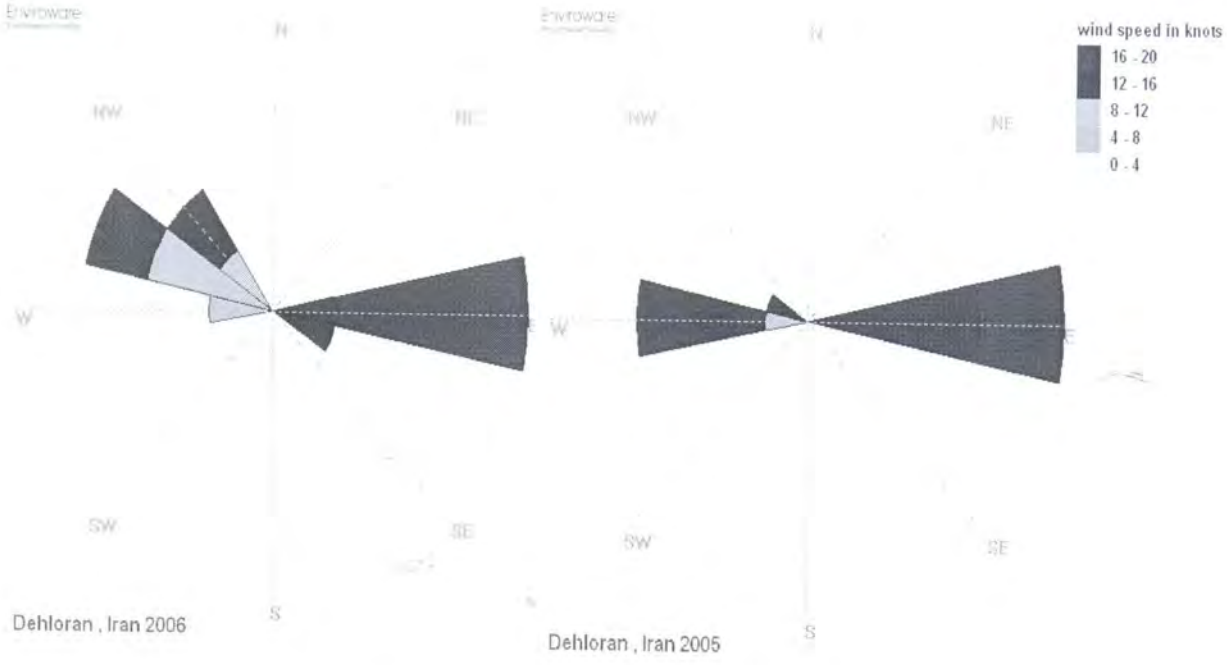


Figure 1-9 Wind rose for met station, Iran

Maldives

The monitoring station in Maldives, where wet and dry deposition can be done, is located in the northern tip of Hanimaadhoo Island, which is about 5 km in length and half a kilometer at its widest point, and about 400 km north of the country's capital Malé. It has the same location for the monitoring of Atmospheric Brown Cloud (ABC). A map of the monitoring site and its surroundings is presented in Figure 1-10.

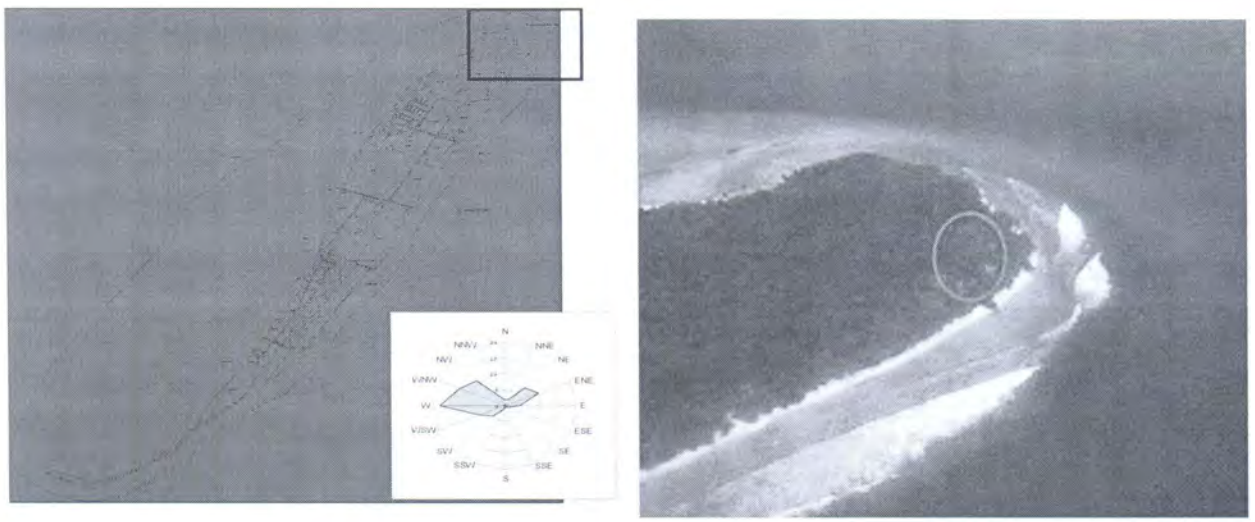


Figure 1-10 Site for monitoring location, Maldives

Evidently, the island has a thick vegetation cover including the areas between the village and the monitoring station. The island has an airport and a daily air service from Malé which is also equipped with a meteorological station. The meteorological station monitors wind direction and speed, relative humidity, temperature and pressure.

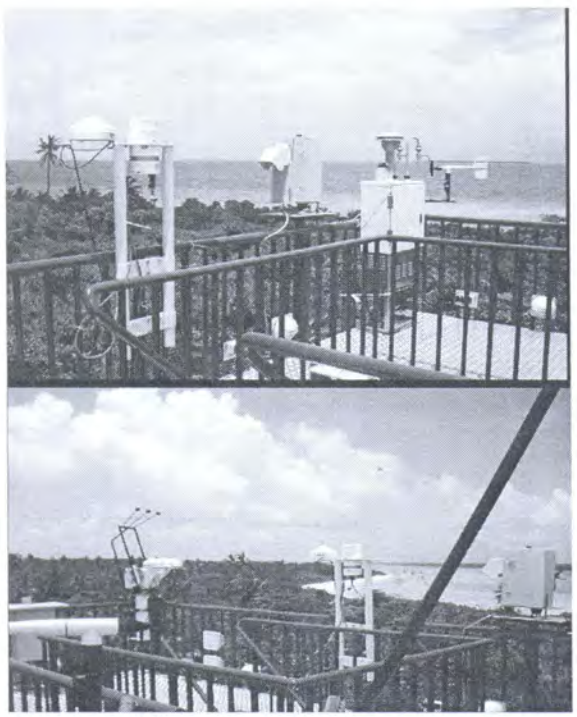


Figure 1-11 Sampling at Maldives monitoring site

Small village with a population of 800 persons located between the airstrip and the monitoring station is situated about 1.5 km north of the village.

The villagers use LPG as a source of energy for cooking and there were no biomass burning reported in the villages on the island.

There is a diesel generator power station of 400 kW capacity located in the village. The stack height of the power station is 20 m and below the tree-line.

Though other uninhabited islands that had no anthropogenic interferences are available, transport costs to such islands is extremely expensive. Thus, Hanimaadhoo Island was a practical choice for this purpose.

Nepal

The IAAS campus was chosen to be the location of the monitoring station. The IAAS campus is located about 15 km. south of the Royal Chitwan National Park and about 25 km north of the Indian border.

The maps of the monitoring site and its surroundings are presented in Figure 1-12 and 1-13. The site is bounded by two roads which lies outside the campus and which have vehicular traffic. The campus has internal roads, but with little vehicular traffic. The site is in the midst of experimental agricultural farms of IAAS.

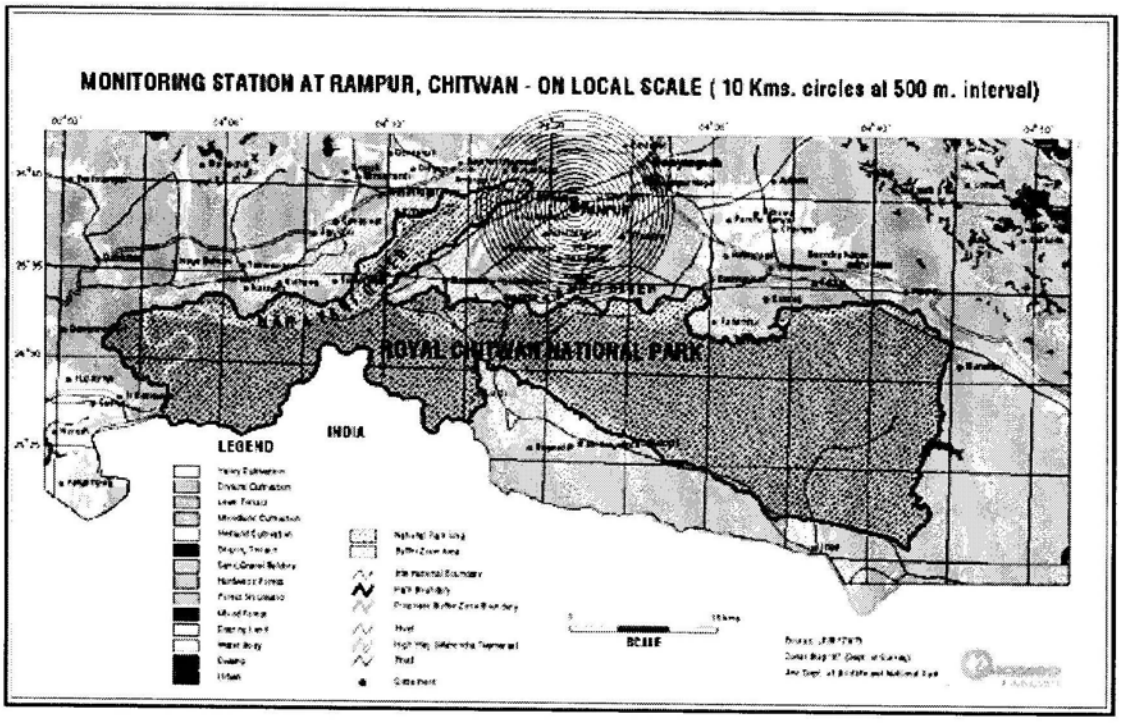


Figure 1-12 Site for the monitoring station - Nepal

The IAAS site is a deposition-monitoring site. It is situated close to the Indian border. The site is in a broad downwind direction from major power plants in India. There is no forest between the site and Indian border, nor is the forest too close to the site. The site is not influenced by local meteorological conditions. The terrain between the site and the international border is flat land. Lastly, it is secure and easily accessible as a result, sampling analysis has minimal time gap since the collection and analysis is done on campus.

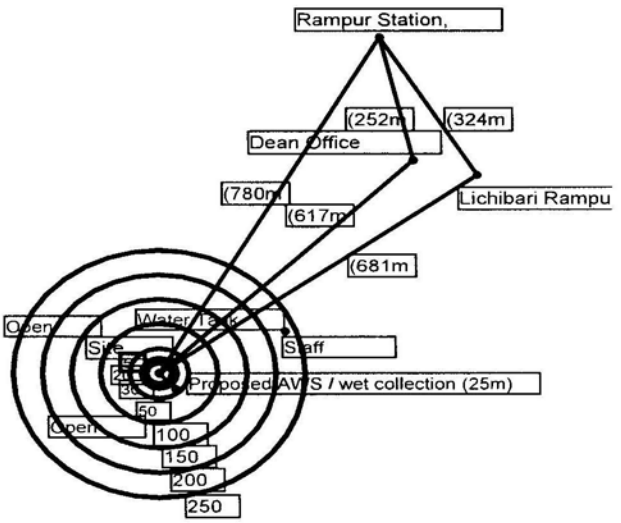


Figure 1-13 On Site Scale (5m-250m) - Nepal

Pakistan

The boundaries of Bahawalnagar District touches the Indian territory in the East and South while Bahawalpur district lies on its West and river Sutlej flows on its Northern side across which districts Okara, Pakpattan and Vehari are situated.The distance of International Border is about 10 Km from the monitoring site.

The monitoring station is within the compound of the meteorological observatory at Bahawalnagar. The observatory is located at the edge of the town where there are few residential and commercial buildings. The area is mostly open; there are no high rise buildings or trees. While the ambient air environment cannot be taken to be totally free of human activity, the site can be considered suitable. It has the advantage of security and easy accessibility. The Meteorological Station records pressure, temperature, cloud cover, humidity, hourly wind and rain (bulk), using conventional standard equipment.

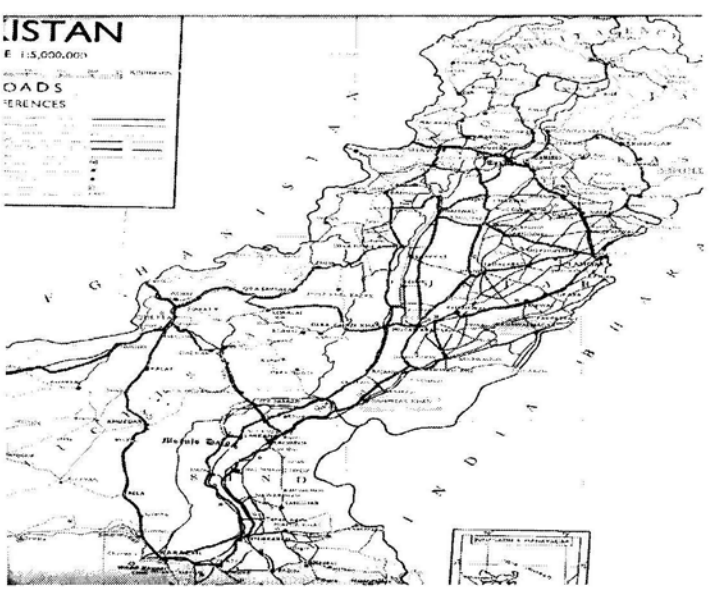


Figure 1-14 Monitoring location Bahawalnagar, Pakistan

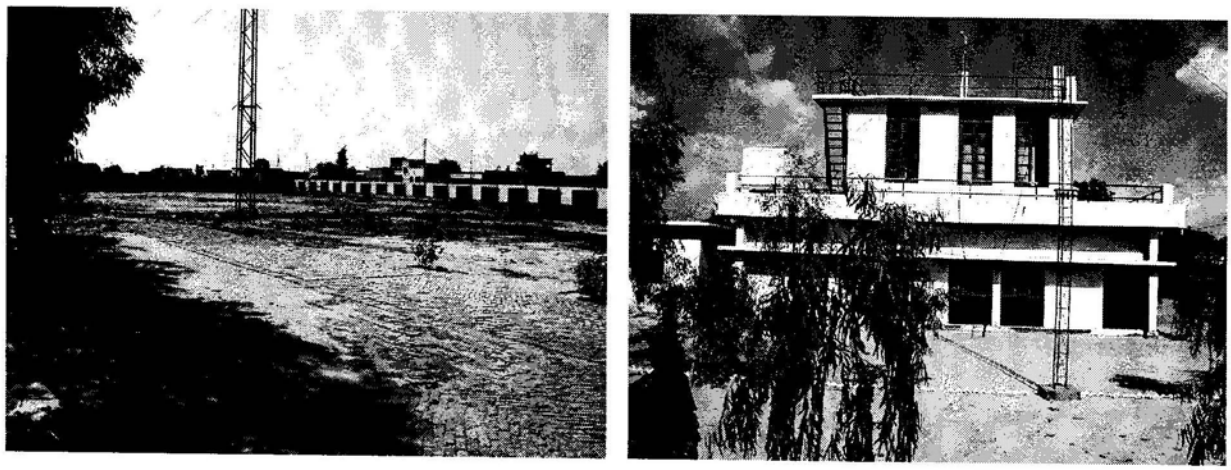


Figure 1-15 Photographs of Bahawalnagar site

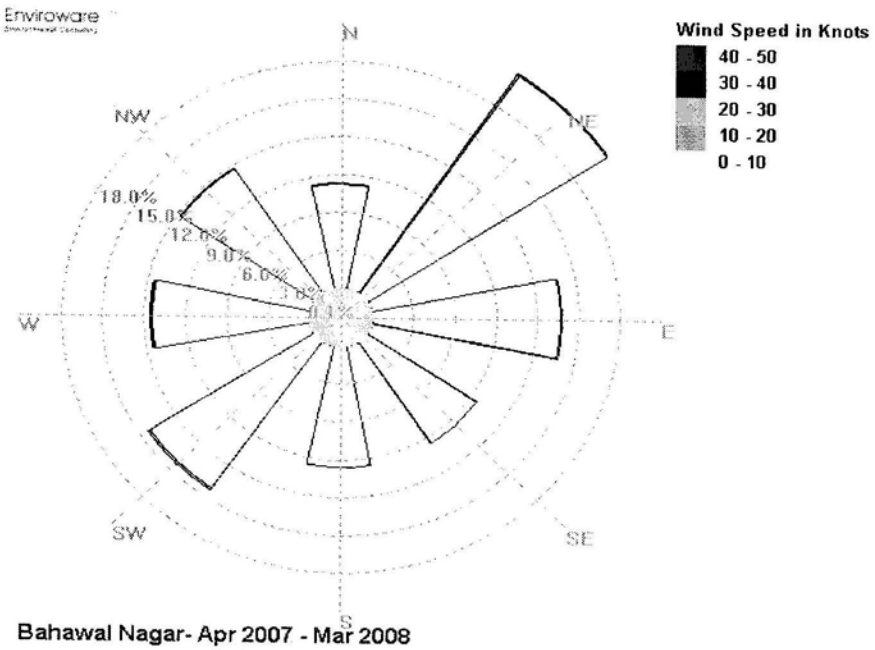


Figure 1-16 Annual average wind rose for Bahawalnagar met station, Pakistan

Sri Lanka

The deposition-monitoring site is on a bald hillock on the edge of a forest. There is no human habitation close to the site except for a small Buddhist monastery. The monks from the monastery have taken the responsibility of providing security for the monitoring equipment. The road to the site is a little-used track. The closest highway is about 15 km from the deposition monitoring site. A thick forest lies between the deposition monitoring site and the highway.

The ecological monitoring site is approximately 5-7 km away from the deposition monitoring site. It is located in another part of the forest. However, the road connecting the deposition and the ecological monitoring sites passes through human habitation.

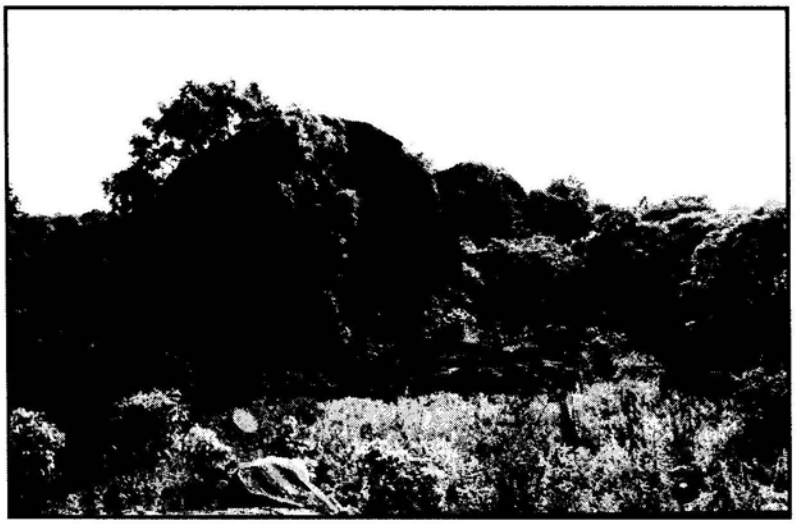


Figure 1-17 Site for monitoring station – Sri Lanka

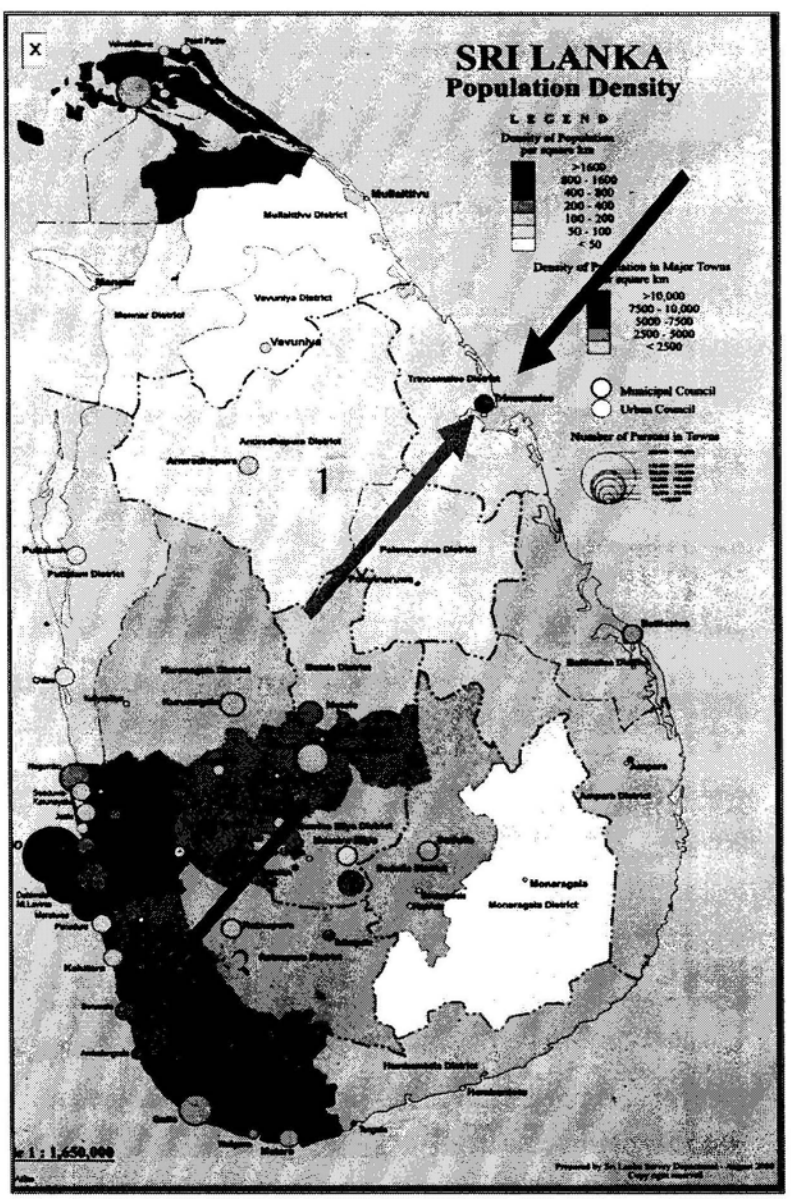


Figure 1-18 Monitoring site of Dutuwewa

CHAPTER 2 MONITORING PROGRAM

The following monitoring parameters and methodologies were identified under the measurement protocol developed for each of the monitoring locations. Based on the finalized methodologies, the participating countries were provided with equipment, glassware and chemicals. The methodologies were broadly grouped into the following:

- Wet Deposition Monitoring,
- Dry Deposition Monitoring, and
- Collection of Meteorological data

2.1 WET DEPOSITION MONITORING

A large number of chemical released from natural or anthropogenic sources are present in the atmosphere in the form of gases or aerosols. These are absorbed by the rain droplets and snow on their way to the earth. Natural sources of pollution may broadly include sea salt, eroded earth material and biogenic activities while fossil fuel combustion and agricultural emissions are the major anthropogenic sources. The composition of the rain water depends on the chemical species that are dissolved in it. This gives a fair idea on the status of air quality in a region; thus, it is imperative to monitor the wet deposition and its characteristics.

To obtain uniformity and high quality monitoring data a protocol was developed and each participating country was required to carry out the wet deposition monitoring using the two common methodologies which are in the "Technical Document for Wet and Dry Deposition Monitoring for Malé Declaration". This document was provided to the concerned people during the in-country training programmes.

Figure 2-1 Learning rainwater sampling

Under the wet monitoring, the weekly composite samples that are collected by two methods that analyses the same parameters as indicated in Table 2-1.

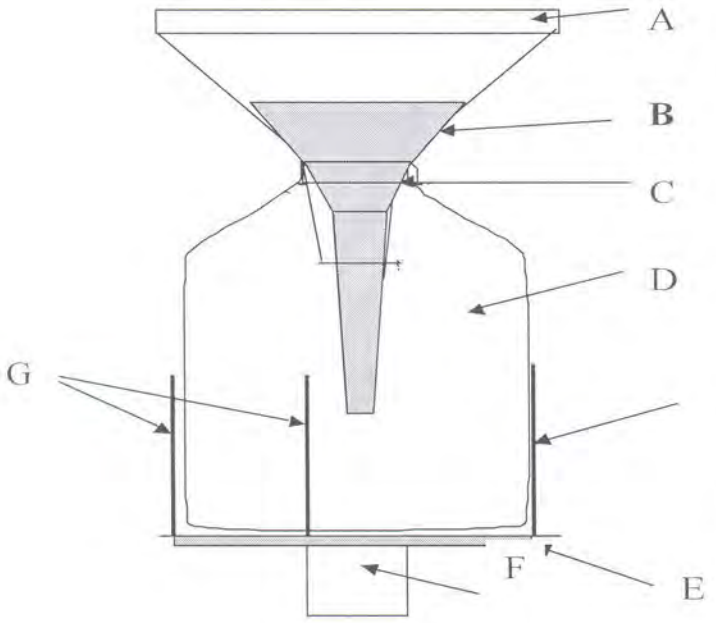
Table 2-1 Parameters for Wet Measurements

S No	Method	Duration/Frequency	Parameters
1	Wet-only Collector Method	Weekly composite	H^+(pH), electrical conductivity (EC), concentration of ammonium, sodium, potassium, magnesium, chloride, sulphate, nitrate (NH_4^+,Na^+,K^+,Mg^{2+},Cl^-,SO_4^{2-},NO_3^-), precipitation
2	Bulk Collector Method	Weekly composite	H^+(pH), EC, concentration of NH_4^+,Na^+,K^+,Mg^{2+},Cl^-,SO_4^{2-}, NO_3-, precipitation

The wet-only and bulk samplers are recommended methods for the sampling of precipitation. Samples collected are sent to laboratories for chemical analysis. For the wet deposition samples collected in a tropical region, a preservation of samples from microbial decomposition has to be considered. Biocides such as Thymol are added for that purpose when a refrigerator is not available during sampling, transportation and storage. Samples without biocides are refrigerated to keep the sample temperature low enough to preserve the sample chemistry, and sent to the laboratories for further chemical analysis. The analytical methodologies are also given in the Technical Document.

At each site one sampler for bulk precipitation was located. Precipitation samplers (Standards for Swedish deposition monitoring) were placed in an open field area. Windy places were avoided as much as possible.

The equipment (Figure 2-2) consists of a funnel (A) (diameter 20.3 cm). Within this large funnel, a smaller funnel (B) containing a screen is placed to protect the sample from litter and evaporation. The sample is collected in a 5 L bottle (D). The sampling equipment is placed on a pole (F) equipped with a plate (E), approximately 1.5 m above the ground.



(A): Funnel of polyetene ca 200 mm dia

(B): Inner funnel of polyetene with small opening.

(C): Cap, leakage free connection.

(D): Polyetene bottle (5L)

(E): Bottom plate fastened onto the pole.

(F): Pole of wood (50x50 mm) length ca 110 cm above ground.

(G): Four rods to keep the equipment in place

Figure 2-2 Open field collector for precipitation

Weekly composite rainwater samples were collected with both automated wet-only collector technique and bulk sample collector technique. The countries used wet only sampler to collect samples during rain events only and bulk sampler representing the total deposition during the period. Wet only samples are define as samples taken from wet-only collector and bulk samples are define as samples are taken from bulk collectors. This was done to easily identify the source of samples.

A flow chart for sampling and analysis of the wet deposition samples is shown in Figure 2-3.

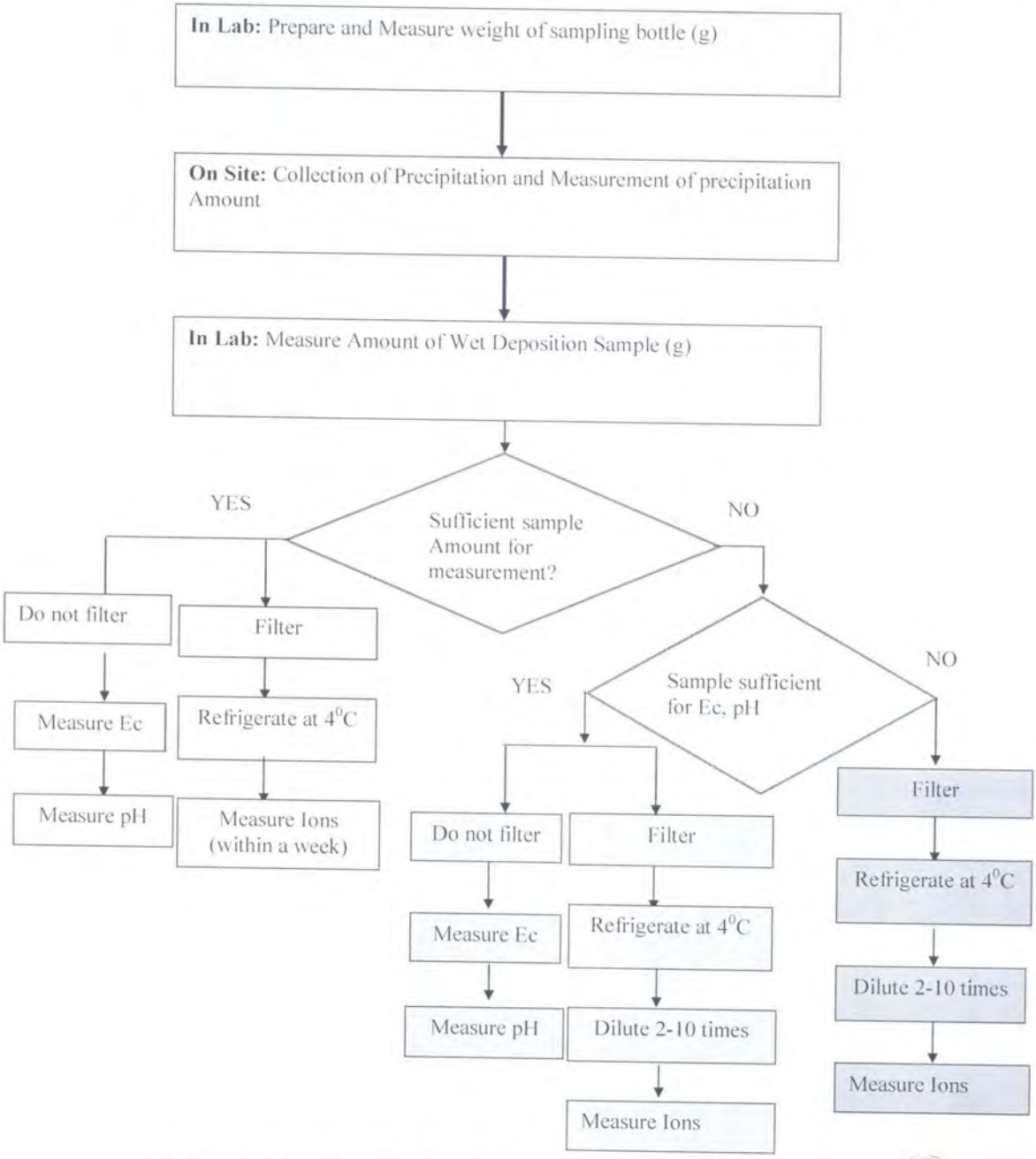


Figure 2-3 Flow chart for sampling and wet analysis deposition

Note: *In case of very low volume of sample the order of measurement should be as follows*

- *SO_4^{2-}, NO_3^- and Cl^-*
- *NH_4^+, Na^+, K^+, Calcium (Ca^{2+}) and Mg^{2+}*
- *If IC is being used, NH_4^+, Na^+, K^+, Ca^{2+} and Mg^{2+}*
- *If no IC is used, NH_4^+ by spectrophotometry, Na^+, K^+, Ca^{2+} and Mg^{2+} by AAS*

Bangladesh, Bhutan, Iran, Nepal, Pakistan and Sri Lanka have submitted the rainwater analysis data from their monitoring site. A perusal of Table 2-2 indicates that the sampling frequency is different for most of the countries. The samples were collected on a daily basis at two sites (Bhutan and Bangladesh); weekly collection is performed at the site in Sri Lanka, monthly collection and analysis at Nepal and random collection at Pakistan site.

Table 2-2 Sampling Frequency for Wet Deposition Monitoring using Wet-only-collector and Bulk collector

S No	Country	Name of site	Characteristics of sites	Sampling Interval	Sampling Months
1	Bangladesh	Kaikhali Forest station, Shamnagar, Satkhira	Remote	Daily	2004: Jul, Oct 2005: Aug, Sep, Oct 2006: Apr, Jun 2007: May, Jul, Aug
2	Bhutan	Bhur, Gelephu	Remote	Daily	2003: Jul, Aug, Sep, Dec 2004: Jan, Feb, Aug, Dec
3	Iran	Chamsari, Ilam	Remote	Weekly	2004: Nov, Dec 2005: Jan, Nov, Dec 2006: Jan, Feb, Oct, Nov, Dec 2007: Jan, Feb
4	Sri Lanka	Dutuwewa	Remote	Weekly	2003: Nov, Dec 2004: Jan to Jul
5	Nepal	Rampur	Rural	Monthly	2006: Jul to Dec 2007: Jan to Aug
6	Pakistan	PBO Bahawal Nagar	Rural	Random	2007: Feb

2.2 DRY DEPOSITION MONITORING

Dry Deposition monitoring was carried out by two methods described in the following sections:

1. High Volume Samplers (HVS)

Figure 2-4 Learning rainwater air sampling

HVS were used to monitor sulphur dioxide (SO_2), nitrogen dioxide (NO_2), Particulate matter < 10 µm in diameter (PM_{10}) and suspended particulate matter (SPM). Two 12-hourly samples were required to be collected each day to get a 24 hours average. Monitoring was carried out for 10 days between 5-25th of each month. The samples from HVS were analyzed in their respective laboratories using suitable analytical methods such as gravimetric for PM and spectrophotometric for SO_2 and NO_2.

2. Passive (Diffusive) Samplers

Passive (diffusive) samplers were used to collect monthly composite samples of SO_2, NO_2 and ozone (O_3). The samples collected with passive (diffusive) samplers were repacked in their containers at the

end of sampling interval and sent to Swedish Environmental Research Institute Ltd. (IVL) for analysis. The start and end of the sampling period were recorded.

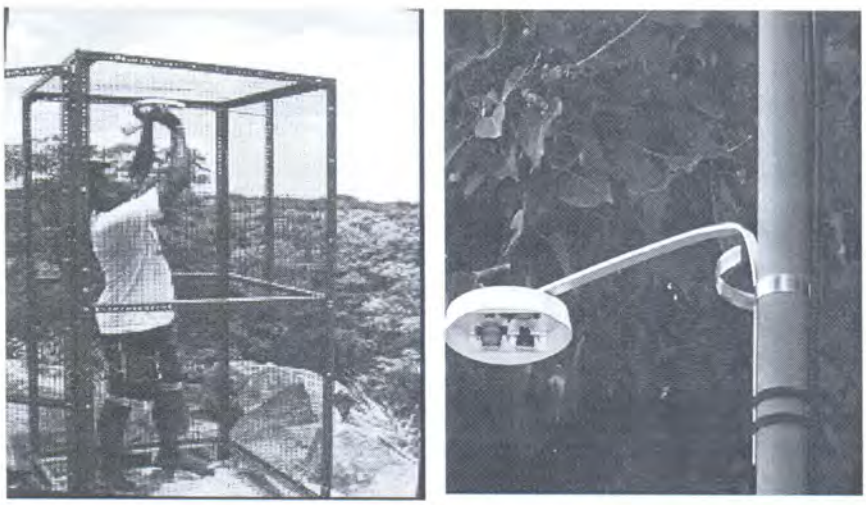


Figure 2-5 Passive (Diffusive) samplers at a Malé station

Under the dry measurements, the monitoring was required to be carried out by two methods for the parameters in the Table 2-3 below:

Table 2-3 Parameters for Dry Measurements

S No	Method	Duration/Frequency	Parameters
1	Passive (Diffusive) Sampling	Monthly composite	Concentration of SO_2, NO_2,and O_3
2	Air concentration Sampling (Using HVS)	24hr composite(consisting of two samples – 9am to 9pm and 9pm to 9am) to be carried out for 10days in a month between 5th and 25th of each month	Concentration of PM_{10}, NRSPM, TSPM, SO_2 and NO_2

Note: *PM_{10} – PM of 10μm or less particulate size (respirable PM)*
NRSPM – non respirable PM
TSPM – total SPM

2.3 ANALYTICAL PROCEDURES

The procedures suggested for analysis of the major constituents of rainwater is given in Table 2-4.

Table 2-4 Techniques suggested for analysis of major constituents in rainwater

S No	Parameter	Instrumental Method
1	EC	Conductivity meter
2	pH	pH meter (glass electrode)
3	Cl^-	Ion chromatography or Argentometric method
	NO_3^-	Ion chromatography or Cadmium reduction method Spectrometry
	SO_4^{2-}	Ion chromatography or turbidimetry
4	NH_4^+	Ion chromatography, Spectrometry
5	Na^+	Ion chromatography, atomic absorption spectrometry (AAS), Flame photometry
	K^+	Ion chromatography, AAS, Flame photometry
	Ca^{2+}	Ion chromatography, titrimetry (EDTA method)
	Mg^{2+}	Ion chromatography , titrimetry (EDTA method)

Rainwater analysis for pH and EC was recommended in addition to the concentrations of anions (SO_4^{2-}, NO_3^-, Cl^-) and cations (NH_4^+, Ca^{2+}, Mg^{2+}, K^+ and Na^+). The analytical methods given above are typical for the analysis of precipitation samples with the instrumentation commonly available in many laboratories.

2.4 METEOROLOGICAL MEASUREMENTS

The participating Malé countries were required to collect and submit the meteorological data along with the monitoring data regularly. Meteorological parameters (wind direction/speed, temperature, relative humidity, precipitation and solar radiation) in relation to wet deposition were to be measured at the site. However, it was decided that instead of setting up separate meteorological stations, required data could be procured from the nearest meteorological station in accordance with the measurement frequencies and methods of the meteorological monitoring system of each country.

2.5 DATA MANAGEMENT

Analytical data of precipitation samples were submitted by the participating laboratories to NIAs. Then each one of them had submitted the data to Malé Secretariat. Thereafter, the MoC members held a discussion with each of the NIAs at the refresher course training which is held every year. After discussion, Secretariat compiled and stored the monitoring data on the website. The data is accessible only for the participating country of NIAs.

CHAPTER 3 RESULTS

3.1 AIR QUALITY

Air pollutants as present in the form of ***gases*** and finely divided ***solid*** and ***liquid*** aerosols. *Aerosols* are loosely defined as "any solid or liquid particles suspended in the air". Air pollutants are generally *primary* and *secondary* in nature.

Primary air pollutants are emitted directly into the atmosphere by the sources such as power-generating plants.

Secondary air pollutants are formed as a result of reactions between primary pollutants and other elements in the atmosphere, such as O_3.

The main air pollutants are,

- Carbon monoxide (CO) - Primary
- SO_2 - Primary
- NO_2 - Primary and Secondary
- O_3 - Secondary
- PM_{10} - Primary and Secondary

SO_2 and nitric oxide (NO) are the primary pollutants, and O_3 is a secondary pollutant (though there are negligible direct emissions of the gas itself). NO_2 is both a primary and secondary pollutant. Other important gaseous pollutants include ammonia (NH_3, CO, volatile organic compounds (VOCs) and persistent organic pollutants (POPs).

SO_2 is an irritant gas that acts in combination with other pollutants; most notably PM. High concentrations of which can affect breathing and may aggravate existing respiratory and cardiovascular diseases. Exposure produces symptoms that include coughing, reduced lung capacity and aggravated lung and cardiovascular. Sensitive populations include asthmatics, individuals with bronchitis or emphysema, children and the elderly. SO_2 is also a primary contributor to *acid rain*, which causes acidification of lakes and streams and can damage trees, crops, historic buildings and monuments. In addition, sulphur compounds in the air contribute to visibility impairment. It is released primarily from burning of fuels that contain sulphur (like coal, oil and diesel). The principal source of SO_2 is industry. Stationary sources such as coal- and oil-fired power plants, steel mills, refineries, pulp and paper mills, and nonferrous smelters are the largest releasers.

Nitrogen oxides (NO_x) include various nitrogen compounds like NO_2 and NO. These compounds play an important role in the atmospheric reactions that create O_3 and *acid rain*. Individually, they may affect ecosystems, both land and water. NO_x forms when fuels are burned at high temperatures and its major contributor of emission from vehicles.

O_3 is the major component of smog. Although O_3 in the upper atmosphere is beneficial because it shields the earth from the sun's harmful ultraviolet radiation, high concentrations of O_3 at ground level is a major health and environmental concern. O_3 levels are generally higher in summer, during hot sunny weather. Concentration of O_3 is usually high in late afternoon. The reason for this is that, O_3 is formed through complex chemical reactions. These reactions are stimulated by ultraviolet radiation and temperature, so peak O_3 levels typically occur during the warmer times of the day and year. The reactivity of O_3 causes health problems because it damages lung tissue, reduces lung function and sensitizes the lungs to other irritants. Scientific evidence indicates that ambient levels of O_3 not only affect people with impaired respiratory systems, such as asthmatics, but healthy adults and children as

well. Exposure from O_3 for several hours at relatively low concentrations has been found out that there is a significantly reduction on lung function and induce respiratory inflammation in normal, healthy people while exercising.

PM is a mixture of particles that can adversely affect human health, damage materials and form atmospheric haze that degrades visibility. It is usually divided up into different classes based on size, ranging from total suspended matter (TSPM) to PM_{10} (in aerodynamic diameter) to $PM_{2.5}$ (particles less than 2.5μm, generally known as fine PM. In general, the smallest particles pose highest human health risks. PM exposure can affect breathing, aggravate existing respiratory and cardiovascular diseases, alter the body's defense systems against foreign materials, and damage lung tissue, contributing to cancer and premature death. Individuals with chronic obstructive pulmonary or cardiovascular disease, asthmatics, the elderly and children are most sensitive to the effects of PM.

PM generally come from combustion processes , wind erosion, sea spray, aberrations etc., and are emitted into the air by sources such as factories, power plants, cars, construction activity, fires and natural windblown dust. It may also contain compounds of heavy metals. Particles formed in the atmosphere by condensation, or the transformation of emitted gases such as SO_2 and VOCs are also considered PM.

3.2 STATUS OF MONITORING

The monitoring data received from the countries is given in Annexure I to III.

DRY MONITORING

The participating countries were required to carry out monitoring by two methods

- HVS
- passive (diffusive) samplers.

Air concentration monitoring data using HVS has been received from four countries; India, Iran, Nepal and Pakistan. The period and parameters for which monitoring was carried out by the participating countries is given in Table 3-1.

Table 3-1 Air Concentration Data Received; Air (H)

S No	Country	Year	Month	Parameters
1	Bangladesh		--	
2	Bhutan		--	
3	India	2004 – 08	Sep 04 -- Mar 08	RSPM, SO_2 , NO_2
4	Iran	2004	Jul, Aug, Sep, Oct, Nov	RSPM, NRSPM, TSPM
		2005	Feb, Mar, Jul, Sep	
		2007	Apr, May, Jun, Jul, Aug	RSPM, NRSPM, TSPM, SO_2, NO_2
		2008	May, Jun	RSPM, NRSPM, TSPM
5	Maldives			
6	Nepal	2003	Apr	RSPM, NRSPM, TSPM, SO_2, NO_2
		2005	Apr, May, Jul – Dec	
		2006	Feb – Dec	
		2007	Jan, Mar, Apr, Nov, Dec	
		2008	Jan, Feb, Mar, Apr	
7	Pakistan	2007	Feb - Dec	RSPM, NRSPM, TSPM
		2008	Jan, Feb, Apr, May, Jun	
8	Sri Lanka		--	

Passive (Diffusive) sampling has been started by all the participating countries. Table 3-2 gives the details of the parameters, period and the frequency for which each of the countries conducted passive monitoring. The passive (diffusive) samplers received are exposed and then sent to IVL for analysis. The analytical data has been received directly from IVL.

Table 3-2 Air Passive Monitoring Data Received; Air (P)

S No	Country	Year	Months	Parameters
1	Bangladesh	2004	Jul, Sep, Oct, Dec	SO_2, NO_2
		2005	Feb, Apr, Jun, Jul, Aug, Sep	
		2006	Mar – Dec	
		2007	Jan – Dec	SO_2,NO_2, O_3
		2008	Jan – Apr	
2.A	Bhutan (Background Site)	2003	Aug – Dec	SO_2, NO_2
		2004	Feb, Apr – Dec	
		2005	Jan, Mar, Apr, Jun, Aug	
		2006	Apr	
		2006	Aug, Sep, Nov	SO_2,NO_2, O_3
		2007	Feb - May, Jul, Aug, Oct, Dec	
		2008	Feb	
2.B	Bhutan (Urban site)	2004	Apr, Jun, Jul, Aug, Oct, Nov, Dec	SO_2, NO_2
		2005	Feb, Apr, May, Jul, Sep, Oct, Nov	
		2006	Jan, Feb, Apr, Jun, Aug, Nov	
		2007	Feb	
3	India	2004	Nov	SO_2, NO_2
		2005	Feb, Mar, Jun – Dec	
		2006	Feb, Mar, Apr, May	
		2006	Jul – Dec	SO_2,NO_2, O_3
		2007	Jan, Feb, May, Jun, Aug, Sep	SO_2, NO_2
4	Iran	2003	Oct	SO_2, NO_2
		2004	Dec	
		2005	Apr -- Aug, Oct – Dec	
		2006	Feb, Apr, May, Jun, Jul	
		2006	Aug – Nov	SO_2,NO_2, O_3
		2007	Mar, Apr, May, Aug, Oct, Nov	
5	Maldives	2003	Aug, Sep, Oct, Nov	SO_2, NO_2
		2004	Jan - Aug, Sep, Nov	
		2005	Jan, Feb, Apr, May, Jun, Oct	
		2006	Jan- Dec	
		2007	Jan – Apr	
		2007	May – Nov	SO_2,NO_2, O_3
		2008	Jan – Apr	

S No	Country	Year	Months	Parameters
6	Nepal	2003	Mar—Dec	SO_2, NO_2
		2004	Mar, Apr, May	
		2005	Jan - Dec	
		2006	Jan – Dec	
		2007	Jan, Feb	
		2007	Mar – Oct	SO_2,NO_2, O_3
7	Pakistan	2005	Jan – Dec	SO_2, NO_2
		2006	Jan – Jun	
		2006	Jul – Dec	SO_2,NO_2, O_3
		2007	Jan, Feb - Apr, Jun – Sep	
8	Sri Lanka	2003	Aug – Dec	SO_2, NO_2
		2004	Jan – Dec	
		2005	Jan – Dec	
		2006	Jan – Jun	
		2006	Jul – Dec	SO_2,NO_2, O_3
		2007	Jan – Dec	
		2008	Jan – Apr	

WET DEPOSITION MONITORING

Wet deposition monitoring using wet-only-collector and bulk collector is being carried out by the countries, which are provided in Tables 3-3 and 3-4 below. The wet deposition monitoring is done in a regular basis on specific parameters depending on the capability and commitment of the country.

Table 3-3 Monitoring Data by Using Wet-only-collector

S No	Country	Year	Month	Parameters	Frequency
1	Bangladesh	2004	Sep, Oct	EC, pH, Precipitation, NH_4^+,Na^+, K^+, Mg^{2+}, Ca^{2+},SO_4^{2-}, Cl^-, NO_3^-	Daily
		2005	Jun – Sep, Dec		
		2006	Jan, Apr, Jun – Dec		
		2007	Jan, May, Jul , Aug		
		2008	Jun		
2	Bhutan	2003	Jul, Aug	EC, pH, Precipitation	Daily
		2007	May –Dec		

S No	Country	Year	Month	Parameters	Frequency
		2008	Jan – Apr		
3	India		-	-	-
4	Iran	2006	Jan, Feb	EC, pH, Precipitation, Na^+, K^+, Mg^{2+}, Ca^{2+}, SO_4^{2-}, Cl^-, NO_3^-	Weekly
		2007	Aug, Sep, Nov, Dec		
		2008	Jan – Apr		
5	Maldives	2005	Jun – Sep, Dec	EC, pH, Na^+, K^+, Mg^{2+}, Ca^{2+}, SO_4^{2-}, Cl^-, NO_3^-	Monthly
		2006	Jan, Jul – Dec		
		2007	Jan		
		2006	Jul – Sep		
6	Nepal	2007	Feb, Aug, Sep, Nov, Dec	EC, pH, Precipitation, NH_4^+, Na^+, K^+, Mg^{2+}, Ca^{2+}, SO_4^{2-}, Cl^-, NO_3^-	Monthly
		2008	Jan - Apr,		
7	Pakistan	2007	Jan, Feb, Apr, May, Jun - Sep, Dec	EC, pH, precipitation	Random
		2008	May		
8	Sri Lanka	2003	Nov, Dec	EC, pH, Precipitation, NH_4^+, Na^+, K^+, Mg^{2+}, Ca^{2+}, SO_4^{2-}, Cl^-, NO_3^-	Weekly
		2004	Jan, Mar – Oct		
		2005	Jan –Apr Aug, Oct, Nov		
		2006	Jan, Apr, Oct, Nov, Dec		
		2007	Apr – Jul		
		2008	May – Jun		

Table 3-4 Monitoring Data by using Bulk collector

S No	Country	Year	Month	Parameters	Frequency
1	Bangladesh	2004 2005 2006 2007 2008	Jul, Aug, Oct Jun – Sep, Dec Jan, Jul – Dec Jan, May, Jul, Aug Jun	EC, pH, Precipitation, Na^+, K^+, Mg^{2+}, Ca^{2+},SO_4^{2-}, Cl^-, NO_3^-	Daily
2	Bhutan	2003 2004 2005	Jul – Oct, Dec Jan, Feb, Aug, Sep, Dec Jan	EC, pH, Precipitation	Daily
3	India		-	-	-
4	Iran	2004 2005 2006 2007	Nov, Dec Jan, Nov, Dec Oct, Nov, Dec Jan, Feb	EC, pH, Na^+, K^+, Mg^{2+}, Ca^{2+},SO_4^{2-}, Cl^-, NO_3^-	- Weekly
5	Maldives	2005 2006 2007	Jun- Sep, Dec Jan, Jul –Dec Jan	Na^+, Ca^{2+},SO_4^{2-}, Cl^-, NO_3^-	Monthly
6	Nepal	2006 2007	Jul – Sep, Nov, Dec Jan – Mar, May, Jun, Jul	EC, pH, Precipitation , SO_4^{2-}, Cl^-, NO_3^-	Monthly
7	Pakistan	2007 2008	Jan, Feb, Apr, May - Sep, Dec Jan	EC, pH, Precipitation	Random
8	Sri Lanka	2003 2004 2005 2006 2007	Nov, Dec Jan; Mar – Oct Jan –Apr Jul, Aug, Oct, Nov Jan, Apr, Oct, Nov, Dec Apr – Jul	EC, pH, Precipitation, NH_4^+,Na^+, K^+, Mg^{2+}, Ca^{2+},SO_4^{2-}, Cl^-, NO_3^-	Weekly

METEOROLOGICAL DATA

There were 3 countries that have presently proving the meteorological data along with wind speed and direction (Table 3-5). These are Bangladesh, Iran and Pakistan. Pakistan has been providing complete data in a regular basis since January, 2007. On the other hand, Bangladesh and Iran only have few available monthly data.

Table 3-5 Meteorological Data

S No	Country	Met. Station	Year	Available wind Data
1	Bangladesh	Kulna	2007 2008	Sep, May, Jul, Dec, Aug May, Apr
2	Bhutan	Gelephu		NA
3	India	Port Canning		NA
4	Iran	Chamsari		2004,2005,2006 Annual Averages
5	Maldives	Hanimaadhoo		NA
6	Nepal	Rampur		NA
7	Pakistan	Bahawalnagar	2007	Apr – Dec
			2008	Jan, Feb, Apr, Jun, May
8	Sri Lanka	Dutuwewa		NA

NA: Not available

3.3 QUALITY ASSURANCE, QUALITY CONTROL AND DATA QUALITY

The conclusions drawn from any data are directly related to the quality of the data received. Thus, Quality Assurance and Quality Control (QA/QC) play a critical role while assessing the data because, "***No Data is better than Data of Unknown or Bad Quality***" as,

- Data is the foundation of any environment(in this case Air Pollution) management plan,
- Data provides information on current status, trends, better insights into science of air pollution,
- Data is crucial in impact assessment, devising science-based policy options and assessment of the effects of various mitigation measures.

Thus, it is essential to have credible data.

With this in mind, extensive QA/QC measures were considered under this programme and a system of flagging the data was developed. The data flags were designed to assist not only in knowing the validity of the data but also the type of errors whether in the field, during sampling or in the laboratory while analysing and reporting the results.

Perusal of the data clearly indicates that all the countries are yet in the process of stabilising/ standardising/ strengthening their sampling, analysis and reporting methodologies and the system of

flagging the data has not been initiated except in a few cases during 2007-08. Thus, while analysing the data, no overemphasis had been given to any particular value. In this process certain results thought to be totally improbable (this is especially true in case of certain Field Blanks found to be very high, in some cases higher than the samples) have been ignored. Monthly and annual averaged values have been used instead of daily or event-wise data to focus on bulk properties and to have an overall view of the status.

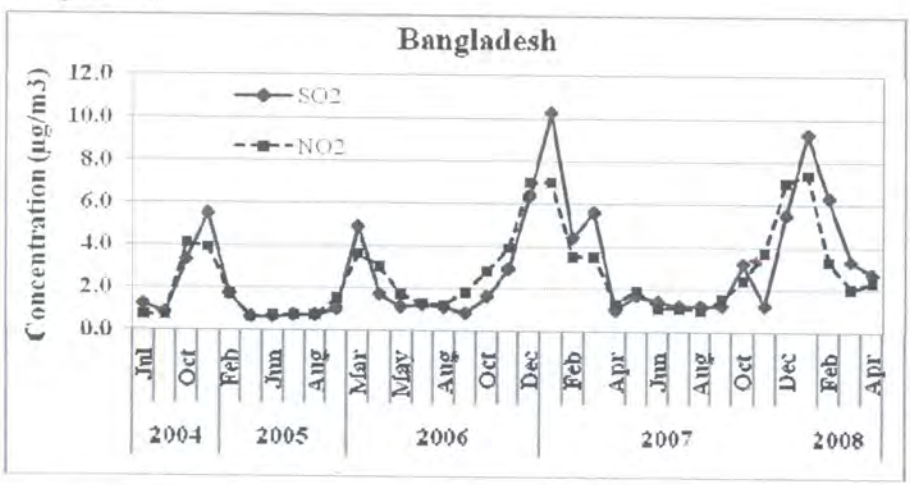
3.4 RESULTS

PASSIVE (DIFFUSIVE) SAMPLING

All the countries have reported the results of ambient air sampling using passive (diffusive) samplers (Annexure III). In general, most of the countries have not been exposing the field blanks in parallel to the samples and in some cases the values of field blanks were found to be very high which could be due to contamination or incorrect labeling, such data has been ignored. In many cases the samplers are sent very late to IVL for analysis as pointed out by IVL in the results conveyed by them. However, most of the countries seem to have become more comfortable with the entire monitoring procedure particularly since 2007 when most of the countries became regular in carrying out the sampling and reporting of results as required.

It is also important that most of the variables remain constant so that the results can be compared. At present this is not practiced as most of the countries are not collecting monthly composite samples (Table 3-2) because the countries are in the process of stabilizing the monitoring requirements. Thus, the interpretation and comparison of results can only be indicative with no emphasis on any particular value. Table 3-8 gives the annual average results of passive (diffusive) sampling.

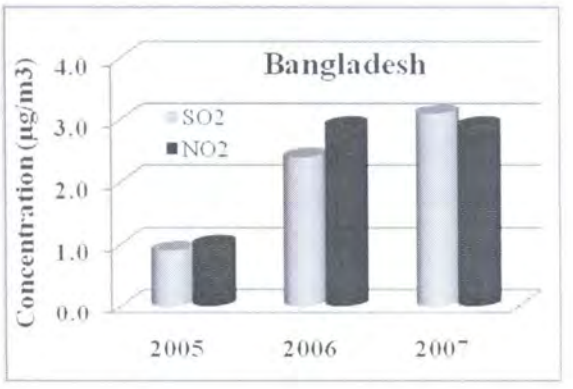
Bangladesh



Bangladesh has reported the results of passive (diffusive) sampling from July 2004 onwards. However, regular monitoring was started only from March 2006. The annual average concentrations in case of 2004-05 were taken for 4 and 6 months respectively.

Figure 3-1 Temporal variation of average SO_2 & NO_2 concentration

The results of 2007 indicates that the maximum monthly average concentration of SO_2 and NO_2 are 10.3 µg/m^3 and 7.0 µg/m^3 respectively (Table 3-6 and 3-7), during the winter months of December-January and the lowest concentrations during June –September during the monsoon season (Figure 3-1 and 3-2). The maximum and the annual average concentration of SO_2 and NO_2 have been increasing over the years. The increase per year is not appreciable.



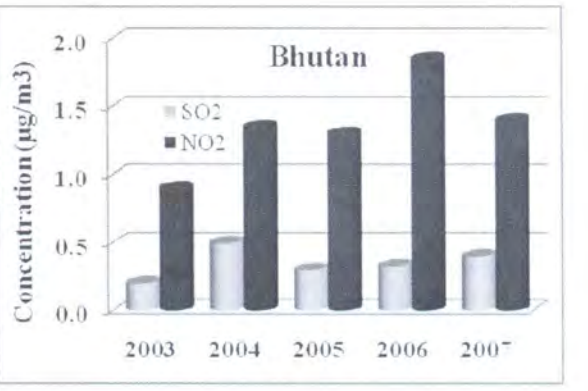


Figure 3-2 & Figure 3-3 Annual variation of SO_2 and NO_2

Bhutan (Background)

Bhutan is conducting passive (diffusive) sampling at two sites namely Bhutan – Background and Bhutan – Urban. The monitoring effort started in 2003. But, the monitoring effort in 2003, 2005, and 2006 has been in selected months, 3-4 month in a year (Figure 3-3 and 3-4).

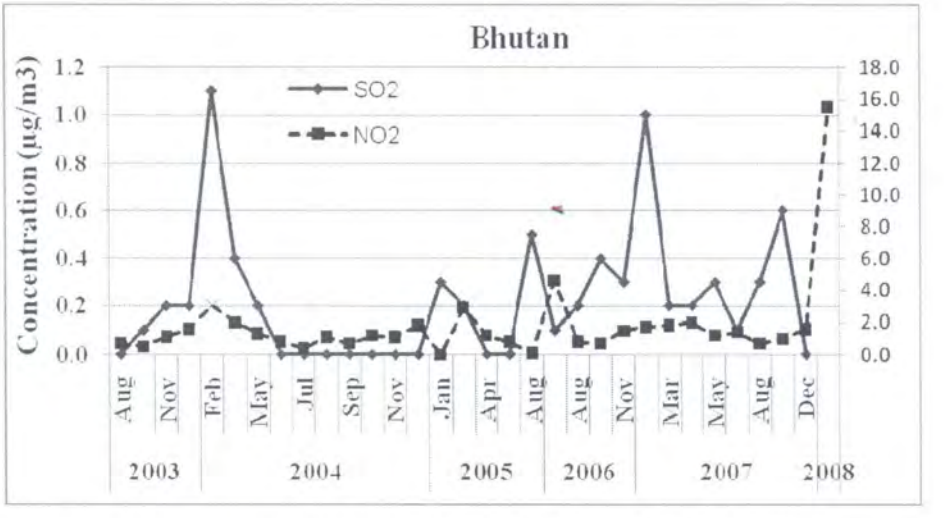


Figure 3-4 Temporal variation of average SO_2 & NO_2 concentration

There is a large difference in the monitoring results between the two monitoring sites. In the Background station, the SO_2 concentrations reported are generally below detection limit (BDL), where the highest concentration is 0.5µg/m^3. The SO_2 concentration at the urban site however varies between 0.3 to 1.5µg/m^3 BDL, slightly higher than the other site. NO_2 concentration is relatively high and the maximum observed values are 4.6µg/m^3. Higher concentrations were observed during winters. Unfortunately, at the moment the monitoring efforts at Bhutan urban station has been discontinued since Feb 2007.

Table 3-6 Annual average concentration of SO2 and NO2 during 2006 – 07.

S No	Country	SO_2 ($\mu g/m^3$)		NO_2 ($\mu g/m^3$)	
		2006	2007	2006	2007
1	Bangladesh	2.4	3.2	2.9	2.9
2A	Bhutan (background)	0.3	0.4	1.9	1.4
2B	Bhutan B (urban)	0.6	*	9.4	*
3	India	6.9	4.1	6.7	5.7
4	Iran	9.9	9.6	1.8	3.3
5	Maldives	0.4	0.4	0.8	0.6
6	Nepal	0.5	0.8	5.8	5.4
7	Pakistan	12.3	6.5**	47.0	16.9**
8	Sri Lanka	0.5	0.5	1.6	1.6

**Station discontinued*
***New Location; results uncertain*

Table 3-7 Concentration of SO_2 and NO_2 during 2007

S No	Country	SO_2 ($\mu g/m^3$)			NO_2 ($\mu g/m^3$)		
		min	Max	avg	min	max	Avg
1	Bangladesh	1.0	10.3	3.2	1.0	7.0	2.9
2A	Bhutan A	0.1	1.0	0.4	0.7	2.0	1.4
2B	Bhutan B			*			*
3	India	1.3	13.0	4.1	2.3	15.2	5.7
4	Iran	5.1	13.6	9.6	0.6	3.8	3.3
5	Maldives	0.2	0.8	0.4	0.3	1.1	0.6
6	Nepal	0.2	3.1	0.8	2.6	8.3	5.4
7	Pakistan	3.7	9.5	6.5**	7.1	60.6	16.9**
8	Sri Lanka	0.3	0.9	0.5	0.8	2.4	1.6

Table 3-8 Annual average concentration of SO_2 and NO_2 – Passive sampling

S No	Value	Year	SO_2 (µg/m^3)	NO_2 (µg/m^3)	O_3 (µg/m^3)
Bangladesh					
1	Annual Avg	2004	2.7	2.4	
		2005	0.2	0.3	
		2006	2.4	2.9	
		2007	3.2	2.9	66.8
Bhutan A					
2 A	Annual Avg	2003	0.2	1.0	
		2004	0.5	1.3	
		2005	0.3	1.3	
		2006	0.3	1.9	31.7
		2007	0.4	1.4	47.6
Bhutan B					
2 B	Annual Avg	2004	1.1	14.8	
		2005	0.9	13.2	
		2006	0.6	9.4	
		2007			
India					
3	Annual Avg	2004	5.5	15.6	
		2005	3.7	6.4	
		2006	7.0	6.3	
		2007	4.1	5.7	54.7
Iran					
4	Annual Avg	2005	9.2	2.4	
		2006	12.8	2.6	93.0
		2007	9.6	1.9	71.3
Maldives					
5	Annual Avg	2004	0.4	0.8	
		2005	1.4	1.1	
		2006	0.5	0.8	
		2007	0.4	0.6	42.4
Nepal					
6	Annual Avg	2004	1.4	7.2	
		2005	0.7	6.2	
		2006	0.6	5.8	
		'2007	0.8	5.4	37.1
Pakistan					

S No	Value	Year	SO_2 (µg/m^3)	NO_2 (µg/m^3)	O_3 (µg/m^3)
7	Annual Avg		14.6	49.0	
			12.3	47.0	26.8
			6.5	16.7	57.6
Sri Lanka					
8	Annual Avg	2003	0.7	1.9	
		2004	0.5	1.6	
		2005	0.5	1.7	
		2006	0.5	1.6	32.5
		2007	0.5	1.6	26.7

India

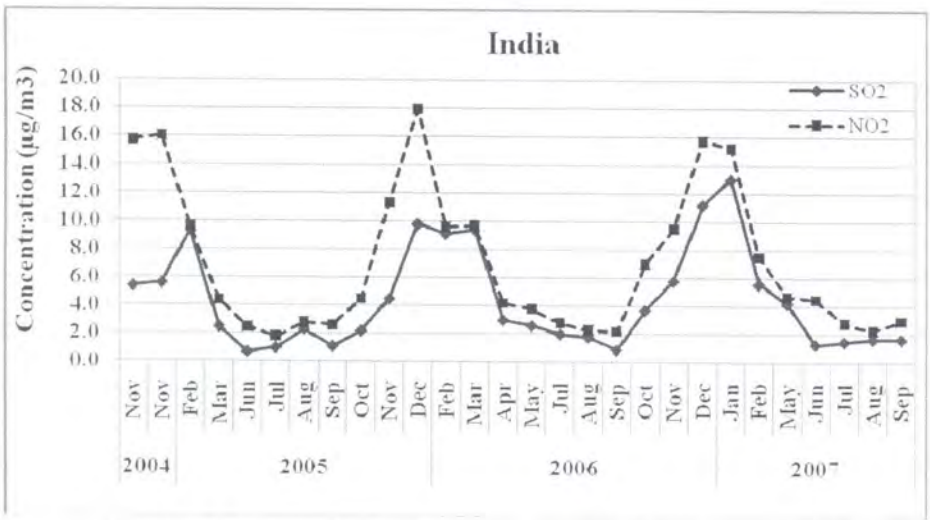
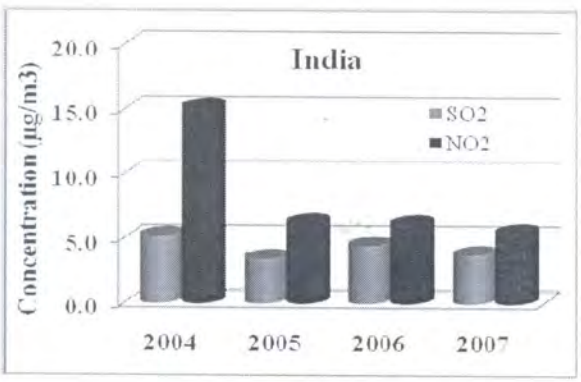


Figure 3-5 Temporal variation of average SO_2 & NO_2 concentration

In the case of India, the annual average concentration of SO_2 varies between 3.7µg/m^3 to 5.0 µg/m^3 . The concentration is generally high during winters (Figure 3-5 and 3.6). The highest concentration (13.0 µg/m^3) were observed in the months of December to January. The annual average concentration of NO_2 lies between 5.7 to 6.3 µg/m^3 having the maximum concentration of 15.7 and 15.2 µg/m^3 which were observed in December 2006 and January 2007 respectively (Table 3-8). However, the concentrations observed during 2007 are lower than those in 2006.



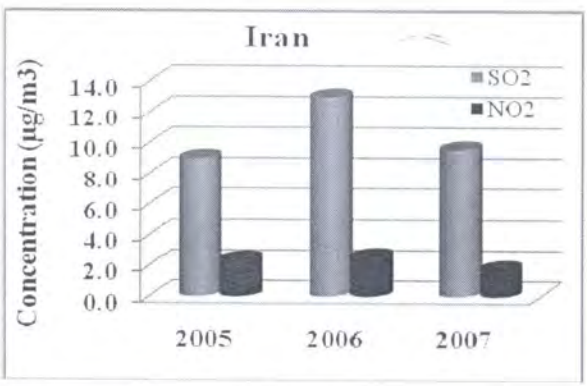


Figure 3-6 and Figure 3-7 Annual average concentration of SO_2 and NO_2

Iran

Figure 3-8 Temporal variation of average SO_2 & NO_2 concentration

The concentration of SO_2 observed in Iran was at the range of 17.3 to 3.5 µg/m^3 in 2005; 22.3 to 7.2 µg/m^3 in 2006 and 13.6 to 5.1µg/m^3 in 2007, with the lower concentrations generally corresponding with the monsoon period of the country. Annual average SO_2 concentration varies between 9.2 and 12.8µg/m^3. The 2007 concentration is not necessarily higher because the data is only taken for four months. On the other hand, the NO_2 concentration is very low with an annual average concentration varying between 1.9 to 2.6 µg/m^3.

Maldives

Maldives started the monitoring in 2003; and became regularly done from 2006 onwards. The concentrations of SO_2 and NO_2 from Table 3-8, Figure 3-9 and 3-10 shown to be very low in the area. The maximum observed concentration of SO_2 and NO_2 were 2.7µg/m^3 and 1.8µg/m^3 respectively, during the same month.

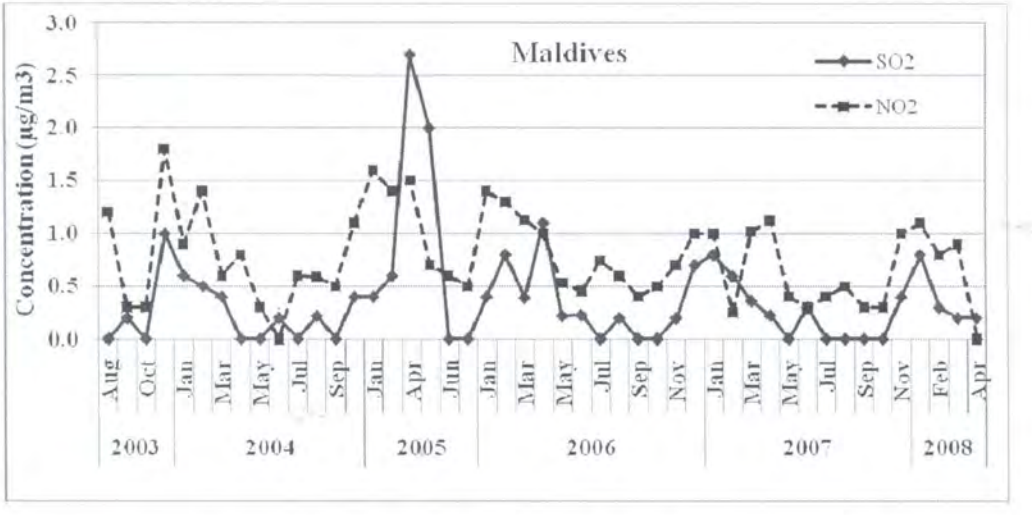
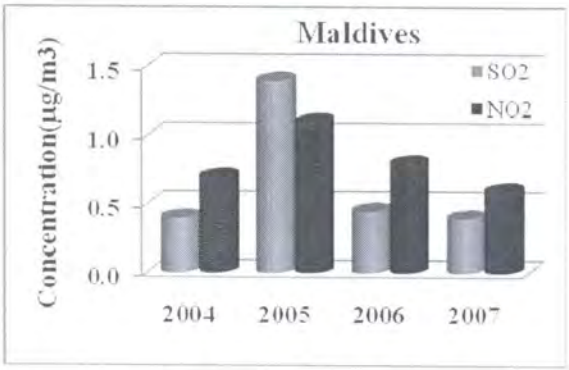


Figure3-9 Temporal variation of average SO_2 & NO_2 concentration



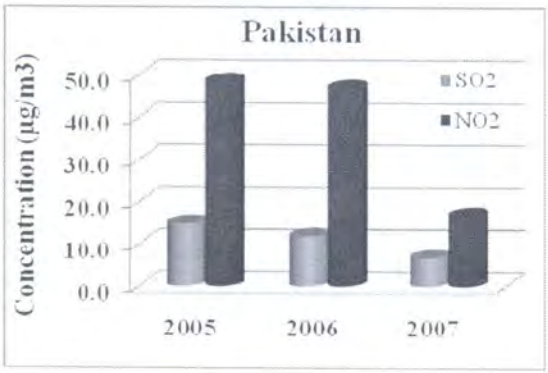


Figure 3-10 and Figure 3-11- Annual average concentration of SO_2 and NO_2

Pakistan

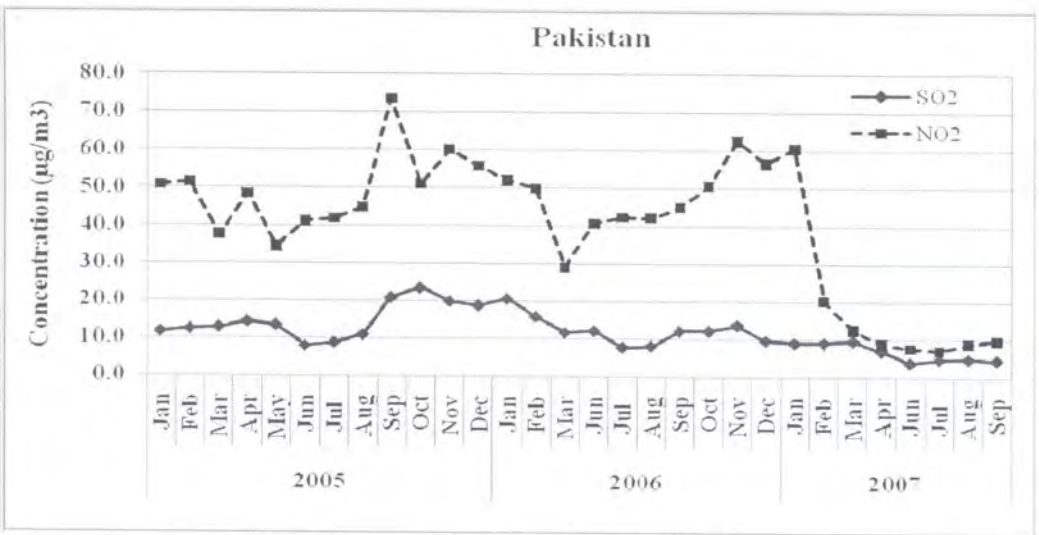


Figure 3-12 Temporal variation of average SO_2 & NO_2 concentration

The highest concentration of SO_2 and NO_2 in Pakistan occur during the winter months. The concentration of SO_2 varies between 7.7 to 23.4 µg/m^3 in 2005 and 2006. The minimum concentrations is indicated in the months of Jun – Aug, that probably coincides with the monsoon / premonsoon period. The NO_2 concentration during varies from 28.8 to 73.3 µg/m^3 again with highest concentrations during winter and lowest during June - August (Figure 3-10 and 3-11) The annual average concentration of SO_2 and NO_2 varies from 14.6 and 12.3, and 49.0 and 46.9 µg/m^3 in 2005 and 2007, respectively. These results suggest industrial activity and movement of vehicles in the area. In 2007, there was a change of sulphur dioxide concentration recoded at 3.7 to 8.9 µg/m^3. This sudden change in the results was due to the shifting of the monitoring station from Islamabad to Bahawalnagar.

Nepal

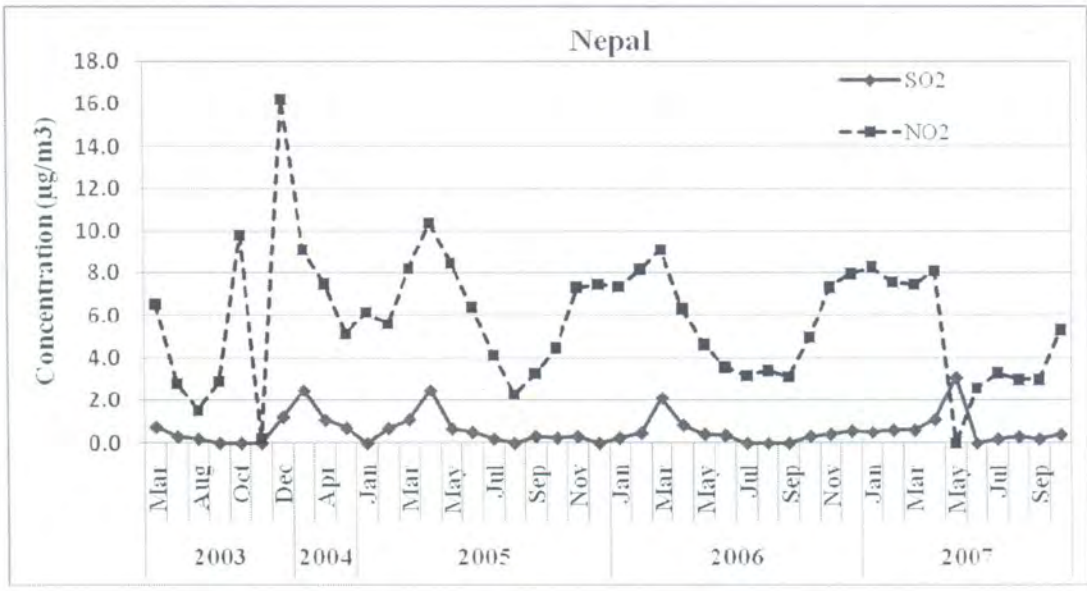
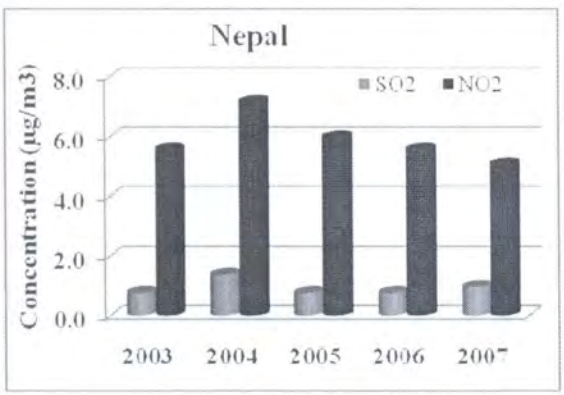


Figure 3-13 Temporal average concentration of SO_2 and NO_2

In Nepal, the annual average concentration of NO_2 is relatively higher. However,there is a clear decreasing trend over the last four years with the concentration in 2004 and 2007 of 7.24 and 4.9 $\mu g/m^3$ respectively. On the other hand, SO_2 concentration remains low (Figure 3-13 and 3-14).



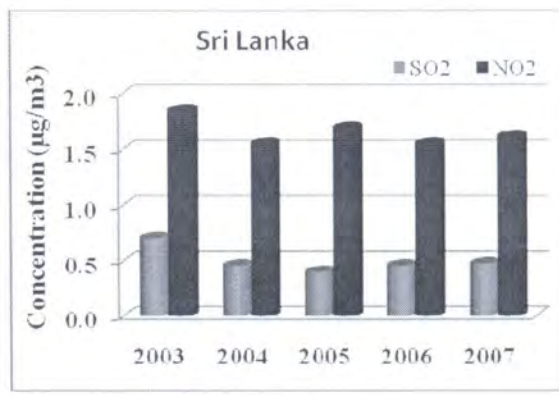


Figure 3-14 and Figure 3-15 Annual average concentration of SO_2 and NO_2

Sri Lanka

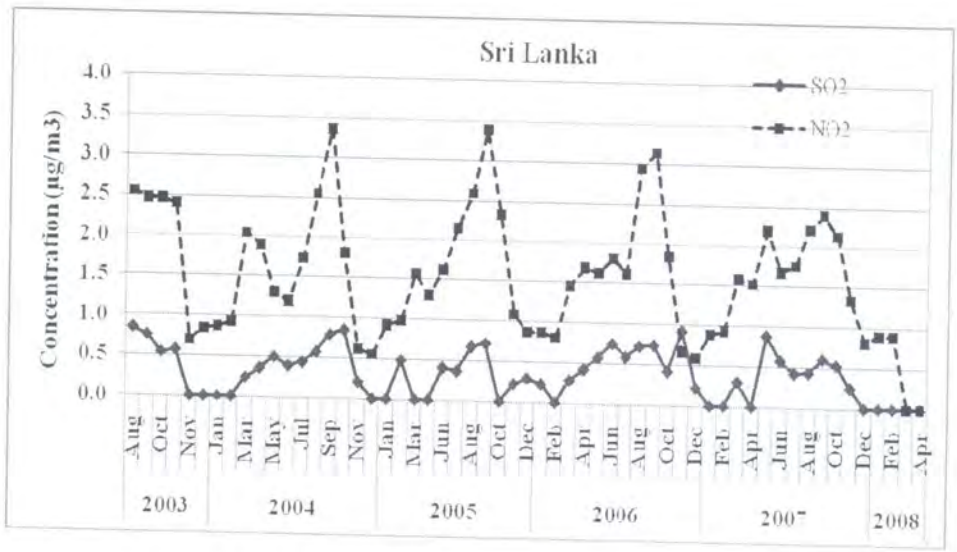


Figure 3-16 Temporal average concentration of SO_2 and NO_2

Sri Lanka has been conducting passive (diffusive) sampling regular basis since Aug 2003. A perusal of the data and Figure 3-15 and 3-16 indicates that the concentrations of both SO_2 and NO_2 remain very low.

A perusal of Table 3-7 and Figure 3-17 which gives the annual average concentration of SO_2 and NO_2 for each of the countries over the years indicates that the concentration of SO_2 has been increasing over the years in Bangladesh, and background location in Bhutan. At the same time, a look at Table 3-6 and Figure 3-18 give a comparison of the annual average SO_2 and NO_2 concentrations in 2006 and 2007 as reported by the various countries indicates that the concentration of SO_2 in ambient air is highest in the case of Pakistan followed by Iran, India and then Bangladesh. The concentration of NO_2 is the highest in Nepal followed by India, Iran and Bangladesh. At the same time the concentration of SO_2 has decreased in 2007 over that in 2006 remained nearly constant in Bangladesh and Sri Lanka and have shown an increase in all other countries. The NO_2 concentration also seems to have decreased in India; remained nearly constant in Nepal and Sri Lanka; and has increased in all other countries.

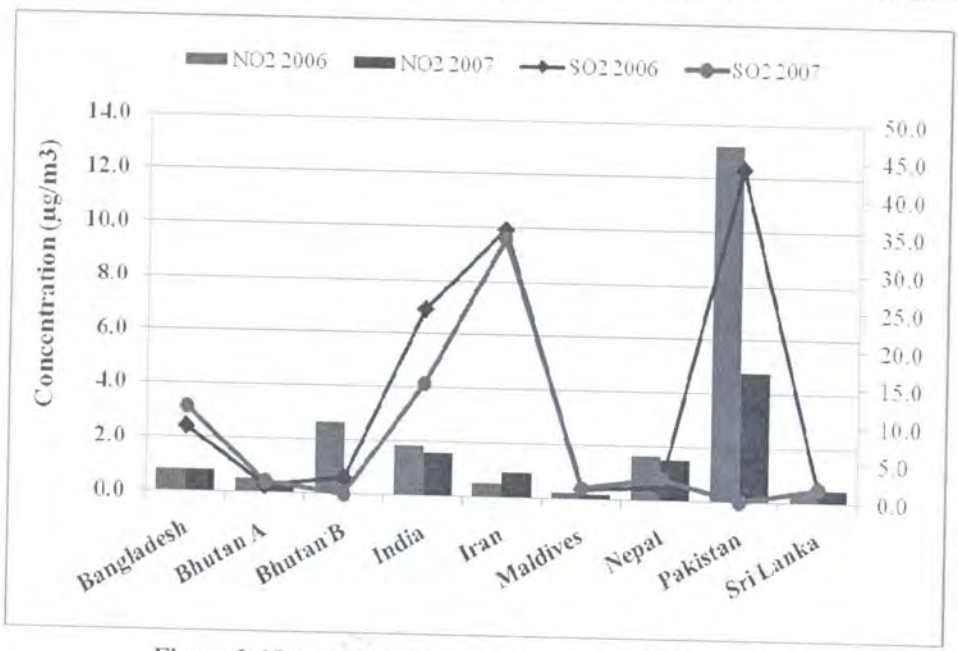


Figure 3-17 Annual average concentration of SO_2 and NO_2

However, it is also important to correlate the results to field conditions and the probable cause of fluctuation on the concentration of pollutants. The results also need to be correlated to the relative location of each of the monitoring sites in each of the countries and the activities around the sites.

Causes for very high SO_2 results in the case of Iran, and NO_2 concentration in India and Nepal also need to be looked into. Since the Pakistan site was earlier urban area and now it has been shifted, the results have not been compared with those of other countries. Seasonal variation of SO_2 and NO_2 are not very clear at all the stations, further studies and more data is needed for drawing a clear conclusion in this regard.

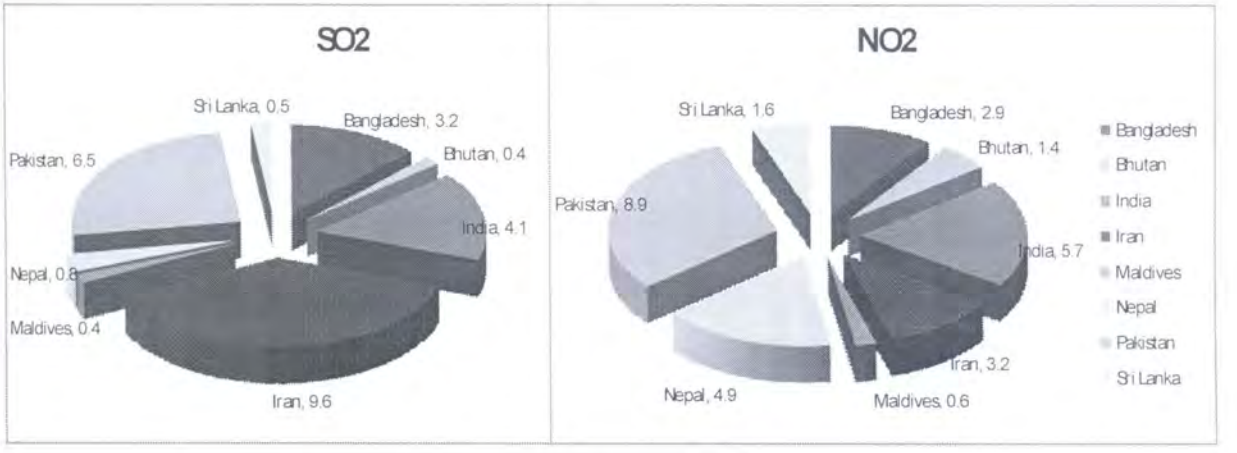


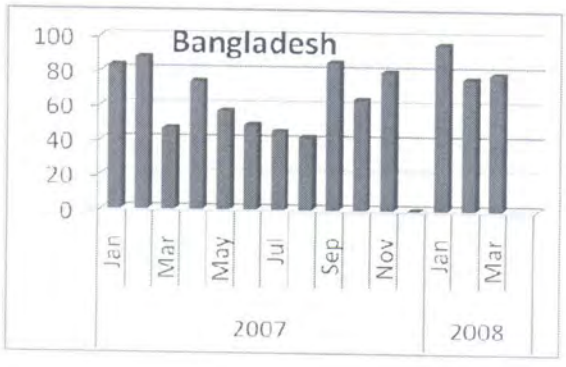
Figure 3-18 Concentration of SO_2 and NO_2 during 2007

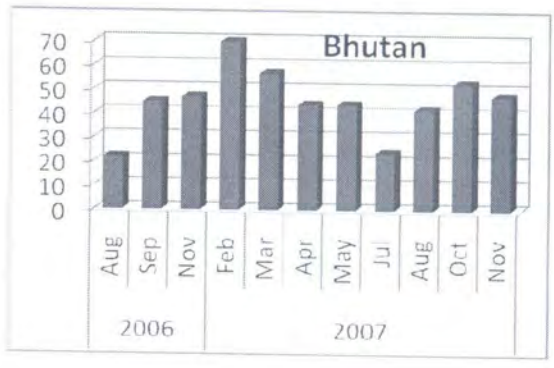
Monthly average variation in the concentration of SO_2 and NO_2 in case of all the countries (Table 3-7) reveals that the concentration levels are generally higher in the winter months as compared to summer.

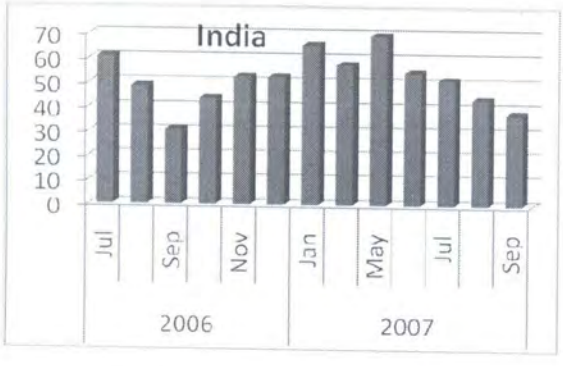
Although SO_2 concentrations generally show seasonal variations, NO_2 are mainly emitted by vehicles rather than by heat production, and therefore they do not show a clear seasonal variation. The data collected so far is not sufficient to accurately establish multi-year trends. Also, missing and non uniform data from different sources hampers a trend analysis, although it can be said that no distinct trend in SO_2 and NO_2 concentrations was observed over the years

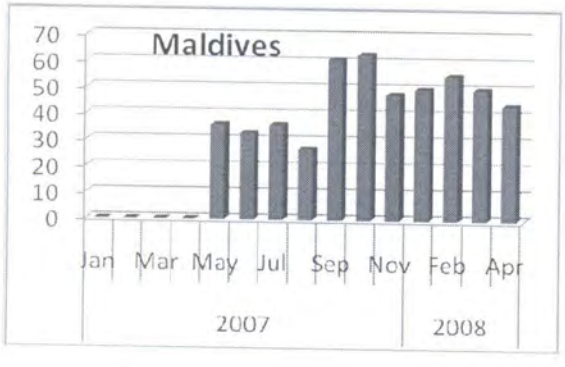
Regular monitoring of O_3 was started in 2007 by all the countries. A perusal of the table indicates that the highest concentration(71.3µg/m^3) of O_3 was found in Iran, followed by Bangladesh(66.8 µg/m^3); Pakistan(57.6 µg/m^3) and India(54.7 µg/m^3)

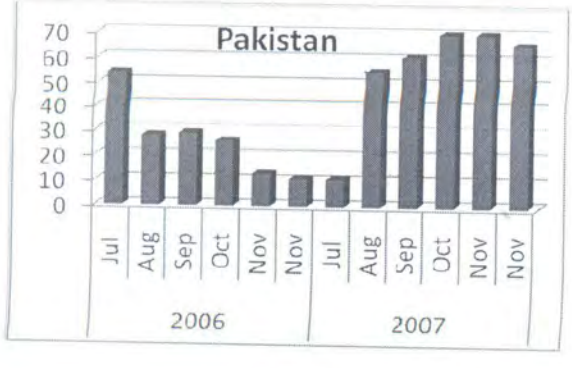
The concentration of O_3 is generally reported to be higher during the winter months as compared to summer. Figure 3-19 gives the temporal variation of O_3 concentration in the case of all the countries.











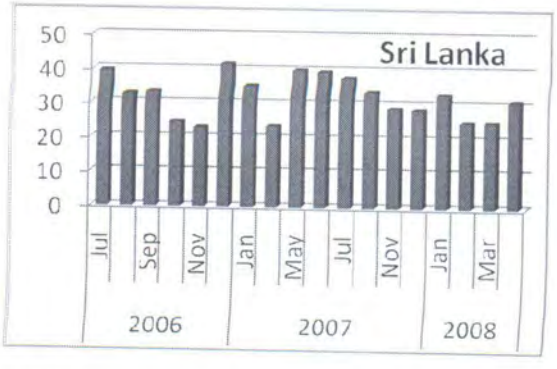


Figure 3-19 Temporal variation of O_3 concentration ($\mu g/m^3$)

AIR CONCENTRATION MONITORING

A perusal of Table 3-9 indicates that only four countries, India, Iran, Nepal and Pakistan have reported the results of ambient air concentration monitoring using HVS. Of these countries, only Iran and Nepal have reported the results of all the five required parameters as per the Malé protocol in 2007 , however the results are only for five and four months respectively. The remaining two, countries, India has reported RSPM, SO_2 and NO_2 ; and Pakistan reported RSPM, NRSPM and TSPM.

Dry deposition flux is dependent on ambient air sources of the acidic gases and dry deposition velocity which in turn is dependent on a number of factors like physical and chemical properties of the gases, surface properties and other environmental factors, that is why dry deposition flux is not measured and reported. However, to measure the magnitude of dry deposition flux, the ambient air concentration of the gases SO_2, NO_2 and O_3 are being discussed.

India

India has given the air concentration monitoring data from September 2004 to March 2008 for PM_{10}, SO_2 and NO_2.

A perusal of Table 3-9 and Figure 3-20 and 3-21 which gives the temporal variation and the monthly average concentration of PM_{10}, SO_2 and NO_2, indicates that the annual average concentration of PM_{10} remained nearly the same over the years, with a slight decreasing trend. The concentration of PM_{10} was highest during the winter months mostly from December to February, when the average concentrations were as high as 170 to 198μg/m^3, higher than the prescribed Indian Standards for such areas. Lowest monthly average in the range of 14 to 30μg/m^3 was observed during the summer and monsoon months between May to September.

Table 3-9 Monthly average concentration of PM_{10}, SO_2 and NO_2 - India

S No	Year	Month	RSPM/PM_{10} (μg/m^3)	SO_2 (μg/m^3)	NO_2 (μg/m^3)
1	2004	Sep	11	BDL	5.0
2		Oct	51	BDL	7.6
3		Nov	124	BDL	16.9
4		Dec	170	BDL	23.3
5	Annual Avg 2004		106	BDL	15.0
6	2005	Jan	142	BDL	20.7
7		Feb	85	BDL	18.3
8		Mar	26	BDL	11.1
9		Apr	36	BDL	10.0
10		May	24	BDL	11.7
11		Jun	27	BDL	11.5
12		Jul	14	BDL	5.2
13		Aug	20	BDL	9.2
14		Sep	14	BDL	11.1
15		Oct	37	BDL	7.5
16		Nov	129	BDL	13.8
17		Dec	170	BDL	19.4
18	Annual Avg 2005		59	BDL	12.3
19	2006	Jan	198	BDL	20.3
20		Feb	108	BDL	15.1

S No	Year	Month	RSPM/PM_{10} ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)
21		Mar	109	BDL	14.5
22		Apr	36	BDL	7.5
23		May	25	BDL	6.2
24		Jun	16	BDL	6.1
25		Jul	17	BDL	5.8
26		Aug	17	BDL	5.7
27		Sep	20	BDL	6.6
28		Oct	58	BDL	10.8
29		Nov	93	BDL	10.0
30		Dec	170	BDL	21.9
31	Annual Avg2006		75	BDL	11.0
32		Jan	188	BDL	24.5
33		Feb	75	BDL	18.0
34		Mar	64	BDL	12.0
35		Apr	26	BDL	10.6
36		May	26	BDL	12.2
37		Jun	12	BDL	11.7
38	2007	Jul	18	BDL	10.4
39		Aug	13	BDL	9.3
40		Sep	17	BDL	13.8
41		Oct	61	BDL	18.1
42		Nov	106	BDL	21.0
43		Dec	191	BDL	26.5
44	Annual Avg 2007		65	BDL	15.6
45		Jan	178	BDL	22.3
46	2008	Feb	103	BDL	24.3
47		Mar	43	BDL	15.6
48	Annual Avg 2008		108		21.0

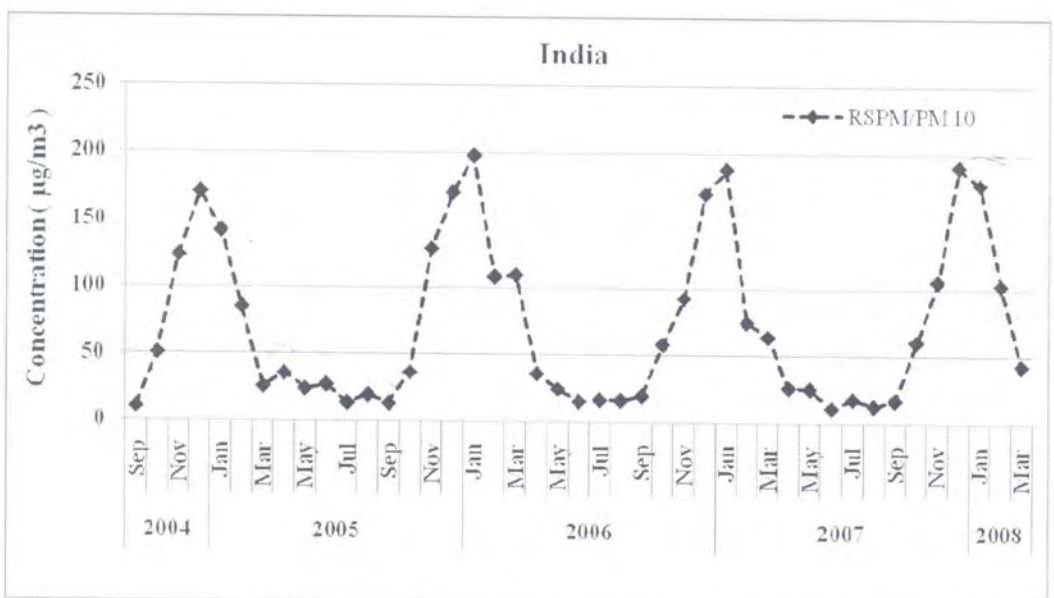


Figure 3-20 Temporal variation of PM_{10} concentration

SO_2 and NO_2 concentrations were characterized by a strong pronounced seasonal variation.

Maximum concentrations were observed during the winter months, generally from December to February indicating both, the effect of contributing climatic factors such as stable temperature inversions and the possibility of greater local influences.

Figure 3-21 Temporal variation of SO_2 and NO_2 concentration

There was no appreciable increase or decrease for SO_2 over the monitoring period and the average monthly SO_2 concentration generally remained negligible (BDL) for most of the times during the previous years and did not exceed 4µg/m^3 at any time. The NO_2 concentrations are also highest during the winter months with monthly average concentrations as high as 27µg/m^3 during December/January. The lowest monthly average concentration of NO_2 during 2004 to 2006 remained between 5-6µg/m^3 was during the monsoon months from Jun to August when the PM concentrations are also low; however, the lowest monthly average during 2007 was 9.3µg/m^3, higher than the previous year. Since the area is remote and there are no chances of very high vehicular emissions, the relatively higher concentration of NO_2 (as compared to SO_2) could be due to activities like biomass burning or agricultural activities.

Iran

Air concentration monitoring was started by Iran in 2004 and the results were reported for only about 4-6 months in a year. Monitoring was done for PM_{10}, NRSPM and TSPM; SO_2 and NO_2 were monitored only during 2007 for five months.

A perusal of Table 3-10 and figure 3-22 and 3-23 indicate that no definite conclusions can be drawn as the data represents different periods in each year.

Table 3-10 Average concentration of PM_{10}, SO_2 and NO_2 – Iran

S No	Year	Month	RSPM/PM_{10} ($\mu g/m^3$)	TSPM ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)
1	2004	Jul	22	44	-	-
2		Aug	32.5	60	-	-
3		Sep	27	61	-	-
4		Oct	21	40	-	-
5		Nov	19	37	-	-
6	Annual Avg 2004		26	50	-	-
7	2005	Feb	20	40	-	-
8		Mar	25	48	-	-
9		Jul	42	240	-	-
10		Sep	18	73	-	-
11	Annual Avg 2005		26	100	-	-
12	2007	Apr	38	94	16.0	25.0
13		May	44	117	15.0	18.0
14		Jun	39	98	13.0	19.0
15		Jul	59	219	21.0	34.0
16		Aug	25	81	13.0	11.0
17	Annual Avg 2007		41	122	15.6	21.4
18	2008	May	152	369	-	-
19		Jun	99	291	-	-

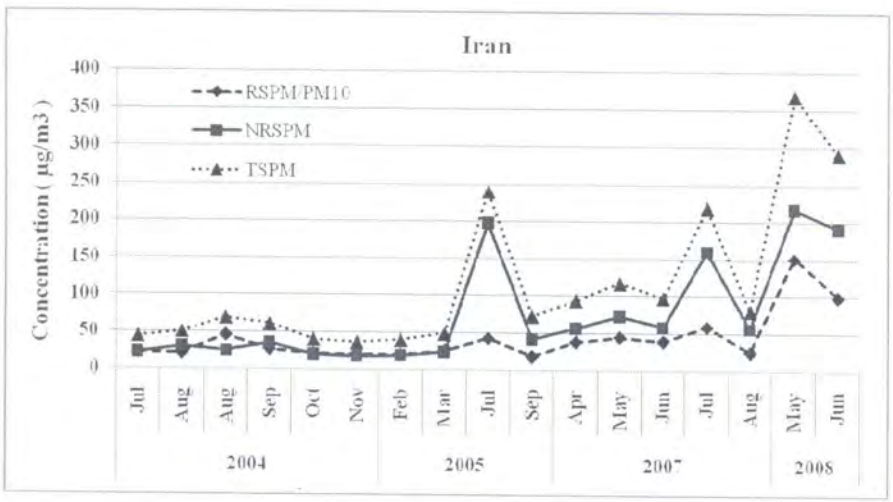


Figure 3-22 Temporal variation of PM_{10} concentration

Considering the monthly average results of July for 2004, 05 and 07 it is seen that the concentration of PM_{10} for the respective years is 22, 42 and 59$\mu g/m^3$ and that of TSPM is 44, 240 and 122$\mu g/m^3$, indicating that PM_{10} concentration has been rising over the years. The results of May, 2008 monitoring also indicate a very high concentration of RSPM and TSPM, i.e., 220 and 514$\mu g/m^3$ respectively.

These points are in need for looking into the causes on the increasing concentrations and taking corrective measures. At the same time the average (five months) SO_2 and NO_2 concentrations were 18.2 and 21.4$\mu g/m^3$. The highest concentrations were 21 and 34$\mu g/m^3$ in July and the lowest 13 and 11$\mu g/m^3$ in August respectively. The reasons for high SO_2 concentrations in Iran (compare results of passive sampling where Iran has highest SO_2 concentrations) need to be looked at since, SO_2 emissions are generally from anthropogenic sources. This may be seen if the results are being influenced by any specific source in the vicinity.

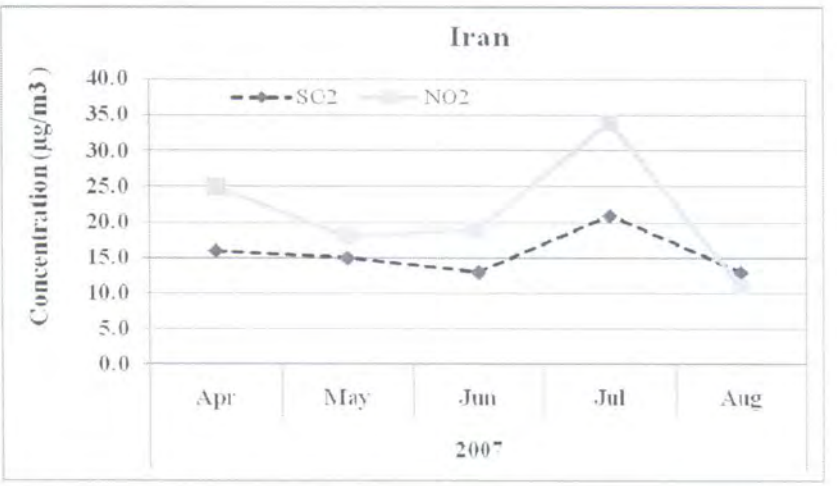


Figure 3-23 Temporal variation of SO_2 and NO_2 concentration

Pakistan

Table 3-11 gives the monthly and annual average results of monitoring and Figure 3-24 gives the temporal variation of the same. The air concentration monitoring started in 2007 for PM_{10}, NRSPM and TSPM. SO_2 and NO_2 monitoring is yet to be initiated.

Table 3-11 Average concentration of PM_{10}, NRSPM and TSPM- -Pakistan

S No	Year	Month	RSPM/PM_{10} (µg/m^3)	TSPM (µg/m^3)
1	2007	Feb	181	320
2		Mar	120	198
3		Apr	140	406
4		May	368	1136
5		Jun	135	523
6		Jul	227	612
7		Aug	135	548
8		Sep	105	415
9		Oct	247	637
10		Nov	257	560
11		Dec	251	456
12	Annual Avg 2007		197	529
13	2008	Jan	170	336
14		Feb	199	527
15		Apr	163	592
16		May	187	706
17		Jun	176	456

In Pakistan, the annual average concentrations of RSPM and TSPM during 2007 were196 and 625µg/m^3 respectively. The highest concentration of 368µg/m^3 PM_{10} and 1136 µg/m^3 TSPM was observed in May 2007. Additionally, Monsoon period showed that the lowest concentration of PM_{10} and TSPM are 105 and 414 µg/m^3 respectively. In general, the concentration of RSPM is high and the reasons for these should be investigated, to ensure that there are no direct local influences. Any constant analytical error can be considered.

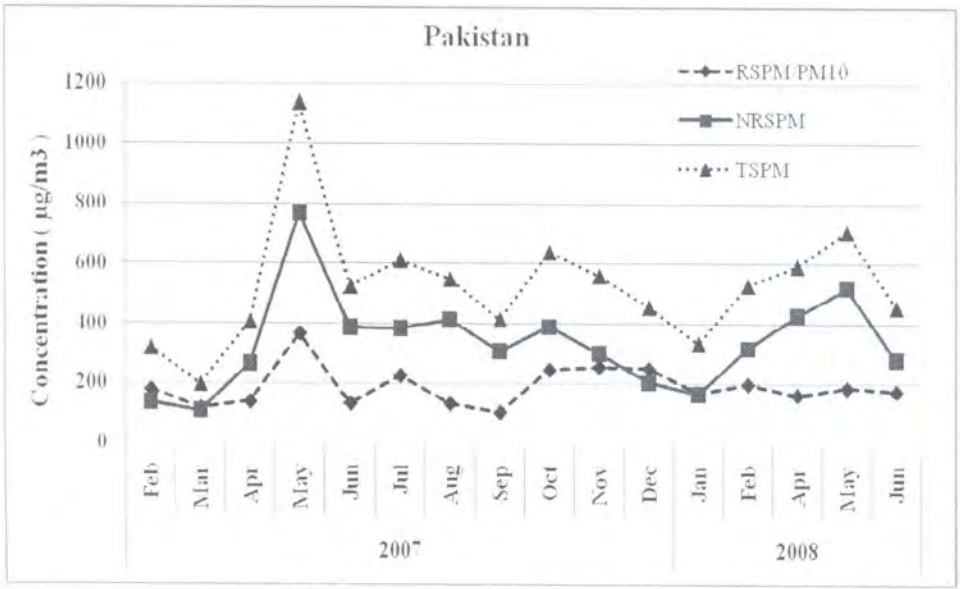


Figure 3-24 Temporal variation of PM_{10} concentration

Nepal

The data of Nepal has been presented in Table 3-12 & Figure 3-25. A perusal of the Table indicates that the monitoring has been carried only for a few months in a year. Hence, these cannot be taken as conclusive, although annual averages have been calculated.

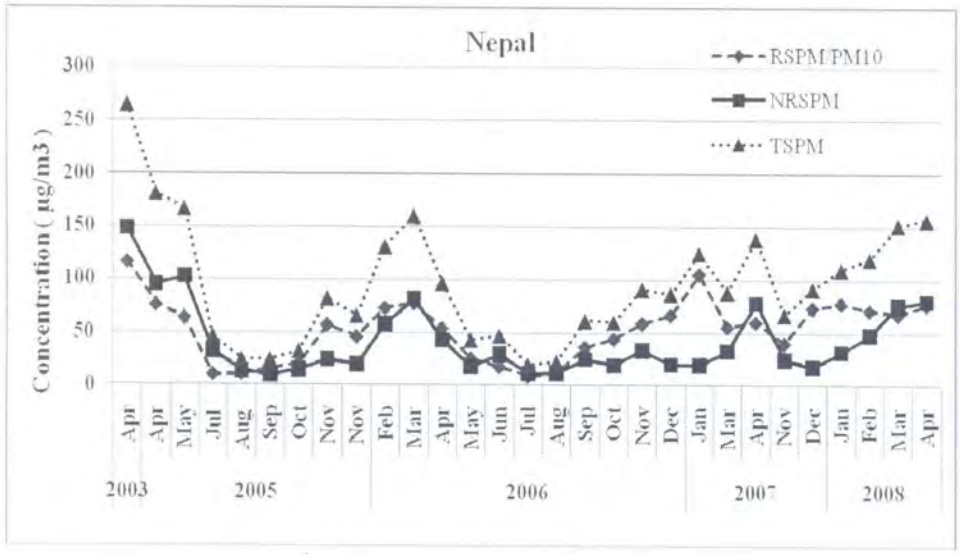


Figure 3-25 Temporal variation of PM_{10} concentration

The monitoring started in 2003 and became regular in 2006. In general, the concentration of SO_2 and NO_2 observed were very low with SO_2 concentration not exceeding 5µg/m^3 and that of NO_2 remains 0.4µg/m^3 for the monitoring period. For most of the time the concentration of SO_2 and NO_2 remains BDL by the method used.

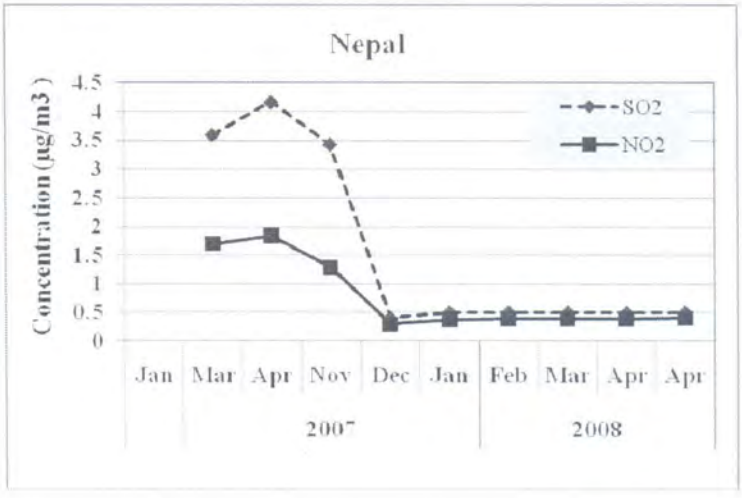


Figure 3-26 Temporal variation of SO_2 and NO_2 concentration

Table 3-12 Average concentration of PM_{10}, NRSPM, TSPM, SO_2 and NO_2 -Nepal

S No	Year	Month	RSPM/PM_{10}	TSPM	SO_2	NO_2
			µg/m^3			
1	2003	Apr	117	265	0.2	4.3
2	2005	Apr	77	181	1.8	1.1
3	2005	May	64	167	2.3	1.2
4	2005	Jul	10	47	0.8	1.4
5	2005	Aug	11	25	-	0.9
6	2005	Sep	16	25	0.4	1.0
7	2005	Oct	21	32	0.4	0.3
8	2005	Nov	57	82	0.9	0.9
9	2005	Nov	46	66	0.3	0.3
10	Annual Avg2005		42	83	0.9	0.8
11	2006	Feb	Feb	131	0.5	0.5
12	2006	Mar	78	160	1.4	1.1
13	2006	Apr	54	97	1.5	1.0
14	2006	May	25	43	2.0	1.7
15	2006	Jun	18	47	1.3	1.3
16	2006	Jul	9	20	4.2	2.2
17	2006	Aug	12	23	4.2	2.3
18	2006	Sep	37	62	3.5	1.7
19	2006	Oct	44	60	3.7	1.6
20	2006	Nov	59	91	4.7	3.3
21	2006	Dec	67	87	4.6	3.0
22	Annual Avg2006		43	75	2.9	1.8
23	2007	Jan	Jan	125	3.6	1.7

S No	Year	Month	RSPM/PM_{10}	TSPM	SO_2	NO_2
			$\mu g/m^3$			
24	2007	Mar	56	89	4.2	1.8
25	2007	Apr	60	139	3.4	1.3
26	2007	Nov	50	84	4.3	2.4
27	2007	Dec	74	92	4.4	2.1
28	2008	Jan	78	110	3.7	2.0
29	2008	Feb	72	120	3.7	1.9
30	2008	Mar	67	152	2.1	5.0
31	2008	Apr	77	157	1.9	3.3

Table 3-13 Air Quality in various countries during 2007

S No	Country	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
		Annual average ($\mu g/m^3$)				
1	India	65			BDL	15.6
2	Iran	41	81	122	16	21.4
3	Nepal	69	32	101	BDL	BDL
4	Pakistan	197	335	529		

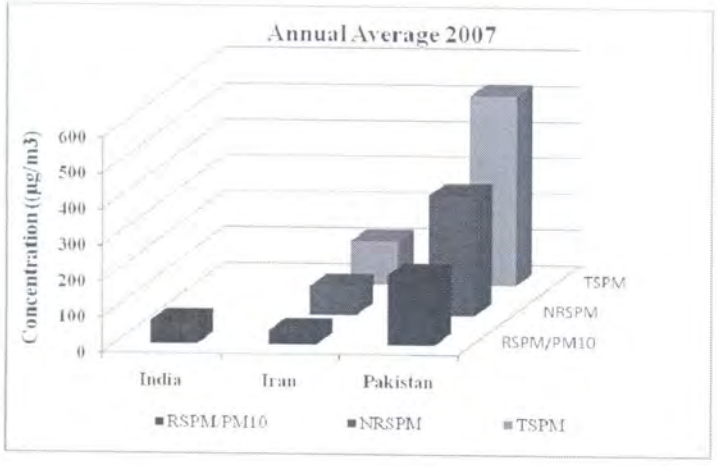


Figure 3-27 Concentration of PMr -2007

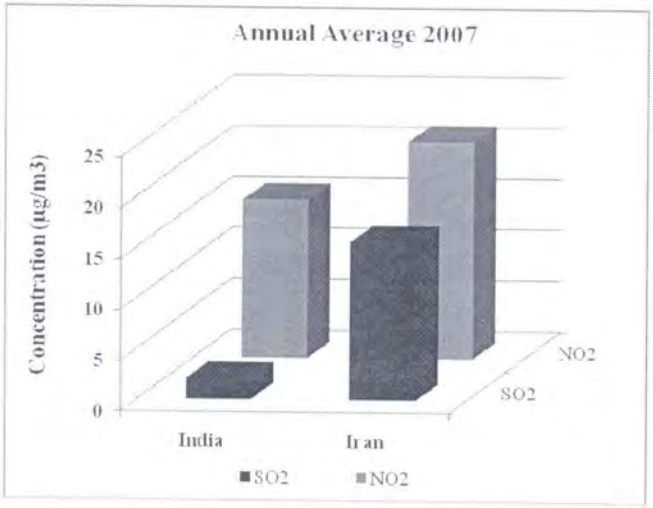


Figure 3-28 Concentration of SO_2 and NO_2 - 2007

COMPARISON OF PASSIVE (DIFFUSIVE) SAMPLING AND AIR CONCENTRATION MONITORING RESULTS:

Only the annual average concentration of SO_2 and NO_2 obtained by the two methods can be compared. This can be done only in some cases as all the countries have not started the air concentration monitoring using HVS. Table 3-13 and Figures 3-29 and 3-30 give the relative concentration of SO_2 and NO_2 by the two methods for year 2007.

Table 3-14 Relative concentration of SO_2 and NO_2: Air (P) vs. Air (H) - 2007

S No	Country	$SO_2(\mu g/m^3)$		$NO_2(\mu g/m^3)$	
		Diffusive	Air (conc.)	Diffusive	Air (conc.)
1	India	4.1	BDL	5.7	15.7
2	Iran	9.6	15.6	3.2	21.4
3	Nepal	0.7		4.9	
4	Pakistan	6.5	-	16.7	-

A perusal of the Table 3-13 indicates that the results obtained by the two methods are very different and cannot be compared. At the same time a look at Figure 3.30 indicates that the temporal variations are similar and the NO_2 concentration remains highest during the winter period.

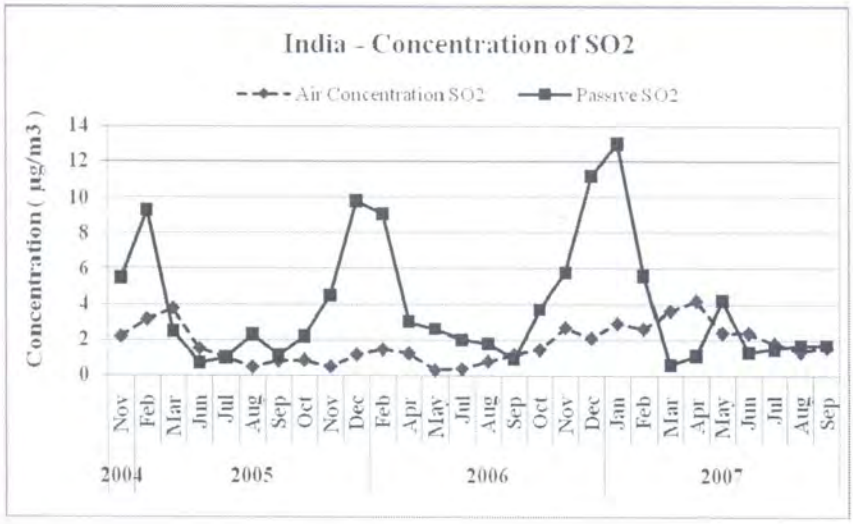


Figure 3-29 Comparison of SO_2 concentration

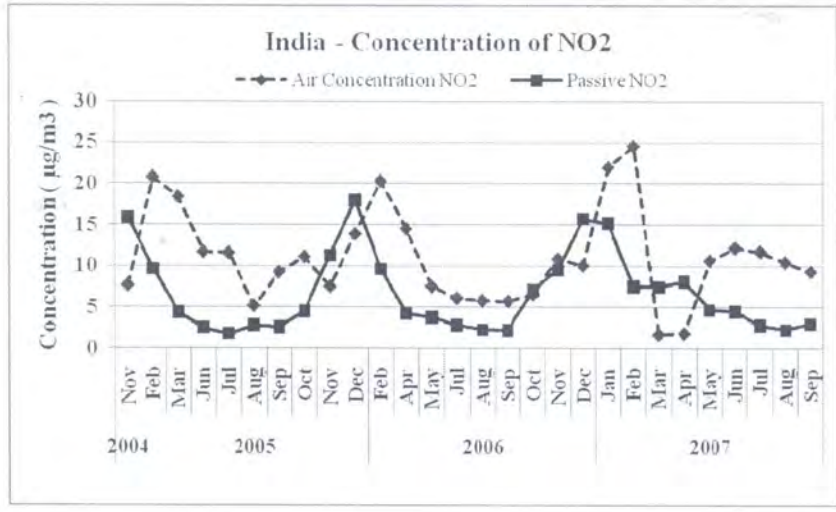


Figure 3-30 Comparison of NO_2 concentration

3.5 PRECIPITATION CHEMISTRY

A large number of chemicals released from natural or anthropogenic sources are present in the atmosphere as gases or aerosols. Clouds and precipitation have long been recognized as important sinks for atmospheric pollutants and aerosols, with size and solubility-induced selective removal affecting both the aerosol size distribution and the rainwater characteristics. Gaseous pollutants such as SO_2 and NO_x once emitted to the atmosphere are oxidised to SO_4^{2-} and NO_3^- through gaseous and aqueous phase processes. The absorption and desorption of gaseous pollutants by clouds, rain and snow is the beginning of the removal process of these gases. However, absorption and desorption involves a complex mechanism which incorporates dissolving and extraction of these species in and out of water droplets. In-cloud scavenging is a determining factor for precipitation sulphate, while it is relatively unimportant in the case of ammonium. The sub-cloud scavenging of NO_2 and SO_2 is not too significant. However, for nitric acid (HNO_3), and ammonia (NH_3) it is an effective process.

Wet deposition in Asian countries is generally influenced by two factors: meteorological conditions such as the wind system and rainfall pattern and geographical distribution of emission sources of chemical substances through natural and anthropogenic activities. Natural sources of pollution may broadly include sea salt, eroded earth material and biogenic activities while fossil fuel combustion and agricultural wastes are the major anthropogenic sources. Wet deposition is the scavenging approach of removal of pollutants from the atmosphere. Rain and snow are the main scavenging processes of air pollutants changing their air concentrations. The composition of the rain water depends on the chemical species that have dissolved in it. Sulphuric acid (H_2SO_4) and HNO_3 are regarded as the major acids, whereas calcium carbonate ($CaCO_3$) and NH_3 are regarded as the major bases.

Once the acids in rain droplets were identified as a potential cause of acidification of lakes and soils, it was widely recommended that regular monitoring of pH and chemical composition of rainwater must commence. Thus, it was decided to include wet deposition monitoring at the Malé sites. However not all the countries have started this monitoring regularly as per the protocol.

The results have been analysed to assess the chemical properties of rain water with regard to,

- Chemical composition, to study the characteristics of rain water related to the site
- Acid and base concentrations, to identify their roles in determining the acidity of water
- Effect of precipitation amount on ion concentrations
- Ratio of SO_4^{2-} to NO_3^- in rain water to know the possible emission effects.

Rainwater contains various dissolved anions and cations after incorporating gaseous and aerosol species from the ambient air. The wet deposition was monitored by wet-only-collector and bulk collector techniques. In the former technique the sampler is exposed for the entire period and includes dry period, in the latter, the sampler has arrangements to do sampling only when it rains. The samples so collected were preserved and transported to the laboratory for analysis. The cations and anions to be monitored at the Malé monitoring sites were , NH_4^+, Na^+, K^+, Mg^{2+}, Ca^{2+},SO_4^{2-}, Cl^- and NO^{3-}. Some quantitative parameters were proposed to analyze the wet deposition measurements in terms of acid-base chemistry. Acidity, or pH, is a fundamental measure of precipitation acidity. It is determined by the nature and proportions of acids and basis in water. In this sense, pH is a secondary parameter, whereas acids and bases are primary ones. If any two of these three quantities are properly determined, then the other can be calculated theoretically.

Tables 3-3 and 3-4 give the details of the monitoring conducted and the ions analysed by each of the laboratories. A perusal of the results indicates that most of the laboratories have measured only pH and electrical conductance. Only Bangladesh, Maldives, Nepal and Sri Lanka have measured all the cations and anions wet only samples, however, only Bangladesh and Sri Lanka have measured all the ions in the bulk samples.

Perusal of the results indicates that most of the countries are yet in the process of strengthening their monitoring and analytical capabilities and thus only the results of pH and conductance wherever available have been analysed.

Bangladesh

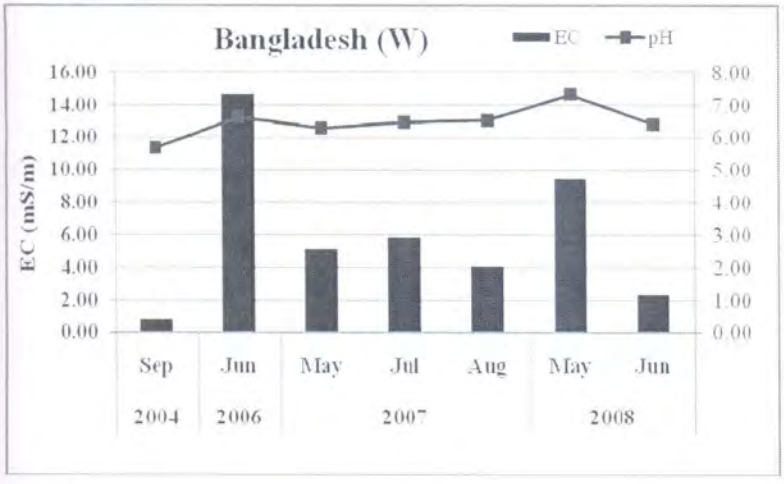


Figure 3-31 Variation in electrical conductance and pH (wet-only-collector)

The results of the wet deposition monitoring by using wet-only-collector and bulk collector (Figure 3-31 and 3-32, respectively) indicate that conductance was not measured on all the days, with minimum average conductance 1.07mS/m and the highest 14.72mS/m. A perusal of the results of monitoring using wet-only collector reveal that electrical conductance (EC) is highest in summers and lowest in monsoons and in the broader sense is related to the amount of precipitation, i.e., lowest conductance at highest precipitation times. The pH varied between 4.6- 6.6.

Figure 3-33 gives the frequency distribution of pH during the monitoring period. It is seen that lower pH values were generally observed in October whereas in summer the pH was generally higher although deviations to this were observed. Inter annual concentration changes might be due to variations in meteorology and emissions.

The monitoring was carried out only for a few months over the five year period.

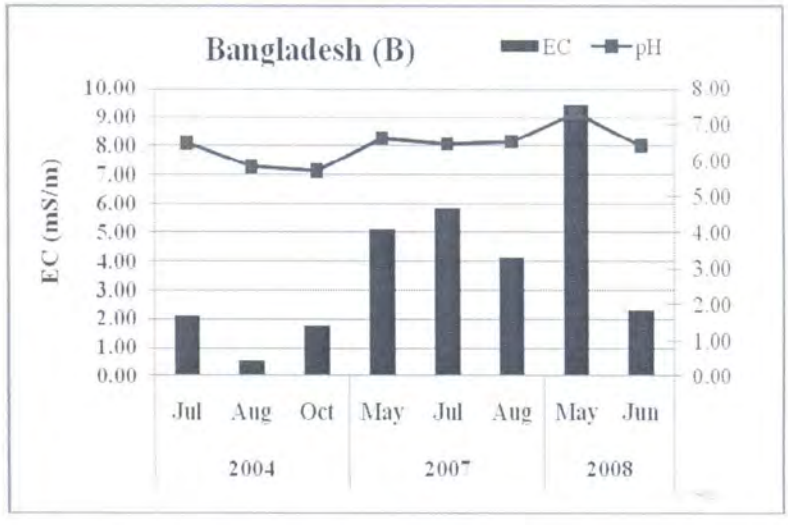


Figure 3-32 Variation in electrical conductance and pH (bulk collector)

Table 3-15 Results of wet monitoring using wet-only-collector, Bangladesh

S No	Year	Month	EC (mS/m)	pH	Precipitation (mm)
1	2004	Sep	0.8	5.7	659
2		Oct		6.0	1184
3	Annual avg 2004		1.1	5.8	
4	2005	Jun			
5		Jul			
6		Aug		5.5	
7		Sep		5.4	
8		Dec		4.7	
9	Annual avg 2005			5.2	
10	2006	Jan		4.7	
11		Apr		6.1	278
12		Jun	14.7	6.6	796
13		Jul		5.8	
14		Aug		5.6	
15		Sep		5.7	
16		Oct		5.2	
17		Nov		5.3	
18		Dec		5.1	
19	Annual avg 2006			5.7	
20	2007	Jan		4.7	
21		May	5.1	6.3	780
22		Jul	5.9	6.5	887
23		Aug	4.1	6.5	1386
24	Annual avg 2007		5.7	6.5	1328
25	2008	May	9.5	7.3	1000
26		Jun	2.3	6.4	1433
27	Annual avg 2008		4.1	6.6	1374

Table 3-16 Results of monitoring using bulk collector, Bangladesh

S No	Year	Month	EC (mS/m)	pH	Precipitation (mm)
1	2004	Jul	2.1	6.5	
2		Aug	0.6	5.8	1004
3		Oct	1.8	5.7	1287
4	Average 2004		1.4	6.0	1068
5	2005	Jun			
6		Jul			
7		Aug			
8		Sep			
9		Dec			
10	Average 2005				
11	2006	Jan			
12		Jul			
13		Aug			
14		Sep			
15		Oct			
16		Nov			
17		Dec			
18	Average 2006				
19	2007	Jan			
20		May	5.1	6.6	800
21		Jul	5.9	6.5	1735
22		Aug	4.1	6.5	1386
23	Average 2007		5.7	6.6	1334
24	2008	May	9.5	7.3	1000
25		Jun	2.3	6.4	1433
26	Average 2008		3.5	6.6	1371

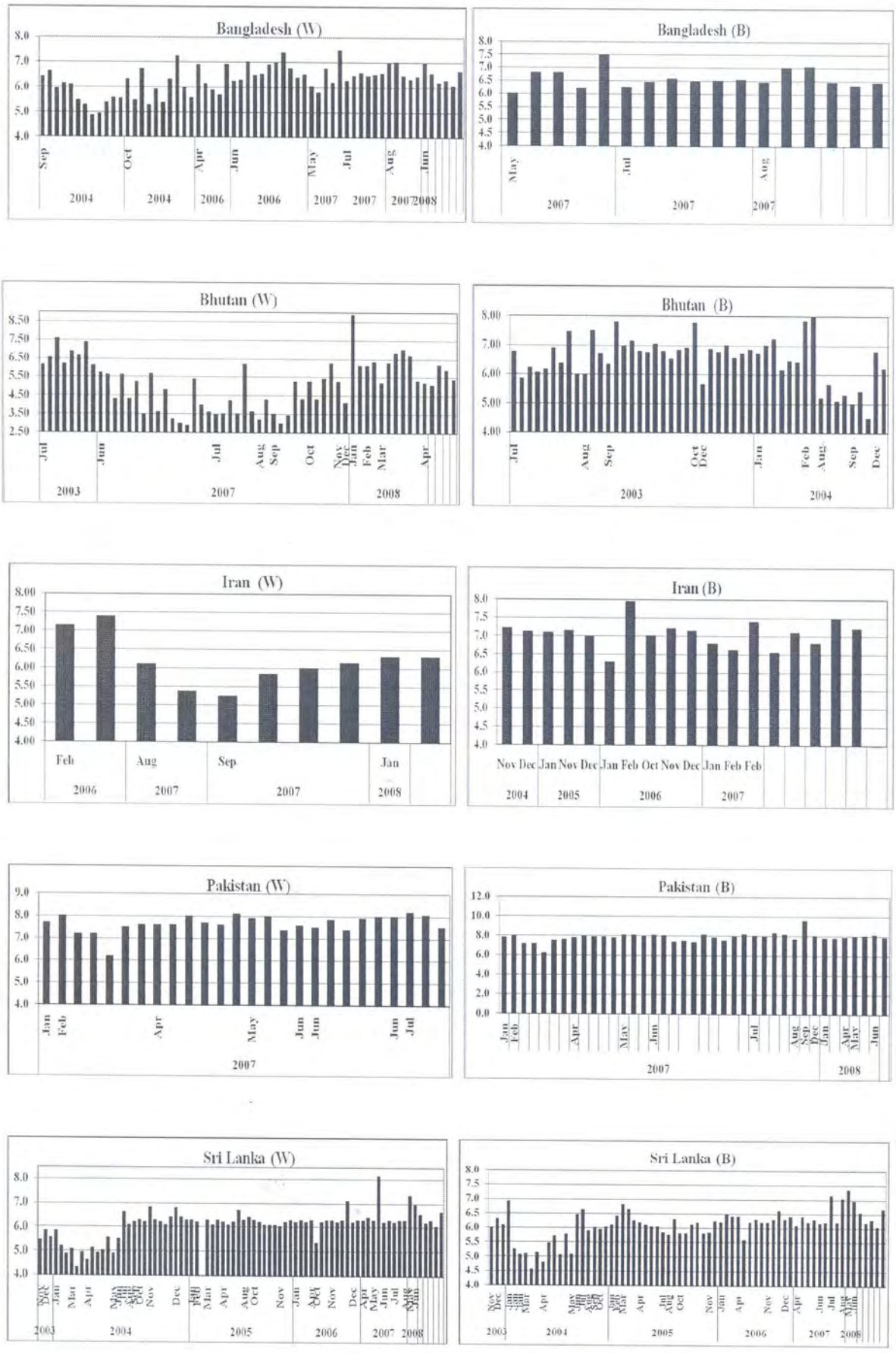


Figure 3-33 Frequency distribution of pH

Bhutan

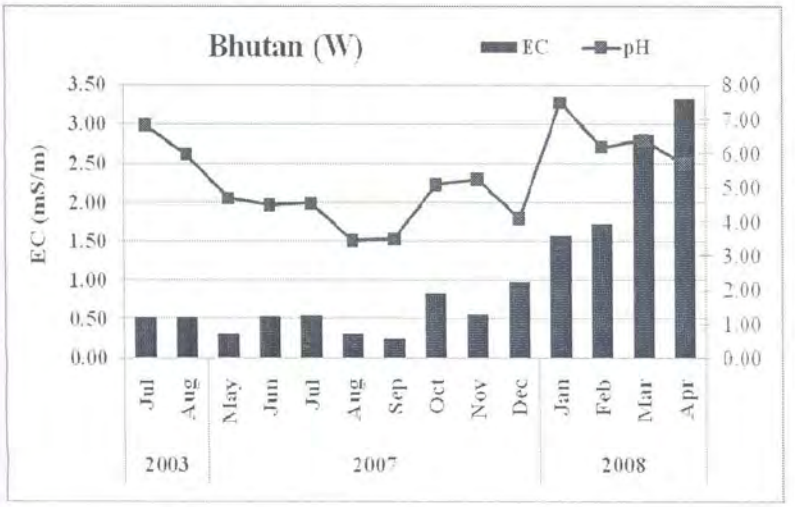


Figure 3-34 Variation in electrical conductance and pH (wet-only collector)

In Bhutan, only pH, conductance and precipitation values have been reported for a few months in each year for both wet only and bulk sample monitoring. The EC and pH results of 2007 (Tables 3-17 and 3.18) indicate that the pH was very low, especially in the months May to September, with the lowest value of 3.5 in the months of August and Sep, 2007. At the same time the average conductance values were highest in April 2008. Figure 3-34 and 3.35 indicate that as per the results of both wet only and bulk sample monitoring, conductivity showed a continuous rising trend from September 2007 to April 2008 and the pH in 2008 (January to April) remained between 5.7 and 7.5.

However, since the results are available for a very short period and the months for which the results have been reported for 2007 and 2008 are different, no specific conclusions can be drawn, especially since the pH in the wet- only collector is often higher than from the bulk collector. There is no correlation between precipitation, EC and/or pH.

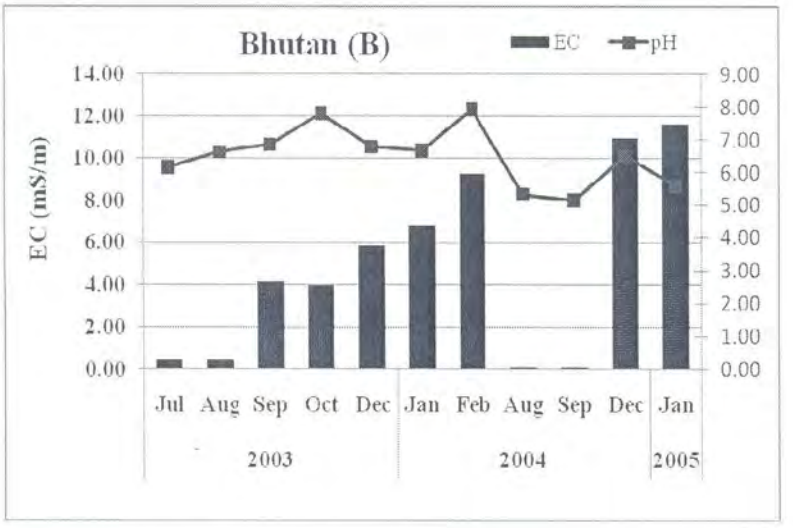


Figure 3-35 Variation in electrical conductance and pH wet (bulk)

Table 3-17 Results of wet monitoring, Bhutan

S No	Year	Month	EC (mS/m)	pH	Precipitation (mm)
1	2003	Jul	0.5	6.8	1649
2	2003	Aug	0.5	6.0	30
3	2007	May	0.3	4.7	6
4	2007	Jun	0.5	4.5	69
5	2007	Jul	0.5	4.5	102
6	2007	Aug	0.3	3.4	118
7	2007	Sep	0.3	3.5	80
8	2007	Oct	0.8	5.1	24
9	2007	Nov	0.6	5.2	36
10	2007	Dec	1.0	4.1	5
11	Annual avg 2007		0.6	4.4	16
12	2008	Jan	0.6	4.4	25
13	2008	Feb	0.7	4.5	68
14	2008	Mar	1.0	4.8	56
15	2008	Apr	1.2	4.9	27
16	Annual avg 2008		1.1	5.2	256

Table 3-18 Results of wet (bulk monitoring), Bhutan

S No	Year	Month	EC (mS/m)	pH	Precipitation (mm)
1	2003	Jul	0.5	6.1	1484
2	2003	Aug	0.5	6.6	36
3	2003	Sep	4.2	6.9	112
4	2003	Dec	5.9	6.8	109
5	2004	Jan	6.8	6.7	12
6	2004	Feb	9.3	7.9	
7	2004	Aug	0.1	5.3	183
8	2004	Sep	0.01	5.2	75
9	2004	Dec	11.0	6.5	
10	2005	Jan	11.6	5.6	3

Iran

Iran has conducted the wet deposition monitoring only for 2-3 months in a year, thus the data cannot be used to establish any trends. Figures 3-36 and 3-37 give the relative variation in the EC and pH in the wet only and bulk precipitation samples respectively. The pH varied from 5.7 to 7.3 in the wet only samples (Table 3-19) collected (with an exception of 4.4 in January, 2006) and from 7.0 to 7.2 in the bulk samples (Table 3-20). Since the data is very less, annual averages have not been considered. Moreover, the results of wet only and bulk samples cannot be compared because they have different periods.

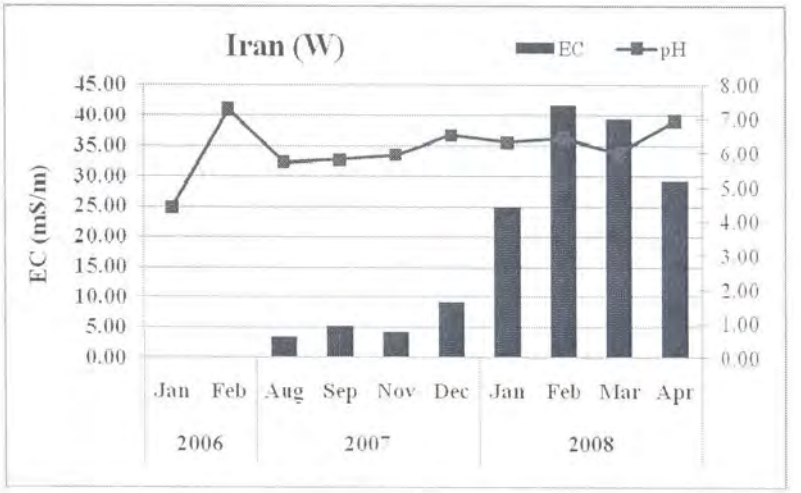


Figure 3-36 Variation in electrical conductance and pH (wet)

In general, the higher pH of the Bulk samples could be due to the higher concentration of cations like calcium and magnesium which represent neutralization with soil ions. Highest conductance of 41.8mS/m was observed during February, 2008. It is also noted that the conductance is much higher in the wet only samples and the concentration of ions is more in the bulk samples.

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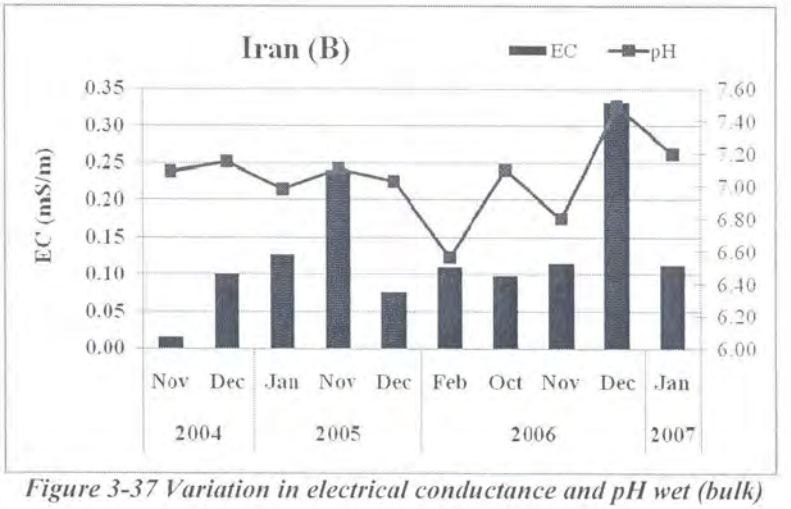

Figure 3-37 Variation in electrical conductance and pH wet (bulk)

Table 3-19Results of wet monitoring, Iran

S No	Year	Month	EC (mS/m)	pH	Precipitation (mm)
Iran (W) - Anions					
1	2006	Jan	0.1	4.4	490
2	2006	Feb	0.1	7.3	500
3	Average 2006		0.1	6.3	492
4	2007	Aug	3.4	5.7	
5	2007	Sep	5.3	5.8	
6	2007	Nov	4.3	6.0	
7	2007	Dec	9.2	6.5	
8	Average 2007		5.2	5.9	
9	2008	Jan	25.0	6.3	

Table 3-20 Iran - Bulk

S No	Year	Month	EC (mS/m)	pH
11	2004	Nov	0.1	7.2
12	2004	Dec	0.1	7.1
13	Average 2004		0.1	7.2
14	2005	Jan		7.1
15	2005	Nov	0.1	7.2
16	2005	Dec	0.1	7.0
17	Average 2005		0.1	7.1
18	2006	Jan	0.2	7.1
19	2006	Feb	0.1	7.0
20	2006	Oct	0.1	6.6
21	2006	Nov	0.1	7.1
22	2006	Dec	0.1	6.8
23	Average 2006		0.1	7.0
24	2007	Jan	0.3	7.5
25		Feb	0.11	7.13

Maldives

The results (Figure 3-38 and Table 3-21) are available only for a few months during 2005 and 2006. The wet only samples have been analysed for all the required parameters.

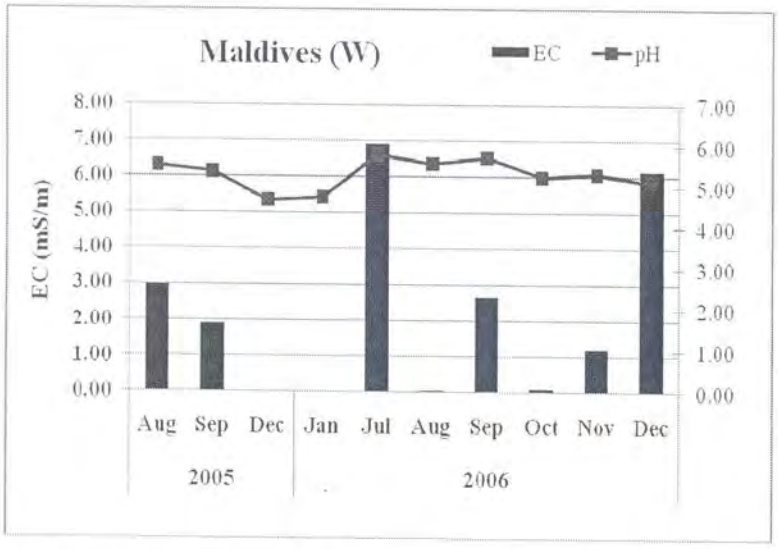

Figure 3-38 Variation in electrical conductance and pH (wet)

Figure 3-38 shows the variation in the pH values and that of EC. As the pH of the unpolluted natural water in equilibrium with atmospheric CO_2 is 5.6, the rainwater in which the pH is less than 5.6 is considered to be acid rain. It can be seen that there are nine acidic events out of the total ten events measured during 2005-2006 and one in Jan, 2008, i.e., 82% of the times the pH value was less than 5.6. Generally pH<5 is considered to be the critical line of the acid rain and reflects human-induced pollution in the absence of a substantial amount of base cations. In this case, 27% of the pH values measured was less than 5.

Thus the rainwater was slightly acidic, the minimum and maximum pH being 4.7 and 5.8 respectively. There is an unusual variation in the conductance values with no correlation with the pH. The conductance varied between 0.1 to 24.4mS/m.

Table 3-21 Results of wet monitoring, Maldives

S No	Year	Month	EC (mS/m)	pH
Maldives (W)				
1	2005	Jun	24.4	-
2	2005	Jul	12.9	-
3	2005	Aug	2.0	5.5
4	2005	Sep	1.9	5.4
5	2005	Dec		4.7
6	2006	Jan		4.7
7	2006	Jul	6.9	5.8
8	2006	Aug	0.1	5.6
9	2006	Sep	2.7	5.7
10	2006	Oct	0.1	5.2
11	2006	Nov	1.2	5.3
12	2006	Dec	6.2	5.1
13	2007	Jan		4.7

Nepal

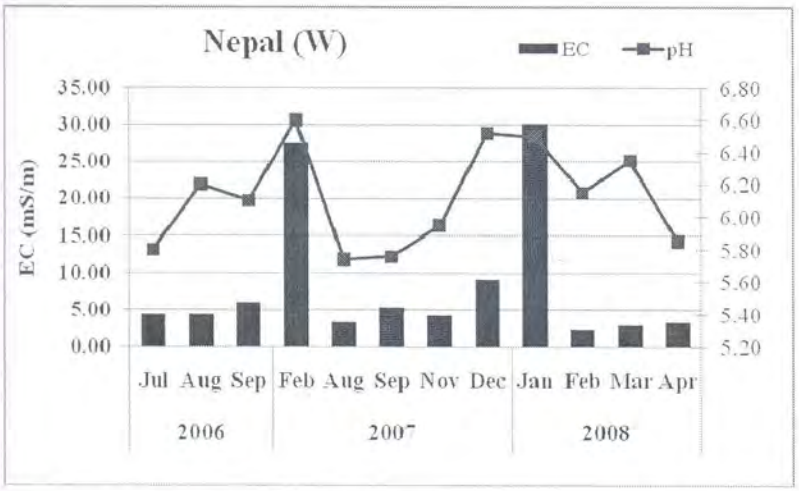

Figure 3-39 Variation in electrical conductance and pH (wet)

The wet only and the bulk monitoring were conducted only for a few months during 2006-2008. The samples were analysed for pH, EC, anions and a very few samples for some cations (Table 3-22 and 3-23). The pH varied between 5.7 and 6.5. (Figure 3-39 and 3-40) over the years, the electrical conductivity showed a decreasing trend. The reason for very high electrical conductivity and pH during the monitoring period needs to be looked into.

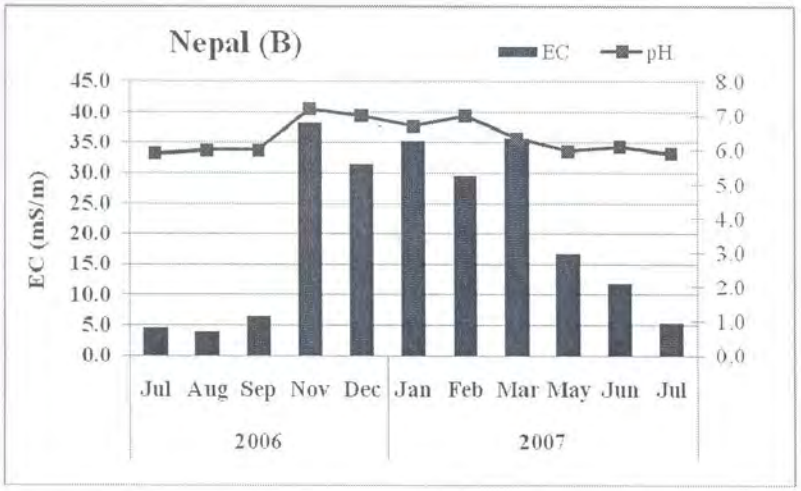

Figure 3-40Variation in electrical conductance and pH (bulk)

Table 3-22 Results of wet monitoring, Nepal

S No	Year	Month	EC mS/m	pH	Precipitation Mm
1	2006	Jul	4.5	5.8	
2	2006	Aug	4.4	6.2	
3	2006	Sep	6.0	6.1	2050
4	2007	Aug	3.4	5.7	4985
5	2007	Sep	5.4	5.8	4300
6	2007	Nov	4.3	6.0	1000
7	2007	Dec	9.2	6.5	1000
8	2008	Jan	30.2	6.5	864
9	2008	Feb [1]	2.4	6.2	975
10	2008	Mar[1]	3.1	6.4	970
11	2008	Apr[1]	3.4	5.9	890

Table 3-23 Results of wet (bulk) monitoring, Nepal

S No	Year	Month	EC mS/m	pH	Precipitation mm
1	2006	Jul	4.6	5.9	
2	2006	Aug	3.9	6.0	
3	2006	Sep	6.4	6.0	11565
4	2006	Nov	38.2	7.2	370
5	2006	Dec	31.5	7.0	620
6			16.9	6.4	
7	2007	Jan	35.3	6.7	
8	2007	Feb	29.5	7.0	
9	2007	Mar	35.7	6.4	
10	2007	May	16.9	6.0	
11	2007	Jun	11.9	6.1	
12	2007	Jul	5.5	5.9	
13			18.1	6.2	

Pakistan

Pakistan started the wet only and bulk sampling in 2007. The samples were analysed only for pH, conductance and precipitation was reported in a few cases. (Figures 3-41 and 3-42 and Table 3-24 and 3-25)

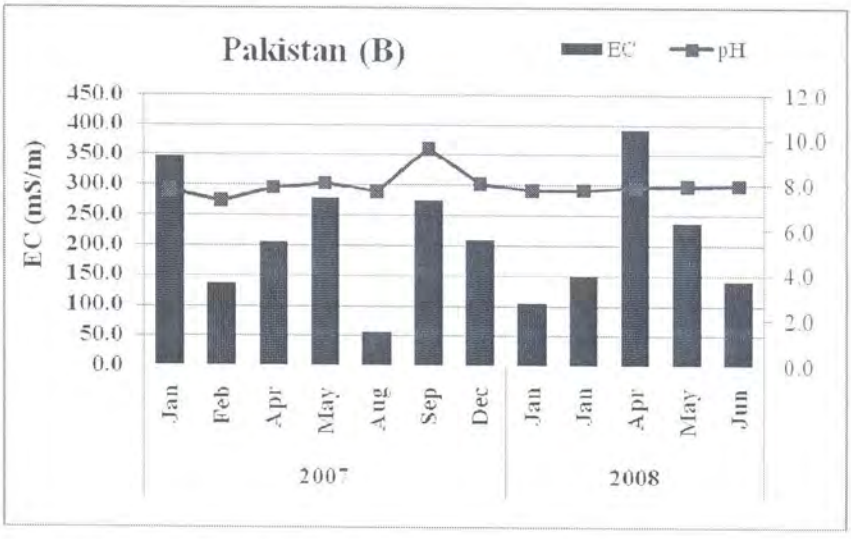

Figure 3-41 Variation in electrical conductance and pH wet (wet)

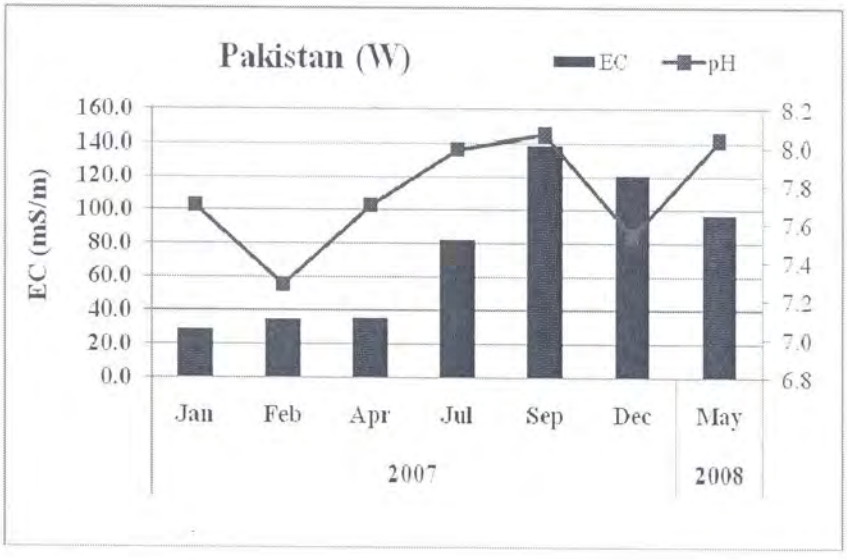

Figure 3-42 Variation in electrical conductance and pH wet (bulk)

Table 3-24 Results of wet monitoring, Pakistan

S No	Year	Month	EC (mS/m)	pH	Precipitation (mm)
1	2007	Jan	29.2	7.7	
2	2007	Feb	35.0	7.3	
3	2007	Apr	35.8	7.7	1
4	2007	May		8.0	
5	2007	Jun	34.7	7.5	33
6	2007	Jul	82.4	8.0	3
7	2007	Aug	23.9	-	19
8	2007	Sep	138.9	8.1	10
9	2007	Dec	120.5	7.5	5
10	Annual avg 2007		69.1	7.6	
11	2008	May	9.7	8.0	16

Table 3-25Results of wet (bulk) monitoring, Pakistan

S No	Year	Month	EC (mS/m)	pH	Precipitation (mm)
1	2007	Jan	348.0	7.8	348
2	2007	Feb	135.8	7.3	
3	2007	Apr	205.6	7.9	
4	2007	May	278.0	8.1	
5	2007	Jun	48.0	7.6	33
6	0	Jul	140.1	8.1	5
7	2007	Aug	56.0	7.7	19
8	2007	Sep	275.0	9.6	10
9	2007	Dec	210.0	8.0	5
10	Annual avg 2007		154.7	7.8	
11	2007	Jan	150.9	7.8	9
12	2008	Apr	393.0	7.9	9
13	2008	May	162.2	8.0	18
14	2008	Jun	139.2	8.0	28
15	Annual avg 2008		211.4	7.9	

Sri Lanka

Sri Lanka carried out the Wet Deposition studies regularly for all the cations and anions since 2004. The volume weighted mean annual pH varied from 4.8 to 7.33 during the four years of wet only and bulk monitoring. Annual differences were evident but despite these slight annual differences, no definite trends were observed, both in the wet only and wet bulk samples. The pH range for both the type of samples was similar, indicating no external contamination due to continuous exposure of the bulk sampler. The lowest pH for any weekly sample (4.3) was measured in March, 2004 and the highest (8.14) in June, 2007.

A look at Figure 3-33 which gives the frequency variation in the pH of weekly samples indicates that maximum number of precipitation samples with pH below 5.6 was captured during 2004, however, it may be noted that the frequency of weekly samples with pH below 5.6 has decreased over the years and no such sample was recorded during 2008. The fluctuations were also associated with fluctuations

in precipitation amounts both above and below the long term averages. There has been a slight increase in the pH over the years.

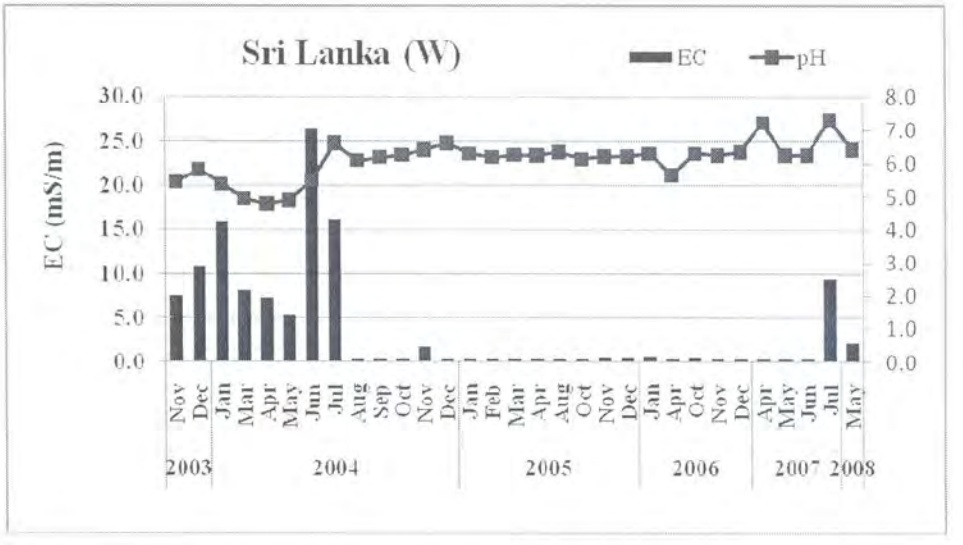

Figure 3-43 Variation in electrical conductance and pH wet (wet)

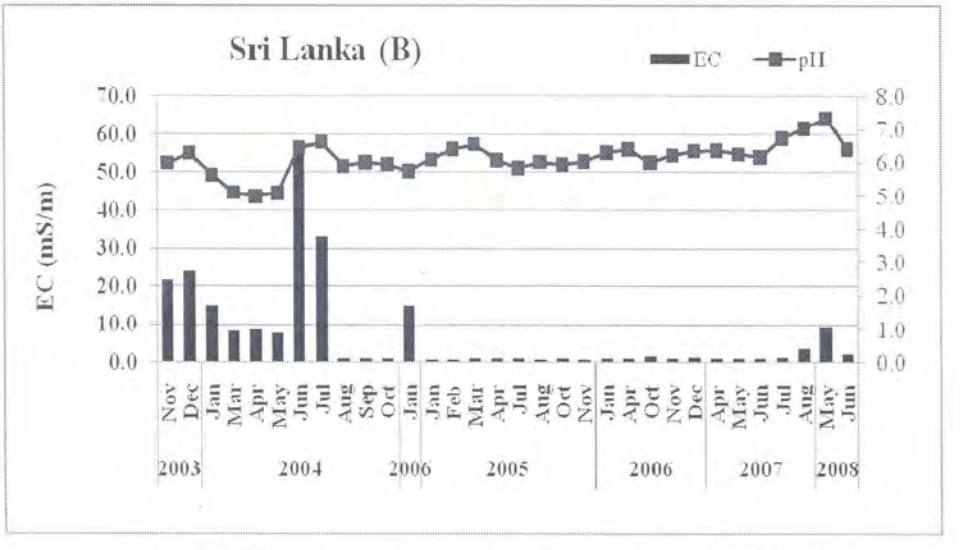

Figure 3-44 Variation in electrical conductance and pH wet (bulk)

High conductance values were reported from November 2003 to July 2004 (maximum 58.2mS/m); however, the data reported after July 2004 indicates a conductance range from 0.5 to 9.4mS/m in the wet only and the bulk samples. A look at Table 3-26 and 3-27 which gives both the measured and calculated EC indicates that the data up to July 2004 may be ignored as probably the measurement and reporting had not stabilized until then. Unusually high EC in May2008 needs to be correlated with the meteorological data to know the reasons.

Table 3-26 Results of wet monitoring, Sri Lanka

S No	Year	Month	EC (mS/m)	pH	Precipitation (mm)
1	2003	Nov	7.6	5.4	281
2	2003	Dec	10.9	5.8	785
3	2004	Jan	15.9	5.4	323
4	2004	Mar	8.2	4.9	1386
5	2004	Apr	7.3	4.8	813
6	2004	May	5.3	4.9	584
7	2004	Jun	26.5	5.5	49
8	2004	Jul	16.3	6.6	249
9	2004	Aug	0.5	6.1	715
10	2004	Sep	0.5	6.2	1050
11	2004	Oct	0.5	6.3	323
12	2004	Nov	1.8	6.4	2566
13	2004	Dec	0.4	6.6	304
14	Annual avg 2004		6.7	5.8	1078
15	2005	Jan	0.4	6.3	2855
16	2005	Feb	0.5	6.2	145
17	2005	Mar	0.5	6.3	1512
18	2005	Apr	0.6	6.3	1643
19	2005	Aug	0.5	6.3	620
20	2005	Oct	0.5	6.1	2121
21	2005	Nov	0.6	6.2	4017
22	2006	Jan	0.7	6.2	1730
23	2006	Apr	0.8	6.3	1110
24	2006	Oct	0.5	5.7	1478
25	2006	Nov	0.6	6.3	4150
26	2006	Dec	0.5	6.3	
27	2007	Apr	0.5	6.4	
28	2007	May	0.5	7.2	
29	2007	Jun	0.5	6.3	
30	2007	Jul	0.5	6.3	
31	2008	May	9.4	7.3	1000
32		Jun	2.3	6.4	1433

Table 3-27 Results of wet (bulk) monitoring, Sri Lanka

S No	Year	Month	EC (mS/m)	pH	Precipitation (mm)
1	2003	Nov	21.6	6.0	2810
2	2003	Dec	23.9	6.3	773
3	2004	Jan	15.0	5.6	58
4	2004	Mar	8.3	5.1	1261
5	2004	Apr	8.5	5.0	807
6	2004	May	7.8	1	576
7	2004	Jun	58.2	6.5	43
8	2004	Jul	33.1	6.6	242
9	2004	Aug	1.1	5.9	690
10	2004	Sep	1.0	6.0	2004
11	2004	Oct	1.1	6.0	585
12	Annual avg 2004		14.9	5.8	755
13	2005	Jan	0.9	6.1	2530
14	2005	Feb	0.8	6.4	140
15	2005	Mar	1.0	6.6	1332
16	2005	Apr	1.0	6.1	1718
17	2005	Jul	1.0	5.9	
18	2005	Aug	0.9	6.0	
19	2005	Oct	1.0	6.0	
20	2005	Nov	0.9	6.0	
21	2006	Jan	1.2	6.3	1182
22	2006	Apr	1.2	6.4	1230
23	2006	Oct	1.5	6.0	2025
24	2006	Nov	1.1	6.2	1692
25	2006	Dec	1.3	6.4	573
26	2007	Apr	1.0	6.4	1465
27	2007	May	1.1	6.3	575
28	2007	Jun	1.0	6.2	1063
29	2007	Jul	1.3	6.7	128
30	2007	Aug	3.8	7.0	2290
31	2008	May	9.5	7.3	1000
32	2008	Jun	2.3	6.4	1433

ANNEXURE I DATA FROM PASSIVE (DIFFUSIVE) SAMPLING

Results of Passive (Diffusive) Sampling Bangladesh

S No	Year	Month	Duration	Temp (^{0}C)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	Remarks
1	2004	Jul	19 Jul-17	29.4	1.2	0.7		
		Sep	17Sep-16	29.6	0.8	0.7		
		Oct	16Oct-14	27.4	3.3	4.1		
		Dec	14 Dec- 2	20.0	5.5	3.9		
	Avg				2.7	2.4		
	FB(2)				0.7	8.5*		
	A C				2.0	2.4		
2	2005	Feb	11Feb-11	24.0	1.7	1.7		
		Apr	11Apr - 9 Jun	28.6	0.6	0.6		Sampler is damaged (storm - value
		Jun	12 Jun -11	31.0	0.6	0.7		
		Jul	11 Jul-9	29.9	0.7	0.7		
		Aug	13Aug-	27.5	0.7	0.7		
		Sep	11Sep-	15.5	1.0	1.5		
	Avg				0.9	1.0		
	FB(1)				0.7	0.7		
	A.C				0.9	1.0		
3	2006	Mar	1 Mar - 1	21.9	4.9	3.6		
		Apr	1Apr - 1	26.2	1.7	3.0		
		May	1 May - 1	27.2	1.1	1.7		
		Jul	1 Jul - 31	27.1	1.2	1.3		
		Aug	1Aug-31	27.2	1.1	1.2		
		Sep	1Sep - 30	26.9	0.8	1.8		
		Oct	1Oct - 31	25.8	1.6	2.8		
		Nov	1Nov-30	19.0	2.9	3.9		
		Dec	1Dec -31	14.5	6.4	7.0		
	Avg				2.4	2.9		
	FB(1)				*	*		
	A.C				2.4	2.9		
4	2007	Jan	1 Jan - 31	12.3	10.3	7.0	88.0	
		Feb	1 Feb -28	18.4	4.4	3.5	83.0	
		Mar	1Mar-31	21.4	5.6	3.5	88.0	
		Apr	2 Apr-30	26.1	1.0	1.3	47.0	
		May	1May-	27.7	1.7	1.9	74.0	
		Jun	1 Jun - 30	27.9	1.4	1.1	57.0	
		Jul	1 Jul - 31	26.9	1.2	1.1	49.0	

ANNEXURE I: Data from Passive (Diffuse) Sampling

S No	Year	Month	Duration	Temp (^{0}C)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	Remarks
		Aug	1Aug-31	27.1	1.2	1.0	45.0	
		Sep	1 Sep - 30	26.7	1.2	1.5	42.0	
		Oct	1 Oct - 31	24.1	3.2	2.4	85.0	
		Nov	1 Nov -30	20.1	1.2	3.7	64.0	
		Dec	1 Dec - 31	14.4	5.5	7.0	80.0	
	Avg				3.2	2.9	66.8	
	FB(3)				< 0.1	0.1	<1	Samples received in lab after more than six months
	A.C				3.2	2.9	66.8	
5	2008	Jan	1 Jan - 31	13.1	9.3	7.4	-	Filter Damage
		Feb	1 Feb - 29	15.0	6.3	3.3	96.0	
		Mar	1 Mar -31	23.2	3.3	2.0	76.0	
		Apr	1 Apr -30	25.7	2.7	2.3	79.0	
	A.C				5.4	3.8	62.8	

** Unusual field blank ignored*

** Represents the values which are not reported.*

The values which are < 0.1 or < 0.2 etc are considered 0 while calculating Actual Concentration

XX indicates min value for the above period

YY indicates max value for the above period

Results of Passive (Diffusive) Sampling Bhutan A

S No	Year	Month	Duration	Temp (^{0}C)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	Remarks
1	2003	Aug	25Aug-25 Sep	20.0	< 0.2	0.7		
		Sep	3Sep - 25 Nov	20.0	0.1	0.5		
		Nov	27Nov-25 Dec	20.0	0.2	1.1		
		Dec	25Dec -25 Jan	20.0	0.2	1.6		
					0.2	1.0		
	FB				*	*		
	A C				0.2	1.0		
2	2004	Feb	25Jan - 4 Mar	20.0	1.1	3.0		
		Apr	25Mar-25 Apr	20.0	0.4	2.0		
		May	25Apr-25 May	20.0	0.2	1.3		
		Jun	25May-25 Jun	20.0	< 0.2 *	0.8		
		Jul	25 Jun -25 Jul	20.0	< 0.2 *	0.4		
		Aug	25 Jul -25 Aug	20.0	< 0.2 *	1.1		
		Sep	25Aug-25 Sep	28.0	< 0.2 *	0.7		
		Oct	25Sep -25 Oct	19.0	< 0.2 *	1.2		
		Nov	25Oct-25 Nov	19.0	< 0.2 *	1.1		
		Dec	25Nov -25 Jan	19.0	0.4	1.8		

S No	Year	Month	Duration	Temp (^{0}C)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	Remarks
	Avg				0.5	1.3		
	FB(3)				<0.2	0.9		
	A.C				0.5	1.3		
3	2005	Jan	25 Jan -12Mar	10.0	< 0.1	< 0.1		
		Mar	12 Mar-12Apr	20.0	0.3	2.9		
		Apr	12 Apr-12 Jun	20.0	0.2	1.2		
		Jun	12 Jun-12 Aug	20.0	< 0.1	0.8		
		Aug	12 Aug-12Sep	20.0	<0.2	0.1		
	Avg				0.3	1.3		
	FB				0.2 *	1.6**		
	A.C				0.3	1.3		
4	2006	Apr	6 Apr - 6 May	21.0	0.5	4.6	-	
		Aug	1 Aug -1 Sep	27.0	0.1	0.8	28.0	Samplers old, received in the lab in 2008, values may be uncertain
		Sep	1 Sep -1 Nov	28.0	0.2	0.7	22.0	
		Nov	1 Nov -1 Jan	25.0	0.4	1.5	45.0	
	Avg				0.3	1.9	31.7	
	FB				1.2**	3.8*		
	A.C				0.3	1.9	31.7	
5	2007	Feb	1 Feb -1 Mar	22.5	0.3	1.7	47.0	
		Mar	1 Mar – 1 Apr	29.0	1.0	1.8	70.0	
		Apr	1 Apr -1 May	30.5	0.2	2.0	57.0	
		May	1 May -1 Jul	25.0	0.2	1.2	44.0	
		Jul	1 Jul -1 Aug	25.0	0.3	1.4	44.0	
		Aug	1 Aug -1 Oct	25.0	0.1	0.7	24.0	Exposed for two months
		Oct	1 Oct -1 Dec	22.0	0.3	1.0	42.0	
		Dec	1 Dec -1 Jan	23.0	0.6	1.6	53.0	
	Avg				0.4	1.4	47.6	
	FB				*	*		
	A.C				0.4	1.4	47.6	
6	2008	Feb	5 days	14	<0.1	15.5	41	Sample exposed only for 5 days due to invalid fire

Note :Months with less than 0.2 value have not been considered for calculating the averages

Unusual FB value ignored

XX indicates min value for the above period

YY indicates max value for the above period

Results of Passive (Diffusive) Sampling Bhutan B

S No	Year	Month	Duration	Temp (^{0}C)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	Remarks
		Apr	14 Apr - 18 May	10.0	1.3	15.3		
		Jun	17 Jun - 16 Jul	22.0	1.4	15.0		
		Jul	16 Jul - 23 Aug	20.0	0.9	11.9		
1	2004	Aug	23 Aug - 5 Oct	22.0	1.0	13.2		
		Oct	5 Oct -15 Nov	22.0	0.7	14.5		
		Nov	15 Nov - 20 Dec	17.0	1.1	15.3		
		Dec	20 Dec - 21 Jan	17.0	1.0	18.2		
	Avg				1.1	14.8		
	FB				2**	16.3**		
	A.C				1.1	14.8		
		Feb	22 Feb - 25 Apr	10.0	0.9	13.0		
		Apr	25 Apr - 25 May	16.0	1.2	10.7		
		May	25 May - 27 Jun	18.0	0.8	13.1		
2	2005	Jul	30 Jul - 1 Sep	20.0	1.5	23.0		
		Sep	1 Sep - 6 Oct	18.0	0.5	9.3		
		Oct	6 Oct - 7 Nov	17.0	0.4	9.5		
		Nov	7 Nov -12 Dec	15.0	0.9	13.8		
	Avg				0.9	13.2		
	FB				1.2**	15.3**		
	A.C				0.9	13.2		
		Jan	16 Jan - 20 Feb	20.0	0.3	5.8		
		Feb	20 Feb - 1 Apr	25.0	0.4	9.0		
		Apr	1 Apr - 1 May	25.0	0.3	7.7		
3	2006	Jun	7 Jun - 7 Aug	23.0	1.2	12.2		
		Aug	7 Aug -16 Nov	20.0	0.6	7.6		
		Nov	16 Nov -11 Jan	13.0	0.7	14.2		
	Avg				0.6	9.4		
	FB				0.4**	11.6**		
	A C				0.6	9.4		
4	2007	Feb	2/7-5/10	7.0	0.9	9.2		Samplers old, received in the lab in 2008, values may be uncertain
	Avg							
	FB				0.5**	12.1**		
	A C							

Note :Months with less than 0.2 have not been considered for calculating the averages

*** Unusual FB value ignored*

XX indicates min value for the above period

YY indicates max value for the above period

Results of Passive (Diffusive) Sampling India

S No	Year	Month	Duration	Temp (^{0}C)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	Remarks
1	2004	Nov	30 Nov - 21 Dec	20.0	5.4	15.7		
		Nov	30 Nov - 21 Dec	20.0	5.6	16.0		
	Avg				5.5	15.9		
	FB (1)				<0.2	0.3		
	A C				5.5	15.6		
2	2005	Feb	5 Feb - 27 Feb	20.0	9.3	9.6		NO_2 sampler damaged, value uncertain
		Mar	10 Mar -31 Mar	20.0	2.5	4.4		
		Jun	15 Jun - 5 Jul	20.0	0.7	2.5		
		Jul	13 Jul - 2 Aug	20.0	1.0	1.8		
		Aug	2 Aug - 23 Aug	20.0	2.3	2.8		
		Sep	1 Sep - 21 Sep	20.0	1.1	2.6		
		Oct	6 Oct - 26 Oct	20.0	2.2	4.5		
		Nov	3 Nov - 23 Nov	20.0	4.5	11.3		
		Dec	1 Dec -21 Dec	25.0	9.8	17.9		
	Avg				3.7	6.4		
	FB(2)				<0.2	0.2		
	A C				3.7	6.4		
3	2006	Feb	2 Feb - 27 Feb	25.0	9.1	9.6		
		Mar	2 Mar -22 Mar	20.0	9.4	9.7		
		Apr	4 Apr - 24 Apr	20.0	3.0	4.2		
		May	2 May -22 May	20.0	2.6	3.8		
		Jul	4 Jul - 24 Jul	20.0	2.0	2.8	61.0	
		Aug	4 Aug - 24 Aug	20.0	1.8	2.3	49.0	
		Sep	5 Sep - 25 Sep	20.0	0.9	2.2	31.0	
		Oct	11 Oct - 31 Oct	20.0	3.7	7.0	44.0	
		Nov	8 Nov - 28 Nov	20.0	5.8	9.5	53.0	
		Dec	6 Dec -27 Dec	20.0	11.2	15.7	53.0	
	Avg				5.0	6.7	48.5	
	FB(1)				<0.2	0.4		
	A C				7.0	6.3		
4	2007	Jan	3 Jan - 24 Jan	20.0	13.0	15.2	66.0	
		Feb	1 Feb - 22 Feb	20.0	5.6	7.5	58.0	
		May	1 May -22 May	20.0	4.2	4.7	70.0	
		Jun	7 Jun -27 Jun	20.0	1.3	4.5	55.0	
		Jul	2 Jul -23 Jul	20.0	1.5	2.8	52.0	
		Aug	1 Aug - 22 Aug	20.0	1.7	2.3	44.0	
		Sep	3 Sep - 24 Sep	20.0	1.7	3.0	38.0	
	Avg				4.1	5.7	54.7	
	FB				*	*		
	A C				4.1	5.7	54.7	

*** Unusual FB value ignored*
XX indicates min value for the above period
YY indicates max value for the above period

ANNEXURE I: Data from Passive (Diffuse) Sampling

Results of Passive (Diffusive) Sampling Iran

S No	Year	Month	Duration	Temp (^{0}C)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	Remarks
1	2003	Oct	1 Oct -31 Oct	20.0	7.4	4.2		Dates uncertain
	Avg							
	FB				*	4.1		
	A C							
2	2004	Dec	1 Dec - 31 Dec	20.0	6.4	1.0		Dates uncertain, NO_2 sampler damaged-value
	Avg							
	FB							
	A C							
3	2005	Apr	2 Apr - 2 May	20.0	7.8	2.1		
		May	10 May -10 Jun	20.0	42.0	1.3		
		May	10 May -10 Jun	20.0	17.3	1.1		
		Jun	10 Jun - 10 Jul	20.0	3.5	1.3		
		Jun	10 Jun - 10 Jul	20.0	6.9	2.2		
		Jul	10 Jul - 10 Aug	20.0	11.0	0.6		
		Jul	10 Jul - 10 Aug	20.0	16.1	3.8		
		Aug	10 Aug -12 Sep	20.0	11.0	1.3		
		Oct	25Oct - 25 Nov	20.0	6.8	4.8		
		Nov	25Nov -24 Dec	20.0	6.7	4.7		
		Dec	24 Dec - 24 Jan	20.0	4.7	3.6		
	Avg				9.2	2.4		
	FB				9.2**	1.9**		
	A C				9.2	2.4		
4	2006	Feb	24 Jan - 24 Feb	20.0	< 0.2 *	< 0.2 *		
		Apr	24 Mar -24 Apr	20.0	< 0.2 *	0.1 *		
		May	24 Apr-24 May	20.0	7.2	1.2		
		Jun	24 May -24 Jun	20.0	11.2			
		Jul	24 Jun - 24 Jul	20.0	22.3	1.1		
		Aug	24 Jul -24 Aug	20.0	14.9	2.0	110.0	
		Sep	24 Aug -24 Sep	40.0	11.8	1.3	71.0	
		Oct	24 Sep -24 Oct	40.0	13.5	3.4	75.0	
		Nov	24 Oct -26 Nov	20.0	8.4	6.7	116.0	
	Avg				12.8	2.6	93.0	
	FB				9.8**	0.9		
	A C				12.8	2.6	93.0	
5	2007	March	15Feb–15 Mar	20.0	5.1		86.0	
		Apr	15Mar-15Apr	22.5	5.1	2.6	76.0	
		May	15Apr-15May	21.6	8.6	3.8	72.0	
		Aug	8/15 to 9/15	38.2	11.7	0.6	74.0	
		Oct	9/15 to 10/15	40.0	13.4	1.1	67.0	

S No	Year	Month	Duration	Temp (^{0}C)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	Remarks
		Nov	10/15 to 11/15	20.0	13.6	1.3	53.0	
	Avg				9.6	1.9	71.3	
	FB				*	*		
	A C				9.6	1.9	71.3	

1. Annual Avgs for 2003 and 2004 are not calculated due to insufficient data

2. Concentrations <0.2 are considered as nil

Since ~~FBs~~ are unusually high these have not been considered

XX indicates min value for the above period

YY indicates max value for the above period

Results of Passive (Diffusive) Sampling Maldives

S No	Year	Month	Duration	Temp (^{0}C)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	Remarks
1	2003	Aug	31 Jul -30 Aug	20.0	<0.2	1.2		
		Sep	30 Aug-30 Sep	20.0	0.2	0.3		
		Oct	30 Sep -1 Nov	20.0	<0.2	0.3		
		Nov	1 Nov -30 Nov	20.0	1.0	1.8		
	Avg				0.6	0.9		
	FB				*	*		
	A C				0.6	0.9		
2	2004	Jan	31 Dec -31 Jan	20.0	0.6	0.9		
		Feb	31 Jan -29 Feb	20.0	0.5	1.4		
		Mar	29 Feb-31 Mar	20.0	0.4	0.6		
		Apr	31 Mar-30 Apr	20.0	<0.2	0.8		
		May	30Apr-31 May	30.4	<0.2	0.3		
		Jun	31May -30 Jun	29.0	0.2	<0.1		
		Jul	30 Jun -31 Jul	29.0	<0.2	0.6		
		Aug	31 Jul -31 Aug	20.0	0.2	0.6		NO_2 sampler damaged, value
		Sep	31Aug -30 Sep	29.0	<0.2	0.5		
		Nov	31Oct -30 Nov	20.0	0.4	1.1		
	Avg				0.4	0.8		
	FB				0.2	0.8		
	A C				0.4	0.8		
3	2005	Jan	31 Dec -31 Jan	30.0	0.4	1.6		
		Feb	31 Jan -28 Feb	30.0	0.6	1.4		
		Apr	31Mar -30 Apr	32.0	2.7	1.5		
		May	30Apr-31 May	31.0	2.0	0.7		
		Jun	31May -30 Jun	30.0	<0.2	0.6		

ANNEXURE I: Data from Passive (Diffuse) Sampling

S No	Year	Month	Duration	Temp (^{0}C)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	Remarks
		Oct	30 Sep -31 Oct	27.0	<0.2	0.5		
	Avg				1.4	1.1		
	FB				0.7	1.4		
	A C				1.4	1.1		
4	2006	Jan	31 Dec -31 Jan	29.0	0.4	1.4		
		Feb	31 Jan -28 Feb	30.0	0.8	1.3		
		Mar	29Feb -31 Mar	31.0	0.4	1.1		
		Apr	31Mar -30 Apr	32.0	1.1	1.0		
		May	30Apr-31 May	28.0	0.2	0.5		
		Jun	31May -30 Jun	28.0	0.2	0.5		
		Jul	30 Jun -31 Jul	31.0	<0.2	0.7		
		Aug	31 Jul -31 Aug	30.0	0.2	0.6		
		Sep	31Aug -30 Sep	20.0	<0.2	0.4		
		Oct	30 Sep -31 Oct	20.0	<0.2	0.5		
		Nov	31Oct -30 Nov	29.0	0.2	0.7		
		Dec	30Nov -31 Dec	30.0	0.7	1.0		
	Avg				0.5	0.8		
	FB				0.5	0.9		
	A C				0.5	0.8		
5	2007	Jan	31 Dec -31 Jan	30.0	0.8	1.0		
		Feb	31 Jan -28 Feb	31.0	0.6	0.3		
		Mar	29Feb -31 Mar	31.0	0.4	1.0		
		Apr	31Mar -30 Apr	32.0	0.2	1.1		
		May	30Apr-31 May	31.0	<0.2	0.4	36.0	
		Jun	31May -30 Jun	31.0	0.3	0.3	33.0	
		Jul	30 Jun -31 Jul	30.0	<0.2	0.4	36.0	
		Aug	31 Jul -31 Aug	28.0	<0.2	0.5	27.0	Ozone sampler old, results uncertain
		Sep	31Aug -30 Sep	30.0	<0.2	0.3	61.0	Ozone sampler old, results uncertain, NO_2
		Oct	30 Sep -31 Oct	30.0	<0.2	0.3	63.0	
		Nov	31Oct -30 Nov	31.0	0.4	1.0	48.0	
	Avg				0.4	0.6	43.4	
	FB				< 0.1	<0.1	1.0	
	A C				0.4	0.6	42.4	
	2008	Jan	31 Dec -31 Jan	29.0	0.8	1.1	50.0	
		Feb	31 Jan -29 Feb	27.0	0.3	0.8	55.0	
		Mar	29Feb -31 Mar	31.0	0.2	0.9	50.0	
		Apr	31Mar -30 Apr	31.0	0.2	<0.1	44.0	
	Avg							
	FB				<0.2	<0.2	1.4	
	A C				0.2		42.6	

S No	Year	Month	Duration	Temp (^{0}C)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	Remarks

1. Annual Avg for 2003 and 2008 are not calculated due to insufficient data
2. Concentrations less than 0.2 are considered as nil
*** Unusual values ignored*
XX indicates min value for the above period
YY indicates max value for the above period

Results for Passive (Diffusive) Sampling Nepal

S No	Year	Month	Duration	Temp (^{0}C)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	Remarks
1	2003	Mar	25 Mar -7 Jun	20.0	0.8	6.6		
		Jun	7 Jun -31 Jun	20.0	0.3	2.8		
		Aug	31 Jul -15 Aug	20.0	0.2	1.5		
		Sep	10 Sep -12 Oct	20.0	<0.2	2.9		
		Oct	12 Oct - 9 Nov	20.0	<0.2	9.8		
		Nov	9 Nov - 9 Dec	20.0	<0.2	0.2		NO_2 very low, unexposed??
		Dec	9 Dec -11 Jan	20.0	1.2	16.2		2 months exposure? Nov-
	Avg				0.6	5.7		
	FB				*	*		
	A.C				0.6	5.7		
2	2004	Mar	1 Mar -1 Apr	20.0	2.5	9.1		
		Apr	1 Apr – 1 May	20.0	1.1	7.5		
		May	1 May -1 Jun	20.0	0.7	5.1		
	Avg			20.0	1.4	7.2		
	FB				*	*		
	A.C				1.4	7.2		
3	2005	Jan	13 Jan -1 Feb	20.0	<0.2	6.1		
		Feb	1 Feb - 1 Mar	20.0	0.7	5.6		
		Mar	1 Mar -1 Apr	20.0	1.1	8.2		
		Apr	1 Apr - 1 May	20.0	2.5	10.4		
		May	1 May -1 Jun	20.0	0.7	8.4		
		Jun	1 Jun -1 Jul	20.0	0.5	6.4		
		Jul	1 Jul -1 Aug	20.0	0.2	4.1		
		Aug	1 Aug - 1 Sep	20.0	<0.2	2.3		
		Sep	1 Sep -1 Oct	20.0	0.3	3.3		
		Oct	1 Oct -1 Nov	20.0	0.2	4.5		
		Nov	1 Nov -1 Dec	20.0	0.3	7.3		
		Dec	1 Dec -1 Jan	20.0	<0.2	7.5		
	Avg			20.0	0.7	6.2		
	FB				0.1*	0.1*		
	A.C				0.7	6.2		

ANNEXURE I: Data from Passive (Diffuse) Sampling

S No	Year	Month	Duration	Temp (^{0}C)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	Remarks
4	2006	Jan	1 Jan -1 Feb	20.0	0.2	7.3		
		Feb	1 Feb - 1 Mar	20.0	0.5	8.2		
		Mar	1 Mar -1 Apr	20.0	2.1	9.1		
		Apr	1 Apr - 1 May	20.0	0.8	6.3		
		May	1 May -1 Jun	20.0	0.4	4.6		
		Jun	1 Jun -1 Jul	20.0	0.4	3.6		
		Jul	1 Jul -1 Aug	20.0	<0.2	3.2		
		Aug	1 Aug - 1 Sep	20.0	<0.2	3.4		
		Sep	1 Sep -1 Oct	20.0	<0.2	3.1		
		Oct	1 Oct -1 Nov	20.0	0.3	5.0		
		Nov	1 Nov -1 Dec	20.0	0.4	7.3		Samplers from 2005-12
		Dec	1 Dec -1 Jan	20.0	0.6	8.0		Samplers from 2006-05.
	Avg				0.6	5.8		
	FB				< 0.1*	0.1*		
	A.C				0.6	5.8		
	2007	Jan	1 Jan -1 Feb	20.0	0.5	8.3		
		Feb	1 Feb - 1 Mar	20.0	0.6	7.6		
		Mar	1 Mar -1 Apr	20.0	0.6	7.5	60.0	
		Apr	1 Apr - 1 May	20.0	1.1	8.1	76.0	
		May	1 May -1 Jun	20.0	3.1		70.0	
		Jun	1 Jun -1 Jul	20.0	<0.2	2.6	30.0	
		Jul	1 Jul -1 Aug	20.0	0.2	3.3	40.0	
		Aug	1 Aug - 1 Sep	20.0	0.3	3.0	30.0	
		Sep	1 Sep -1 Oct	20.0	0.2	3.0	37.0	
		Oct	1 Oct -1 Nov	20.0	0.4	5.3	28.0	
	Avg				0.8	5.4	37.1	
	FB				<0.1*	0.1*	<0.05*	
	A.C				0.8	5.4	37.1	

1. For March 2003 Avg values are taken

**2. Concentrations less than 0.2 are considered as nil*

*** Unusual values ignored*

XX indicates min value for the above period

YY indicates max value for the above period

Results of Passive (Diffusive) Sampling Pakistan

S No	Year	Month	Duration	Temp	SO_2	NO_2	O_3	Remarks
				(^{0}C)	($\mu g/m^3$)			
1	2005	Jan	18 Jan -18 Feb	20.0	11.7	50.6		
		Feb	18 Feb - 22 Mar	20.0	12.4	51.5		
		Mar	22 Mar -21 Apr	19.8	12.9	37.5		
		Apr	21 Apr -21 May	24.0	14.4	48.3		
		May	21 May -22 Jun	28.5	13.4	34.3		
		Jun	22 Jun -22 Jul	30.3	7.8	41.1		
		Jul	22 Jul -22 Aug	29.3	8.7	41.8		
		Aug	22 Aug -24 Sep	28.0	10.9	44.7		
		Sep	24 Sep -25 Oct	25.7	20.9	73.5		SO_2 sampler very dirty
		Oct	25 Oct -25 Nov	25.0	23.5	51.0		
		Nov	25 Nov -29 Dec	25.0	19.9	60.2		
		Dec	29 Dec - 28 Jan	25.0	18.8	55.8		
	Avg				14.6	49.2		
	F.B				0.1	0.2		
	A.C				14.6	49.0		
2	2006	Jan	28 Jan -28 Feb	9.7	20.6	51.9		
		Feb	28 Feb -31 Mar	11.4	15.8	49.9		
		Mar	31 Mar -6 Jun	23.0	11.6	28.9		
		Jun	6 Jun -26 Jun	23.0	12.1	40.6		
		Jul	26 Jun -27 Jul	27.0	7.7	42.2	54.0	
		Aug	27 Jul -2 Sep	23.3	8.0	42.1	28.0	
		Sep	2 Sep -27 Sep	20.5	12.1	45.0	29.0	
		Oct	27 Sep -31 Oct	16.0	12.1	50.5	26.0	
		Nov	31 Oct -27 Nov	5.4	13.7	62.5	13.0	
		Dec	27 Nov -28 Dec	4.1	9.6	56.5	11.0	
	Avg				12.3	47.0	26.8	
	F.B				0.0	0.1		
	A C				12.3	47.0	26.8	
3	2007	Jan	28 Dec - 9 Jan	3.5	8.9	60.6	11.0	
		Feb	17 Jan - 28 Feb	18.7	9.0	20.2	55.0	
		Mar	1Mar -1 Apr	40.0	9.5	12.4	61.0	
		Apr	1 Apr -30 Apr	20.0	6.8	8.8	70.0	
		Jun	1 Jun - 1 Jul	20.0	3.7	7.7	70.0	
		Jul	1 Jul -1 Aug	20.0	4.7	7.1	66.0	
		Aug	7 Aug -8 Sep	28.0	4.8	8.8	61.0	
		Sep	8 Sep - 8 Oct	20.0	4.4	9.7	76.0	
	Avg				6.5	16.9	58.8	
	F.B				0.0	0.2	1.2	
	A.C				6.5	16.7	57.6	

*** Unusual FB value ignored*

XX indicates min value for the above period

YY indicates max value for the above period

Results of Passive (Diffusive) Sampling Sri Lanka

S No	Year	Month	Duration	Temp (^{0}C)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	Remarks
		Aug	15 Aug-2 Oct	20.0	0.9	2.6		
		Sep	15 Aug-3 Oct	20.0	0.8	2.5		NO_2:Other containers used
1	2003	Oct	2 Oct -5 Nov	28.0	0.5	2.5		
		Nov	2 Oct -6 Nov	28.0	0.6	2.4		
		Nov	5Nov-29 Nov	28.0	<0.2	0.7		
		Dec	29Nov-26Dec	28.0	<0.2	0.8		
	Avg				0.7	1.9		
	FB				*	*		
	A.C				0.7	1.9		
		Jan	26Dec-31 Jan	31.0	<0.2	0.9		North East
		Feb	31Jan- 27 Feb	31.0	<0.2	0.9		
		Mar	27Feb-26Mar	28.0	0.2	2.1		
		Apr	26Mar-30Apr	28.0	0.4	1.9		
		May	14May-29May	28.0	0.5	1.3		
		Jun	29 May -1 Jul	28.0	0.4	1.2		
2	2004	Jul	1 Jul -29 Jul	28.0	0.4	1.8		
		Aug	29Jul -27 Aug	28.0	0.6	2.6		
		Sep	27Aug -1 Oct	28.0	0.8	3.4		
		Oct	1 Oct -1 Nov	28.0	0.9	1.8		
		Nov	1Nov -30 Nov	28.0	0.2	0.6		Rainy period
		Dec	20 Nov -2 Jan	28.0	<0.2	0.6		
	Avg				0.5	1.6		
	FB				*	*		
	A.C				0.5	1.6		
		Jan	2 Jan -30 Jan	28.0	<0.2	0.9		Monsoon season, according to
		Feb	30 Jan - 27	28.0	0.5	1.0		
		Mar	27 Feb -2 Apr	28.0	<0.2	1.6		Rain started in the last week of march.
		Apr	2 Apr -30 Apr	28.0	<0.2	1.3		
		Jun	28 May -2 Jul	30.0	0.4	1.6		Monsoon period.
3	2005	Jul	2 Jul -30 Jul	30.0	0.4	2.2		Remark on protocol not possible to read
		Aug	30 Jul -27 Aug	30.0	0.7	2.6		
		Sep	27 Aug -2 Oct	30.0	0.7	3.4		
		Oct	2 Oct -31 Oct	30.0	<0.2	2.33		Inter monsoonal
		Nov	31 Oct -4 Dec	30.0	0.2	1.1		Inter monsoonal
		Dec	4 Dec -3 Jan	30.0	0.3	0.9		Monsoonal rain.
	Avg			29.27	0.5	1.7		
	FB				*	*		
	A.C				0.5	1.7		

S No	Year	Month	Duration	Temp (^{0}C)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	Remarks
		Jan	3 Jan -29 Jan	28.0	0.2	0.9		Monsoon rain.
		Feb	29 Jan -5 Mar	28.0	<0.2	0.8		Monsoon rain.
		Mar	5 Mar -8 Apr	20.0	0.3	1.5		
		Apr	8 Apr -30 Mar	20.0	0.4	1.7		Monsoon period
		May	30 Apr -3 Jun	20.0	0.6	1.6		
		Jun	3 Jun -3 Jul	20.0	0.8	1.8		
4	2006	Jul	3 Jul -4 Aug	30.0	0.6	1.6	39.62	
		Aug	4 Aug -3 Sep	30.0	0.7	2.9	32.60	
		Sep	3 Sep -30 Sep	30.0	0.7	3.1	33.43	
		Oct	30 Sep -4 Nov	28.0	0.4	1.9	24.4	Samplers intended for Stn 3, protocol marked Field blank.
		Nov	4 Nov -2 Dec	27.0	0.9	0.7	22.85	
		Dec	2 Dec -31 Dec	30.0	0.2	0.6	41.76	
	Avg				0.5	1.6	32.45	
	FB				*	*		
	A.C				0.5	1.6	32.45	
		Jan	30 Dec -3 Feb	30.0	<0.2	0.9	35.30	
		Feb	3 Feb -4 Mar	30.0	<0.2	0.9	23.36	
		Mar	4 Mar -1 Apr	30.0	0.3	1.6		O_3 missing
		Apr	1 Apr -30 Apr	30.0	<0.2	1.5		O_3 missing
		May	30 Apr -7 Jun	30.0	0.9	2.2	40.03	
		Jun	7 Jun -1 Jul	32.0	0.6	1.7	39.64	
5	2007	Jul	1 Jul -29 Jul	30.0	0.4	1.7	37.89	
		Aug	29 Jul -1 Sep	30.0	0.4	2.2	33.80	
		Sep	1 Sep -29 Sep	30.0	0.6	2.4		
		Oct	29 Sep -27	30.0	0.5	2.1		
		Nov	27Oct -27 Nov	32.0	0.3	1.3	28.8	Damage observed on blue cap, result
		Dec	27Nov -29	30.0	<0.2	0.8	28.38	
	Avg				0.5	1.6	26.72	
	FB				*	*		
	A C				0.5	1.6	26.72	
		Jan	29 Dec– 26		<0.2	0.9	33.0	
		Feb	26 Jan – 1 Mar		<0.2	0.9	25.0	
6	2008	Mar	1 Mar -29 Mar		<0.2	<0.1	25.0	Very low NO_2
		Apr	29 Mar -4 Apr		<0.2	<0.1	31.0	
	Avg					0.9	27.6	
	FB				<.1	0.10	1.0	
	A.C					0.8	26.6	

1. Concentrations less than 0.2 are not considered
*** Unusual FB value ignored*
XX indicates min value for the above period
YY indicates max value for the above period

ANNEXURE II CONCENTRATION OF RSPM, NRSPM, TSPM, SO_2, NO_2 BY AIR CONCENTRATION MONITORING

Results of Air Concentration – Iran

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
1	2004	Jul	02-Jul-04	22	22	44		
2		Aug	06-Aug-04	20	30	51		
3		Aug	21-Aug-04	45	24	69		
4		Sep	16-Sep-04	27	35	61		
5		Oct	12-Oct-04	21	20	40		
6		Nov	25-Nov-04	19	18dewj	37		
	Annual average 2004			26	25	50		
7	2005	Feb	7-Feb-05	20	19	40		
8		Mar	15-Mar-05	25	23	48		
9		Jul	20-Jul-05	42	198	240		
10		Sep	28-Sep-05	18	41	73		
	Annual average 2005			26	70	100		
11	2007	Apr	5-Apr-07	38	56	94	16.0	25.0
12		May	25May-07	44	73	117	15.0	18.0
13		Jun	5-Jun-07	39	59	98	13.0	19.0
14		Jul	10-Jul-07	59	160	219	21.0	34.0
15		Aug	30-Aug-07	25	56	81	13.0	11.0
	Annual average 2007			41	81	122	15.6	21.4
16	2008	May	22-May	212	277	489		
			23-May	138	224	362		
			25-May	60	131	192		
			26-May	696	833	1,529		
			27-May	183	172	355		
			28-May	263	329	592		
			29-May	131	266	397		
			30-May	75	121	196		
Avg	2008	May		152	217	369		
17	2008	Jun	16-Jun	1,401	1,973	3,374		
			17-Jun	751	851	1,602		
			18-Jun	547	492	1,039		
			21-Jun	154	201	355		
			22-Jun	177	226	403		
			23-Jun	167	244	411		
			25-Jun	47	183	230		
			27-Jun	40	239	279		

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
			28-Jun	37	68	106		
			29-Jun	73	181	254		
Avg	2008	Jun		99	192	291		

Results of Air Concentration – India

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
1	2004	Sep	15-Sep	9			1.0	3.0
			17-Sep	7			1.0	2.0
			20-Sep	11			4.0	3.0
			24-Sep	9			2.0	7.0
			27-Sep	18			2.0	10.0
Avg	2004	Sep		11			2.0	5.0
2	2004	Oct	1-Oct	17			1.0	2.0
			4-Oct	12			1.0	4.0
			6-Oct	10			3.0	4.0
			8-Oct	49			2.0	11.0
			11-Oct	37			1.0	5.0
			15-Oct	43			1.0	5.0
			18-Oct	70			3.0	9.0
			20-Oct	68			3.0	8.0
			25-Oct	76			3.0	8.0
			27-Oct	121			3.0	12.0
			29-Oct	54			3.0	16.0
Avg	2004	Oct		51			2.2	7.6
3	2004	Nov	1-Nov	128			2.0	18.0
			3-Nov	111			5.0	15.0
			5-Nov	132			2.0	14.0
			8-Nov	93			1.0	14.0
			10-Nov	80			1.0	27.0
			11-Nov	112			3.0	23.0
			15-Nov	154			2.0	20.0
			17-Nov	169			2.0	29.0
			19-Nov	137			1.0	12.0
			22-Nov	96			2.0	9.0
			24-Nov	120			2.0	10.0
			26-Nov	132			1.0	15.0
			29-Nov	144			2.0	14.0
Avg	2004	Nov		124			2.0	16.9
4	2004	Dec	1-Dec	125			1.0	15.0
			6-Dec	147			2.0	14.0

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
			8-Dec	204			2.0	33.0
			10-Dec	117			3.0	39.0
			13-Dec	130			2.0	25.0
			15-Dec	298			7.0	32.0
			17-Dec	193			1.0	20.0
			20-Dec	59			2.0	9.0
			22-Dec	116			2.0	15.0
			25-Dec	122			7.0	15.0
			27-Dec	197			7.0	31.0
			29-Dec	248			1.0	32.0
			31-Dec	259			6.0	23.0
Avg	2004	Dec		170			3.3	23.3
	Annual average 2004			106			2.5	15.0
5	2005	Jan	3-Jan	210			6.0	15.0
			5-Jan	163			6.0	21.0
			7-Jan	214			2.0	34.0
			12-Jan	98			3.0	12.0
			13-Jan	212			1.0	23.0
			17-Jan	95			2.0	23.0
			23-Jan	144			5.0	16.0
			24-Jan	92			3.0	14.0
			31-Jan	83			0.0	18.0
Avg		2005	Jan	142			3.1	20.7
6	2005	Feb	2-Feb	112			4.0	19.0
			7-Feb	117			1.0	22.0
			9-Feb	133			3.0	17.0
			11-Feb	147			4.0	26.0
			14-Feb	69			4.0	10.0
			16-Feb	38			8.0	20.0
			17-Feb	27			4.0	12.0
			18-Feb	23			1.0	13.0
			21-Feb	84			4.0	20.0
			23-Feb	84			3.0	22.0
			24-Feb	104			6.0	19.0
			28-Feb	81			3.0	20.0
Avg	2005	Feb		85			3.8	18.3
7	2005	Mar	2-Mar	62			2.0	15.0
			4-Mar	27			3.0	17.0
			7-Mar	30			2.0	8.0
			9-Mar	36			1.0	9.0
			11-Mar	31			3.0	11.0
			15-Mar	32			0.0	9.0
			17-Mar	17			1.0	10.0

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
			21-Mar	19			1.0	9.0
			22-Mar	15			2.0	10.0
			24-Mar	13			3.0	14.0
			28-Mar	14			3.0	12.0
			30-Mar	13			1.0	9.0
Avg	2005	Mar		26			1.8	11.1
8	2005	Apr	1-Apr	28			1.0	9.0
			4-Apr	26			1.0	8.0
			6-Apr	12			5.0	9.0
			7-Apr	12			10.0	10.0
			11-Apr	27			1.0	8.0
			12-Apr	141			1.0	12.0
			18-Apr	27			1.0	9.0
			19-Apr	30			2.0	10.0
			24-Apr	38			2.0	11.0
			25-Apr	35			3.0	10.0
			27-Apr	32			3.0	14.0
			28-Apr	19			1.0	10.0
Avg	2005	Apr		36			2.6	10.0
9	2005	May	3-May	20			1.0	14.0
			5-May	16			1.0	7.0
			9-May	25			1.0	14.0
			11-May	31			1.0	14.0
			12-May	30			1.0	10.0
			16-May	28			2.0	11.0
			18-May	24			2.0	9.0
			19-May	18			2.0	12.0
			24-May	28			2.0	9.0
			26-May	18			2.0	15.0
			30-May	17			1.0	8.0
			31-May	34			2.0	17.0
Avg	2005	May		24			1.5	11.7
10	2005	Jun	1-Jun	29			1.0	17.0
			2-Jun	28			1.0	17.0
			6-Jun	33			1.0	10.0
			8-Jun	33			2.0	21.0
			10-Jun	29			1.0	11.0
			13-Jun	26			1.0	5.0
			15-Jun	50			1.0	8.0
			17-Jun	38			1.0	13.0
			20-Jun	20			1.0	12.0
			22-Jun	10			1.0	10.0
			24-Jun	21			1.0	10.0
			29-Jun	21			1.0	9.0

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
			30-Jun	15			0.0	7.0
Avg	2005	Jun		27			1.0	11.5
11	2005	Jul	4-Jul	12			1.0	12.0
			6-Jul	11			0.0	4.0
			7-Jul	5			1.0	6.0
			11-Jul	33			1.0	9.0
			13-Jul	9			1.0	3.0
			15-Jul	16			0.0	5.0
			18-Jul	14			0.0	5.0
			20-Jul	22			1.0	4.0
			21-Jul	17			0.0	5.0
			22-Jul	26			1.0	3.0
			25-Jul	6			0.0	4.0
			27-Jul	6			0.0	3.0
			28-Jul	7			0.0	4.0
Avg	2005	Jul		14			0.5	5.2
12	2005	Aug	15-Aug	22			1.0	5.0
			17-Aug	22			1.0	2.0
			18-Aug	13			0.0	5.0
			19-Aug	9			1.0	5.0
			22-Aug	17			1.0	13.0
			24-Aug	22			0.0	11.0
			25-Aug	21			1.0	20.0
			26-Aug	18			1.0	9.0
			29-Aug	25			1.0	17.0
			31-Aug	30			1.0	5.0
Avg	2005	Aug		20			0.8	9.2
13	2005	Sep	2-Sep	14			1.0	9.0
			5-Sep	14			1.0	6.0
			7-Sep	0			1.0	48.0
			9-Sep	7			0.0	2.0
			12-Sep	3			0.0	1.0
			14-Sep	9			1.0	5.0
			16-Sep	14			2.0	12.0
			19-Sep	9			0.0	8.0
			21-Sep	7			1.0	10.0
			23-Sep	18			1.0	10.0
			26-Sep	52			1.0	7.0
			28-Sep	18			1.0	10.0
			29-Sep	14			1.0	16.0
Avg	2005	Sep		14			0.8	11.1
14	2005	Oct	6-Oct	41			1.0	8.0

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
			11-Oct	30			1.0	9.0
			14-Oct	77			1.0	12.0
			17-Oct	20			1.0	10.0
			19-Oct	9			0.0	3.0
			20-Oct	2			0.0	2.0
			24-Oct	43			0.0	9.0
			26-Oct	52			0.0	7.0
			27-Oct	26			0.0	7.0
			31-Oct	66			1.0	8.0
Avg	2005	Oct		37			0.5	7.5
15	2005	Nov	1-Nov	106			1.0	6.0
			3-Nov	72			1.0	9.0
			7-Nov	100			1.0	19.0
			9-Nov	79			0.0	14.0
			11-Nov	106			1.0	12.0
			16-Nov	146			2.0	12.0
			17-Nov	152			1.0	9.0
			21-Nov	157			1.0	15.0
			22-Nov	158			1.0	13.0
			24-Nov	154			2.0	15.0
			28-Nov	141			2.0	14.0
			30-Nov	176			1.0	28.0
Avg	2005	Nov		129			1.2	13.8
16	2005	Dec	1-Dec	200			1.0	18.0
			6-Dec	202			2.0	23.0
			8-Dec	196			1.0	22.0
			12-Dec	169			0.0	24.0
			14-Dec	178			0.0	29.0
			15-Dec	157			0.0	22.0
			19-Dec	111			0.0	13.0
			21-Dec	102			0.0	7.0
			22-Dec	71			0.0	8.0
			26-Dec	237			1.0	33.0
			27-Dec	182			1.0	18.0
			29-Dec	239			1.0	16.0
Avg	2005	Dec		170			0.6	19.4
	Annual average 2005			59			1.5	12.3
17	2006	Jan	2-Jan	167			2.0	22.0
			4-Jan	247			0.0	23.0
			5-Jan	196			1.0	19.0
			9-Jan	175			1.0	19.0
			12-Jan	286			1.0	21.0

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
			16-Jan	179			1.0	19.0
			18-Jan	124			2.0	22.0
			23-Jan	142			3.0	23.0
			24-Jan	176			2.0	18.0
			30-Jan	223			1.0	18.0
			31-Jan	261			2.0	19.0
Avg	2006	Jan		198			1.5	20.3
18	2006	Feb	6-Feb	165			1.0	22.0
			8-Feb	163			1.0	21.0
			13-Feb	99			1.0	17.0
			15-Feb	76			2.0	15.0
			17-Feb	64			1.0	10.0
			20-Feb	133			1.0	15.0
			23-Feb	73			3.0	10.0
			27-Feb	93			3.0	11.0
Avg	2006	Feb		108			1.6	15.1
19	2006	Mar	1-Mar	62			2.0	14.0
			3-Mar	268			3.0	18.0
			6-Mar	52			1.0	15.0
			8-Mar	64			2.0	11.0
			10-Mar	126			2.0	18.0
			15-Mar	132			1.0	14.0
			17-Mar	170			1.0	20.0
			20-Mar	87			1.0	14.0
			22-Mar	70			0.0	12.0
			24-Mar	121			0.0	11.0
			27-Mar	111			1.0	13.0
			29-Mar	94			1.0	16.0
			31-Mar	66			1.0	12.0
Avg	2006	Mar		109			1.2	14.5
20	2006	Apr	3-Apr	30			0.0	11.0
			5-Apr	15			0.0	6.0
			7-Apr	55			0.0	4.0
			12-Apr	24			0.0	6.0
			13-Apr	50			1.0	8.0
			17-Apr	29			0.0	6.0
			19-Apr	41			0.0	8.0
			21-Apr	25			1.0	8.0
			24-Apr	53			0.0	8.0
			28-Apr	39			1.0	10.0
Avg	2006	Apr		36			0.3	7.5

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
21	2006	May	1-May	31			0.0	7.0
			3-May	33			1.0	5.0
			5-May	25			1.0	7.0
			8-May	19			0.0	5.0
			10-May	26			0.0	3.0
			12-May	17			0.0	2.0
			15-May	26			1.0	6.0
			17-May	24			2.0	6.0
			18-May	41			1.0	8.0
			22-May	22			1.0	8.0
			24-May	32			1.0	7.0
			25-May	21			1.0	9.0
			29-May	18			1.0	7.0
			31-May	10			1.0	7.0
Avg	2006	May	May	25			0.8	6.2
22	2006	Jun	1-Jun	15			1.0	7.0
			8-Jun	26			1.0	7.0
			12-Jun	21			1.0	7.0
			14-Jun	19			0.0	8.0
			16-Jun	20			0.0	7.0
			19-Jun	30			1.0	7.0
			21-Jun	7			0.0	5.0
			23-Jun	8			0.0	5.0
			26-Jun	9			0.0	6.0
			28-Jun	9			0.0	4.0
			30-Jun	10			0.0	4.0
Avg	2006	Jun		16			0.4	6.1
23	2006	Jul	3-Jul	8			0.0	6.0
			6-Jul	26			0.0	6.0
			10-Jul	22			1.0	5.0
			12-Jul	25			1.0	5.0
			13-Jul	5			1.0	5.0
			17-Jul	22			1.0	6.0
			25-Jul	19			1.0	6.0
			27-Jul	11			1.0	8.0
			31-Jul	15			1.0	5.0
Avg	2006	Jul	Jul	17			0.8	5.8
24	2006	Aug	2-Aug	9			1.0	4.0
			3-Aug	10			2.0	7.0
			7-Aug	25			1.0	5.0
			10-Aug	28			1.0	4.0
			17-Aug	11			1.0	10.0

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
			24-Aug	23			1.0	5.0
			28-Aug	11			1.0	5.0
Avg	2006	Aug		17			1.1	5.7
25	2006	Sep	6-Sep	22			1.0	6.0
			8-Sep	19			1.0	5.0
			11-Sep	11			1.0	6.0
			13-Sep	9			1.0	6.0
			15-Sep	6			1.0	3.0
			18-Sep	25			3.0	5.0
			21-Sep	10			3.0	15.0
			25-Sep	22			1.0	6.0
			27-Sep	56			1.0	7.0
Avg	2006	Sep		20			1.4	6.6
26	2006	Oct	4-Oct	27			3.0	10.0
			5-Oct	57			3.0	9.0
			10-Oct	85			2.0	8.0
			12-Oct	63			2.0	8.0
			16-Oct	30			2.0	6.0
			18-Oct	45			3.0	9.0
			20-Oct	23			2.0	15.0
			21-Oct	58			3.0	18.0
			22-Oct	65			4.0	16.0
			25-Oct	73			1.0	8.0
			27-Oct	93			2.0	10.0
			30-Oct	79			5.0	13.0
Avg	2006	Oct		58			2.7	10.8
27	2006	Nov	1-Nov	100			2.0	7.0
			2-Nov	90			1.0	10.0
			6-Nov	130			2.0	9.0
			8-Nov	55			1.0	7.0
			9-Nov	14			1.0	7.0
			13-Nov	107			3.0	8.0
			15-Nov	102			3.0	9.0
			16-Nov	120			3.0	11.0
			20-Nov	91			2.0	14.0
			22-Nov	80			2.0	13.0
			24-Nov	50			3.0	12.0
			27-Nov	99			2.0	9.0
			29-Nov	167			2.0	14.0
Avg	2006	Nov		93			2.1	10.0
28	2006	Dec	4-Dec	218			4.0	21.0

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
			5-Dec	200			3.0	18.0
			7-Dec	195			3.0	21.0
			11-Dec	66			3.0	23.0
			13-Dec	103			3.0	24.0
			14-Dec	162			2.0	17.0
			18-Dec	163			2.0	24.0
			20-Dec	196			4.0	27.0
			21-Dec	180			3.0	26.0
			26-Dec	213			2.0	18.0
			28-Dec	173			3.0	22.0
Avg	2006	Dec	Dec	170			2.9	21.9
	Annual average 2006			75			1.4	11.0
29	2007	Jan	2-Jan	224			3.0	30.0
			4-Jan	204			3.0	28.0
			9-Jan	201			3.0	27.0
			11-Jan	186			2.0	21.0
			15-Jan	187			2.0	22.0
			17-Jan	206			3.0	25.0
			19-Jan	189			3.0	25.0
			22-Jan	134			2.0	21.0
			24-Jan	219			3.0	27.0
			31-Jan	134			2.0	19.0
Avg	2007	Jan		188			2.6	24.5
30	2007	Feb	2-Feb	11			1.0	39.0
			5-Feb	47			1.0	12.0
			7-Feb	25			1.0	14.0
			9-Feb	91			1.0	13.0
			12-Feb	61			1.0	11.0
			14-Feb	67			1.0	11.0
			16-Feb	58			1.0	15.0
			19-Feb	114			3.0	23.0
			21-Feb	144			2.0	27.0
			23-Feb	145			2.0	21.0
			26-Feb	95			1.0	19.0
			28-Feb	43			1.0	11.0
Avg	2007	Feb		75			1.3	18.0
31	2007	Mar	5-Mar	103			1.0	14.0
			8-Mar	69			1.0	8.0
			12-Mar	45			2.0	14.0
			14-Mar	95			2.0	12.0
			19-Mar	46			3.0	14.0
			20-Mar	41			3.0	15.0
			21-Mar	40			2.0	12.0

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
			26-Mar	59			2.0	15.0
			28-Mar	80			2.0	7.0
			29-Mar	63			2.0	9.0
Avg	2007	Mar		64			2.0	12.0
32	2007	Apr	2-Apr	35			3.0	10.0
			3-Apr	30			3.0	9.0
			4-Apr	29			3.0	6.0
			9-Apr	33			2.0	11.0
			11-Apr	21			2.0	14.0
			13-Apr	15			2.0	11.0
			16-Apr	26			3.0	11.0
			18-Apr	2			2.0	8.0
			19-Apr	19			2.0	9.0
			23-Apr	35			3.0	5.0
			25-Apr	30			2.0	11.0
			26-Apr	26			2.0	10.0
			30-Apr	40			2.0	23.0
Avg	2007	Apr		26			2.4	10.6
33	2007	May	3-May	37			2.0	17.0
			7-May	17			3.0	9.0
			9-May	21			2.0	10.0
			10-May	23			4.0	14.0
			14-May	35			2.0	11.0
			16-May	38			3.0	14.0
			17-May	14			2.0	10.0
			21-May	22			2.0	10.0
			23-May	23			3.0	12.0
			24-May	16			2.0	10.0
			28-May	23			2.0	10.0
			30-May	33			2.0	15.0
			31-May	30			2.0	16.0
Avg	2007	May		26			2.4	12.2
34	2007	Jun	4-Jun	14			3.0	23.0
			6-Jun	14			2.0	17.0
			8-Jun	14			3.0	19.0
			11-Jun	21			1.0	8.0
			14-Jun	11			2.0	7.0
			18-Jun	11			1.0	10.0
			20-Jun	9			1.0	7.0
			21-Jun	4			2.0	9.0
			25-Jun	9			2.0	9.0
			28-Jun	8			1.0	8.0
Avg	2007	Jun		12			1.8	11.7

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
35	2007	Jul	2-Jul	19			1.0	5.0
			3-Jul	14			1.0	5.0
			9-Jul	56			1.0	10.0
			11-Jul	19			1.0	16.0
			12-Jul	17			1.0	10.0
			16-Jul	15			3.0	14.0
			18-Jul	16			2.0	14.0
			20-Jul	17			2.0	17.0
			23-Jul	15			1.0	10.0
			25-Jul	10			1.0	7.0
			27-Jul	10			1.0	9.0
			30-Jul	10			1.0	8.0
Avg	2007	Jul		18			1.3	10.4
36			1-Aug	17			1.0	8.0
			2-Aug	14			1.0	8.0
			6-Aug	7			1.0	6.0
			8-Aug	16			2.0	11.0
			9-Aug	13			2.0	12.0
			20-Aug	24			2.0	9.0
			22-Aug	17			2.0	9.0
			23-Aug	12			2.0	11.0
			27-Aug	9			2.0	11.0
			29-Aug	9			1.0	8.0
			30-Aug	8			1.0	9.0
Avg	2007	Aug		13			1.5	9.3
37	2007	Sep	3-Sep	6			BDL	10.0
			5-Sep	11			BDL	17.0
			6-Sep	6			BDL	15.0
			10-Sep	22			BDL	24.0
			12-Sep	38			BDL	14.0
			13-Sep	31			BDL	16.0
			19-Sep	22			BDL	12.0
			20-Sep	15			BDL	14.0
			24-Sep	8			BDL	5.0
			26-Sep	19			BDL	12.0
			27-Sep	13			BDL	13.0
Avg	2007	Sep		17			BDL	13.8
38	2007	Oct	1-Oct	25			BDL	13.0
			3-Oct	19			BDL	15.0
			5-Oct	30			BDL	17.0
			8-Oct	47			BDL	13.0
			10-Oct	63			BDL	16.0
			12-Oct	109			BDL	13.0

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
			17-Oct	37			BDL	11.0
			24-Oct	107			BDL	24.0
			25-Oct	114			BDL	26.0
			29-Oct	79			BDL	24.0
			30-Oct	38			BDL	27.0
Avg	2007	Oct		61			BDL	18.1
39	2007	Nov	1-Nov	55			BDL	23.0
			5-Nov	59			BDL	21.0
			8-Nov	61			BDL	19.0
			9-Nov	107			5.0	35.0
			10-Nov	89			BDL	18.0
			19-Nov	115			BDL	19.0
			21-Nov	121			BDL	19.0
			22-Nov	143			BDL	20.0
			26-Nov	130			BDL	20.0
			28-Nov	133			BDL	16.0
			30-Nov	150			BDL	21.0
Avg	2007	Nov		106			BDL	21.0
40	2007	Dec	3-Dec	168			4.0	43.0
			5-Dec	150			BDL	18.0
			7-Dec	116			BDL	20.0
			10-Dec	186			BDL	23.0
			12-Dec	172			BDL	21.0
			13-Dec	150			BDL	19.0
			17-Dec	143			4.0	26.0
			19-Dec	196			BDL	29.0
			20-Dec	211			4.0	28.0
			26-Dec	277			BDL	31.0
			27-Dec	255			6.0	36.0
			31-Dec	267			BDL	24.0
Avg	2007	Dec		191			BDL	26.5
	Annual average 2007			65			2.1	15.6
41	2008	Jan	2-Jan	237			BDL	34.0
			3-Jan	189			BDL	43.0
			7-Jan	196			BDL	23.0
			9-Jan	312			BDL	17.0
			14-Jan	231			BDL	30.0
			16-Jan	218			BDL	20.0
			17-Jan	190			BDL	16.0
			21-Jan	141			BDL	18.0
			23-Jan	81			BDL	18.0
			24-Jan	80			BDL	14.0
			28-Jan	165			BDL	15.0
			30-Jan	92			BDL	20.0

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
Avg	2008	Jan					BDL	22.3
42	2008	Feb	1-Feb	99			BDL	17.0
			5-Feb	145			BDL	25.0
			6-Feb	125			BDL	22.0
			7-Feb	74			BDL	28.0
			12-Feb	140			BDL	25.0
			14-Feb	145			BDL	26.0
			18-Feb	34			BDL	26.0
			20-Feb	36			BDL	21.0
			25-Feb	48			BDL	20.0
			27-Feb	141			BDL	29.0
			28-Feb	147			BDL	28.0
Avg	2008	Feb		103			BDL	24.3
43	2008	Mar	3-Mar	35			BDL	21.0
			5-Mar	30			BDL	23.0
			7-Mar	38			BDL	19.0
			10-Mar	101			BDL	29.0
			12-Mar	59			BDL	12.0
			14-Mar	85			BDL	11.0
			17-Mar	39			BDL	12.0
			19-Mar	22			BDL	11.0
			24-Mar	39			BDL	13.0
			26-Mar	20			BDL	14.0
			28-Mar	23			BDL	13.0
			31-Mar	28			BDL	9.0
Avg	2008	Mar		43			BDL	15.6

Results of Air Concentration – Nepal

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
1	2003	Apr	8-Apr	80	145	225	-	1.0
			8-Apr	216	488	704	0.4	5.0
			10-Apr	138	116	254	0.1	4.6
			10-Apr	262	32	294	0.1	5.5
			12-Apr	123	175	298	0.1	2.5
			12-Apr	178	127	305	0.1	6.4
			14-Apr	95	205	303	0.2	4.1
			16-Apr	46	94	140	0.2	5.3
			18-Apr	57	17	74	0.1	1.9
			21-Apr	65	97	161	0.3	2.7
			21-Apr	87	167	253	0.3	4.8
			23-Apr	63	104	167	0.1	3.8
			23-Apr	110	160	270	-	7.7
Avg	2003	Apr		117	148	265	0.2	4.3
2	2005	Apr	10-Apr	79	94	173	2.0	1.0
			11-Apr	73	121	194	3.0	1.0
			12-Apr	80	10	187	2.0	1.0
			15-Apr	51	86	137	2.0	1.0
			16-Apr	82	114	196	2.0	1.0
			20-Apr	69	93	162	1.0	1.0
			21-Apr	123	102	225	2.0	1.0
			22-Apr	93	105	198	1.0	1.0
			25-Apr	47	122	169	2.0	2.0
			26-Apr	68	105	173	1.0	1.0
Avg	2005	Apr		77	95	181	1.8	1.1
3	2005	May	10-May	57	101	158	4.0	1.0
			11-May	70	120	190	2.0	1.0
			12-May	63	103	166	2.0	2.0
			15-May	54	108	162	2.0	1.0
			16-May	77	98	175	2.0	1.0
			20-May	45	84	129	2.0	1.0
			21-May	56	92	148	2.0	1.0
			22-May	68	102	170	1.0	1.0
			24-May	78	94	172	3.0	2.0
			25-May	73	126	199	3.0	1.0
Avg	2005	May		64	103	167	2.3	1.2
4	2005	Jul [1]	14-Jul	16	31	47	0.0	1.0
			21-Jul	7	12	49	1.0	1.0
			22-Jul	15	40	55	0.0	2.0
			23-Jul	14	42	56	1.0	2.0

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
			25-Jul	5	36	41	0.0	1.0
			26-Jul	7	40	47	1.0	1.0
			27-Jul	8	31	39	1.0	1.0
			28-Jul	10	28	38	2.0	2.0
Avg	2005	Jul		10	33	47	0.8	1.4
5	2005	Aug [1]	14-Aug	10	9	19	0.0	1.0
			16-Aug	13	8	21	0.0	1.0
			17-Aug	6	8	14	0.0	1.0
			18-Aug	11	14	25	0.0	1.0
			20-Aug	8	9	17	0.0	1.0
			21-Aug	13	20	33	0.0	1.0
			22-Aug	18	25	43	0.0	1.0
			24-Aug	4	15	19	0.0	0.0
			25-Aug	11	12	23	0.0	1.0
			26-Aug	15	18	33	0.0	1.0
Avg	2005	Aug		11	14	25	0.0	0.9
6	2005	Sep [1]	9-Sep	13	5	18	0.0	1.0
			10-Sep	12	1	13	0.0	1.0
			11-Sep	11	14	25	0.0	1.0
			16-Sep	27	11	38	1.0	1.0
			17-Sep	23	14	37	1.0	1.0
			18-Sep	25	25	50	0.0	1.0
			21-Sep	6	6	12	0.0	1.0
			22-Sep	9	9	18	1.0	1.0
			12-Sep	15	7	22	1.0	1.0
			24-Sep	14	2	16	0.0	1.0
Avg	2005	Sep		16	9	25	0.4	1.0
7	2005	Oct	14-Oct	26	14	10	0.0	0.0
			15-Oct	33	23	56	0.0	0.0
			16-Oct	31	26	57	0.0	1.0
			17-Oct	33	23	56	0.0	1.0
			18-Oct	24	29	53	1.0	0.0
			21-Oct	15	6	21	1.0	0.0
			22-Oct	6	5	11	1.0	0.0
			23-Oct	15	9	24	0.0	0.0
			24-Oct	13	11	24	1.0	0.0
			25-Oct	9	3	12	0.0	1.0
Avg	2005	Oct		21	15	32	0.4	0.3
8	2005	Nov	10-Nov	34	38	72	0.0	0.0
			11-Nov	41	26	67	0.0	0.0
			14-Nov	68	13	81	1.0	2.0

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
			15-Nov	61	20	81	0.0	1.0
			16-Nov	72	26	98	2.0	2.0
			16-Nov	74	24	98	1.0	0.0
			18-Nov	66	24	90	0.0	1.0
			20-Nov	48	22	70	2.0	1.0
			21-Nov	57	28	85	1.0	1.0
			22-Nov	52	-	-	2.0	1.0
Avg	2005	Nov		57	25	82	0.9	0.9
9	2005	Dec	13-Dec	50	11	61	0.0	0.0
			14-Dec	58	35	93	0.0	0.0
			15-Dec	60	18	80	1.0	1.0
			16-Dec	20	14	34	1.0	1.0
			18-Dec	54	26	80	1.0	1.0
			19-Dec	57	19	76	0.0	0.0
			20-Dec	45	15	60	0.0	0.0
			21-Dec	52	24	76	0.0	0.0
			22-Dec	51	28	79	0.0	0.0
			25-Dec	12	8	20	0.0	0.0
Avg	2005	Nov		46	20	66	0.3	0.3
	Annual average 2005			42	40	83	0.9	0.8
10	2006	Feb	13-Feb	62	34	96	0.0	0.0
			14-Feb	75	67	142	1.0	1.0
			15-Feb	93	67	160	0.0	0.0
			18-Feb	51	94	145	1.0	1.0
			19-Feb	66	63	129	1.0	1.0
			20-Feb	67	51	118	0.0	0.0
			22-Feb	74	64	138	0.0	0.0
			23-Feb	84	47	131	0.0	0.0
			24-Feb	76	28	104	1.0	1.0
			25-Jan	86	65	151	1.0	1.0
Avg	2006	Feb		73	58	131	0.5	0.5
11	2006	Mar	12-Mar	32	9	41	2.0	1.0
			13-Mar	42	35	77	1.0	1.0
			18-Mar	67	39	106	2.0	1.0
			19-Mar	75	49	124	-	1.0
			20-Mar	77	54	131	-	1.0
			22-Mar	66	112	178	1.0	1.0
			23-Mar	68	95	163	2.0	1.0
			25-Mar	92	119	211	-	1.0
			26-Mar	159	130	289	1.0	1.0
			27-Mar	102	178	280	1.0	2.0
Avg	2006	Mar		78	82	160	1.4	1.1

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
12	2006	Apr	12-Apr	59	38	97	2.0	1.0
			13-Apr	57	57	114	1.0	1.0
			15-Apr	60	35	95	-	1.0
			16-Apr	62	66	128	2.0	1.0
			17-Apr	52	39	91	-	1.0
			20-Apr	39	50	89	1.0	1.0
			21-Apr	53	56	109	2.0	1.0
			22-Apr	53	38	91	-	1.0
			23-Apr	43	22	65	1.0	1.0
			24-Apr	62	28	90	-	1.0
Avg	2006	Apr		54	43	97	1.5	1.0
13	2006	May	24-May	39	12	51	2.0	2.0
			25-May	24	23	47	3.0	2.0
			27-May	13	18	31	1.0	1.0
Avg	2006	May		25	18	43	2.0	1.7
14	2006	Jun	9-Jun	19	38	57	1.0	1.0
			10-Jun	15	17	32	-	-
			14-Jun	12	15	27	-	-
			15-Jun	7	75	82	-	-
			19-Jun	34	46	80	-	1.0
			20-Jun	18	30	48	1.0	1.0
			21-Jun	19	17	36	-	-
			23-Jun	16	25	41	-	-
			24-Jun	13	15	28	-	-
			25-Jun	23	18	41	2.0	2.0
Avg	2006	Jun		18	30	47	1.3	1.3
15	2006	Jul	8-Jul	14	11	25	3.0	2.0
			9-Jul	5	7	12	4.0	2.0
			12-Jul	3	5	8	4.0	2.0
			13-Jul	7	18	25	4.0	2.0
			14-Jul	8	16	24	4.0	2.0
			15-Jul	3	5	8	5.0	2.0
			17-Jul	9	22	31	4.0	3.0
			19-Jul	11	9	20	5.0	3.0
			20-Jul	12	9	21	4.0	2.0
			21-Jul	14	9	23	5.0	2.0
Avg	2006	Jul		9	11	20	4.2	2.2
16	2006	Aug	6-Aug	9	7	16	4.0	1.0
			7-Aug	12	15	27	4.0	2.0
			8-Aug	11	13	24	4.0	2.0
			11-Aug	13	9	22	4.0	3.0

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
			12-Aug	14	4	18	4.0	3.0
			15-Aug	12	22	24	4.0	3.0
			16-Aug	9	13	22	5.0	3.0
			17-Aug	13	16	29	4.0	2.0
			24-Aug	11	7	18	4.0	2.0
			25-Aug	14	11	25	5.0	2.0
Avg	2006	Aug		12	12	23	4.2	2.3
17	2006	Sep	12-Sep	64	70	134	4.0	2.0
			14-Sep	30	24	54	4.0	2.0
			15-Sep	32	20	52	4.0	2.0
			16-Sep	28	13	41	3.0	1.0
			18-Sep	25	13	38	4.0	1.0
			19-Sep	29	17	46	3.0	2.0
			20-Sep	53	38	91	3.0	2.0
			22-Sep	32	18	50	3.0	1.0
			23-Sep	32	20	52	3.0	2.0
			24-Sep	40	17	57	4.0	2.0
Avg	2006	Sep		37	25	62	3.5	1.7
18	2006	Oct	10-Oct	38	21	59	4.0	2.0
			11-Oct	53	15	68	3.0	2.0
			12-Oct	32	20	52	4.0	2.0
			13-Oct	46	21	67	3.0	2.0
			14-Oct	38	20	58	3.0	1.0
			16-Oct	40	20	60	3.0	1.0
			17-Oct	39	22	61	4.0	1.0
			18-Oct	73	20	63	4.0	2.0
			19-Oct	43	19	62	5.0	2.0
			20-Oct	39	15	54	4.0	1.0
Avg	2006	Oct		44	19	60	3.7	1.6
19	2006	Nov	7-Nov	38	65	91	5.0	4.0
			10-Nov	40	41	81	5.0	3.0
			15-Nov	48	27	75	4.0	2.0
			16-Nov	61	33	94	4.0	3.0
			17-Nov	56	32	88	5.0	4.0
			18-Nov	68	19	87	5.0	4.0
			19-Nov	73	28	101	4.0	3.0
			23-Nov	82	32	114	5.0	3.0
			24-Nov	67	28	95	5.0	4.0
			25-Nov	56	29	85	5.0	3.0
Avg	2006	Nov		59	33	91	4.7	3.3
20	2006	Dec	7-Dec	79	9	88	5.0	3.0

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
			8-Dec	94	33	127	5.0	4.0
			10-Dec	62	26	88	5.0	3.0
			16-Dec	64	26	90	5.0	4.0
			17-Dec	64	22	86	5.0	4.0
			18-Dec	38	11	49	4.0	2.0
			21-Dec	57	33	90	4.0	3.0
			22-Dec	60	19	79	4.0	2.0
			23-Dec	60	4	64	5.0	3.0
			20-Dec	90	17	107	4.0	2.0
Avg	2006	Dec		67	20	87	4.6	3.0
	Annual average 2006			43	32	75	2.9	1.8
21	2007	Jan	11-Jan	58	16	74	4.0	2.0
			12-Jan	75	20	95	4.0	2.0
			13-Jan	92	20	112	4.0	2.0
			14-Jan	140	26	166	3.0	1.0
			16-Jan	133	42	175	3.0	2.0
			17-Jan	117	18	135	3.0	1.0
			18-Jan	125	20	145	4.0	1.0
			22-Jan	119	12	131	4.0	2.0
			24-Jan	98	10	108	3.0	2.0
			25-Jan	99	11	110	4.0	2.0
Avg	2007	Jan		106	20	125	3.6	1.7
22	2007	Mar	15-Mar	34	25	59	4.0	2.0
			16-Mar	54	19	73	3.0	1.0
			17-Mar	41	36	77	5.0	2.0
			18-Mar	52	14	66	4.0	2.0
			22-Mar	43	25	68	4.0	2.0
			24-Mar	110	78	188	5.0	2.0
Avg	2007	Mar		56	33	89	4.2	1.8
23	2007	Apr	5-Apr	123	108	231	3.0	2.0
			6-Apr	81	74	155	4.0	2.0
			11-Apr	58	110	168	3.0	1.0
			12-Apr	50	79	129	3.0	1.0
			17-Apr	53	70	123	3.0	1.0
			18-Apr	33	52	85	4.0	1.0
			22-Apr	24	55	79	4.0	1.0
Avg	2007	Apr		60	78	139	3.4	1.3
24	2007	Nov	21-Nov	58	29	87	4.0	3.0
			22-Nov	29	21	80	5.0	3.0
			23-Nov	54	24	78	4.0	2.0
			25-Nov	65	44	109	4.0	2.0

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
			27-Nov	59	25	84	4.0	2.0
			28-Nov	61	47	108	4.0	2.0
			30-Nov	7	30	37	5.0	2.0
			1-Dec	66	23	89	4.0	3.0
Avg	2007	Nov		50	30	84	4.3	2.4
25	2007	Dec	7-Dec	69	21	90	5.0	2.0
			8-Dec	72	25	97	5.0	2.0
			10-Dec	58	38	96	5.0	2.0
			11-Dec	76	8	84	4.0	2.0
			12-Dec	95	19	114	4.0	2.0
			13-Dec	81	16	97	4.0	2.0
			14-Dec	75	10	85	4.0	2.0
			15-Dec	66	11	77	4.0	2.0
			19-Dec	71	15	86	5.0	3.0
			20-Dec	75	16	91	4.0	2.0
Avg	2007	Dec		74	18	92	4.4	2.1
26	2008	Jan	6-Jan	86	20	106	3.0	1.0
			8-Jan	80	23	103	3.0	2.0
			10-Jan	77	32	109	3.0	2.0
			11-Jan	42	37	79	4.0	2.0
			16-Jan	77	38	115	3.0	1.0
			17-Jan	73	22	95	4.0	3.0
			18-Jan	85	20	105	4.0	1.0
			19-Jan	84	40	124	3.0	1.0
			22-Jan	80	41	121	5.0	4.0
			23-Jan	96	46	142	5.0	3.0
Avg	2008	Jan		78	32	110	3.7	2.0
27	2008	Feb	14-Feb	55	36	91	4.0	3.0
			15-Feb	58	46	104	3.0	1.0
			16-Feb	47	48	95	5.0	3.0
			17-Feb	59	54	113	4.0	2.0
			19-Feb	156	59	215	3.0	1.0
			20-Feb	52	51	103	4.0	2.0
			21-Feb	72	51	123	4.0	1.0
			22-Feb	98	55	153	3.0	2.0
			23-Feb	72	47	119	3.0	2.0
			24-Feb	47	36	83	4.0	2.0
Avg	2008	Feb		72	48	120	3.7	1.9
28	2008	Mar	10-Mar	75	89	164	3.0	10.0
			12-Mar	111	63	174	2.0	8.0
			13-Mar	82	132	214	2.0	5.0

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
			14-Mar	77	113	190	1.0	3.0
			20-Mar	37	88	215	2.0	3.0
			21-Mar	57	46	103	3.0	6.0
			24-Mar	73	55	128	3.0	5.0
			26-Mar	47	48	95	1.0	3.0
			27-Mar	57	62	119	2.0	4.0
			28-Mar	58	60	118	2.0	3.0
Avg	2008	Mar		67	76	152	2.1	5.0
29	2008	Apr	7-Apr	88	95	183	2.0	4.0
			9-Apr	71	83	154	2.0	4.0
			10-Apr	80	70	150	2.0	3.0
			11-Apr	75	76	151	2.0	3.0
			17-Apr	71	80	151	3.0	5.0
			18-Apr	67	72	139	2.0	4.0
			23-Apr	71	77	148	2.0	4.0
			24-Apr	86	93	179	2.0	1.0
			25-Apr	83	70	153	1.0	2.0
			26-Apr	75	87	162	1.0	3.0
Avg	2008	Apr		77	80	157	1.9	3.3
Note(1) Generally cloudy and rainy								

Results of Air Concentration – Pakistan

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
			3-Feb	624	307	931		
			4-Feb	157	139	296		
			5-Feb	209	116	326		
			15-Feb	60	123	183		
			16-Feb	153	78	231		
1	2007	Feb	17-Feb	70	162	232		
			18-Feb	113	272	386		
			25-Feb	135	74	209		
			26-Feb	128	51	179		
			27-Feb	160	63	223		
Avg	2007	Feb		181	138	320		
			4-Mar	77	35	112		
			5-Mar	117	137	254		
2	2007	Mar	6-Mar	134	89	23		
			15-Mar	154	59	213		
			16-Mar	126	96	222		

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
			17-Mar	108	100	208		
			18-Mar	88	81	169		
			25-Mar	129	107	236		
			26-Mar	145	135	280		
			27-Mar	126	267	267		
Avg	2007	Mar		120	111	198		
			3-Apr	62	80	142		
			4-Apr	60	85	146		
			5-Apr	138	82	220		
			15-Apr	134	166	300		
3	2007	Apr	16-Apr	158	497	655		
			17-Apr	211	478	689		
			18-Apr	206	407	612		
			25-Apr	157	300	457		
			26-Apr	130	303	434		
Avg	2007	Apr		140	267	406		
			3-May	219	373	592		
			4-May	505	1121	1626		
			5-May	242	331	574		
			15-May	447	885	1332		
4	2007	May	16-May	303	546	849		
			17-May	278	447	725		
			18-May	283	1096	1379		
			25-May	820	1305	2125		
			26-May	349	771	1120		
			27-May	229	811	1041		
Avg	2007	May		368	769	1136		
			3-Jun	179	382	561		
			4-Jun	181	464	645		
			5-Jun	123	330	452		
			15-Jun	435	1346	1782		
5	2007	Jun	16-Jun	108	264	372		
			17-Jun	51	100	151		
			18-Jun	33	94	127		
			25-Jun	110	313	423		
			26-Jun	50	380	430		
			27-Jun	81	210	290		
Avg	2007	Jun		135	388	523		
6	2007	Jul	5-Jul	112	269	381		
			6-Jul	228	323	550		

ANNEXURE II: Air Concentration Data

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
			7-Jul	108	341	450		
			15-Jul	176	287	463		
			16-Jul	83	257	339		
			17-Jul	222	119	341		
			18-Jul	576	670	1246		
			25-Jul	191	207	398		
			26-Jul	306	758	1063		
			28-Jul	271	615	886		
Avg	2007	Jul		227	385	612		
			5-Aug	50	147	197		
			6-Aug	149	466	615		
			7-Aug	155	525	680		
			15-Aug	149	395	544		
7	2007	Aug	16-Aug	146	339	485		
			17-Aug	189	341	530		
			18-Aug	125	314	439		
			25-Aug	112	931	1043		
			26-Aug	152	330	482		
			27-Aug	122	346	468		
Avg	2007	Aug		135	413	548		
			5-Sep	106	292	397		
			6-Sep	131	335	466		
			7-Sep	147	340	487		
			15-Sep	85	276	361		
8	2007	Sep	16-Sep	105	305	411		
			17-Sep	82	331	414		
			18-Sep	130	376	506		
			25-Sep	81	246	328		
			26-Sep	92	302	394		
			27-Sep	95	287	382		
Avg	2007	Sep		105	309	415		
			5-Oct	267	421	688		
			6-Oct	195	277	472		
			7-Oct	207	406	612		
			15-Oct	254	372	626		
9	2007	Oct	16-Oct	296	478	773		
			17-Oct	286	304	590		
			18-Oct	248	414	662		
			25-Oct	82	357	439		
			26-Oct	323	459	782		
			27-Oct	314	415	729		

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
Avg	2007	Oct		247	390	637		
10	2007	Nov	4-Nov	248	291	539		
			5-Nov	287	309	595		
			6-Nov	232	322	554		
			15-Nov	230	363	593		
			16-Nov	377	342	720		
			17-Nov	250	268	518		
			18-Nov	218	337	555		
			25-Nov	250	256	506		
			26-Nov	249	327	576		
			27-Nov	230	215	445		
Avg	2007	Nov		257	303	560		
11	2007	Dec	4-Dec	238	205	443		
			5-Dec	307	282	589		
			6-Dec	265	208	472		
			16-Dec	264	176	440		
			17-Dec	288	178	466		
			18-Dec	301	143	444		
			19-Dec	188	184	372		
			25-Dec	140	161	301		
			26-Dec	202	193	395		
			27-Dec	320	316	636		
Avg	2007	Dec	Dec	251	204	456		
	Annual average 2007			197	335	529		
12	2008	Jan	7-Jan	13	46	59		
			9-Jan	58	70	128		
			10-Jan	76	72	147		
			15-Jan	203	208	411		
			16-Jan	260	383	643		
			18-Jan	135	219	355		
			19-Jan	205	168	373		
			25-Jan	276	108	384		
			26-Jan	291	206	497		
			27-Jan	181	178	359		
Avg	2008	Jan		170	166	336		
13	2008	Feb	5-Feb	177	326	503		
			6-Feb	168	244	411		
			7-Feb	139	344	583		
			16-Feb	227	253	480		

S No	Year	Month	DATE	RSPM/PM_{10}	NRSPM	TSPM	SO_2	NO_2
				($\mu g/m^3$)				
			17-Feb	233	410	643		
			18-Feb	230	341	570		
			19-Feb	267	300	567		
			26-Feb	185	415	599		
			27-Feb	194	319	513		
			28-Feb	167	234	401		
Avg	2008	Feb		199	318	527		
			15-Apr	66	351	417		
			17-Apr	134	451	584		
14	2008	Apr	18-Apr	160	382	543		
			25-Apr	224	474	698		
			26-Apr	183	461	644		
			27-Apr	213	452	665		
Avg	2008	Apr		163	428	592		
			15-May	272	612	884		
15	2008	May	16-May	217	476	693		
			26-May	149	493	642		
			27-May	110	493	603		
Avg	2008	May		187	519	706		
			4-Jun	134	411	544		
			5-Jun	479	249	729		
			6-Jun	400	542	942		
			15-Jun	208	442	649		
16	2008	Jun	16-Jun	90	227	317		
			17-Jun	127	297	424		
			18-Jun	106	228	334		
			25-Jun	78	141	218		
			26-Jun	57	99	156		
			27-Jun	80	163	244		
Avg	2008	Jun		176	280	456		

ANNEXURE III WET DEPOSITION DATA FROM WET-ONLY AND BULK COLLECTOR

Bangladesh (Wet-only Collector)

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{2-}	Cl^-	NO_3	NOTE
				mS/m		ml	mm	µmol/l								
	2004	Sep	5-Sep	2.0	6.4	590										
			6-Sep	2.1	6.6	180										
			10-Sep	2.2	6.0	340										
			11-Sep	0.7	6.1	945										
			12-Sep	0.5	6.1	550										
			13-Sep	0.5	5.5	2710										
			14-Sep	1.2	5.3	100										
			15-Sep	0.7	4.9	480										
			16-Sep	0.8	5.0	225										
			17-Sep	1.1	5.4	240										
			23-Sep	0.6	5.6	620										
			29-Sep	0.8	5.6	930										
	2004	Sep		0.8	5.7	659.2										Weighted mean calculated.
	2004	Oct	2-Oct		6.3		2460									
			3-Oct		5.5		550									
			4-Oct		6.7		730									
			17-Oct		5.3		520									
			18-Oct		5.9		1200									

ANNEXURE III: Wet Deposition Data from Wet-Only and Bulk Collector

				EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{2-}	Cl^-	NO_3	
				mS/m		ml	mm	µmol/l								
			19-Oct		5.4		1530									
			20-Oct		6.3		2160									
			22-Oct		7.2		750									
			23-Oct		6.0		730									
			24-Oct		5.6		1210									
	2004	Oct			6.0											Simple average calculated.
	Annual average 2004			1.1	5.8											Data less, average not representative.
	2006	Apr	13-Apr	-	6.9	150.0										
			17-Apr	-	6.1	120.0										
			18-Apr	-	5.9	240.0										
			19-Apr	-	5.7	630.0										
			22-Apr	-	6.9	250.0										
	2006	Apr			6.1	278.0										Weighted mean calculated.
	2006	Jun	2-Jun	19.2	6.2	1500.0										
			5-Jun	15.7	6.3	1020.0										
			6-Jun	12.0	7.0	850.0										
			7-Jun	17.8	6.5	490.0										
			9-Jun	17.7	6.5	710.0										
			15-Jun	15.6	6.9	840.0										
			21-Jun	13.4	7.0	500.0										

				EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{2-}	Cl^-	NO_3	
				mS/m		ml	mm	µmol/l								
			22-Jun	5.5	7.4	640.0										
			23-Jun	12.7	6.8	750.0										
			24-Jun	7.1	6.4	900.0										
			29-Jun	24.1	6.5	550.0										
	2006	Jun		14.7	6.6	795.5										Weighted mean calculated.
	Annual average 2006			14.6	6.6	633.8										Data less, average not representative.
	2007	May	7-May	2.5	6.0		800									
			16-May	3.5	5.8		1200		72.6	11.2	2.8		Nil	104.4		
			19-May	8.0	6.8		360		302.2	69.8	27.0		Nil	470.0		
			20-May	7.4	6.2		950		178.2	50.0	6.3		Nil	156.6		
			21-May	6.4	7.5		590		283.9	29.2	29.9		Nil	443.4		
	2007	May		5.1	6.3		780		171.8	33.3	11.8			227.4		Weighted mean calculated.
	2007	Jul	1-Jul	2.6	6.3	50	1500		201.3	25.2			Nil	320.0		
			5-Jul	6.2	6.5	50	4000		62.4	16.2			Nil	280.0		
			6-Jul	5.1	6.6	50	3000		76.3	11.5			Nil	302.0		
			14-Jul	8.9	6.5	50	560		239.2	28.6			Nil	315.0		
			15-Jul	10.2	6.5	50	700		197.2	21.3			Nil	290.0		
			18-Jul	7.9	6.5	50	650		276.3	45.2			Nil	325.0		
	2007	Jul		5.9	6.5		887		118.3	19.0				297.5		Weighted mean calculated.
	2007	Aug	12-Aug	5.2	7.0	50	480									

ANNEXURE III: Wet Deposition Data from Wet-Only and Bulk Collector

				EC	pH	Amount of sample	Precipitation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{2-}	Cl^-	NO_3	
				mS/m		ml	mm	µmol/l								
			15-Aug	5.8	7.0	50	900									
			17-Aug	5.1	6.5	50	2550									
			19-Aug	1.5	6.3	50	2000									
			30-Aug	5.1	6.4	50	1000									
	2007	Aug		4.1	6.5		1386									Weighted mean calculated.
	Annual average 2007			5.7		6.5	1328									Data less , average not representative
	2008	May		9.5	7.3		1000	17.1	423.0	37.2	30.5	120.	88.2	310.2	92.0	
	2008	Jun	1-Jun	5.4	7.0		1200	2.7	263.0	21.6	30.4	60.0	13.1	282.0	20.0	
			3-Jun	2.5	6.6		1500	17.2	86.3	17.0	14.3	19.0	9.5	148.0	15.8	
			5-Jun	2.3	6.2		1500	16.9	64.4	16.0	6.4	17.1	6.0	148.0	11.9	
			7-Jun	1.1	6.3		1500	16.4	31.5	8.7	2.4	8.0	3.8	70.5	8.4	
			17-Jun	0.9	6.1		1800	12.5	21.1	6.8	2.2	7.5	2.8	52.0	4.9	
			23-Jun	2.5	6.7		1100	16.8	71.9	14.6	12.5	18.5	15.8	138.0	16.7	
	2008	Jun		2.3	6.4		1433	14.0	82.1	13.6	10.3	20.0	7.8	131.8	12.2	Weighted mean calculated.
	Annual average 2008			4.1		6.6	1374									Data less , average not representative.
		Indicates max value for that year														
		Indicates min value for that year														

Bangladesh (Bulk Collector)

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{2-}	Cl^-	NO_3	NOTE
				mS/m		ml	mm	µmol/l								
	2004	Jul	19-Jul	4.0	6.6											
			20-Jul	3.1	6.8											
			21-Jul	2.8	6.3											
			22-Jul	2.7	6.1											
			23-Jul	2.7	6.5											
			24-Jul	1.8	6.8											
			25-Jul	0.7	6.5											
			26-Jul	0.9	6.2											
			27-Jul	1.5	6.3											
			28-Jul	1.2	6.6											
			29-Jul	1.9	6.6											
			30-Jul	2.0	6..63											
			31-Jul	2.1	6.7											
	2004	Jul		2.1	6.5											Simple average calculated.
	2004	Aug	3-Aug	5.4	7.5	120										
			5-Aug	2.2	7.0	420										
			6-Aug	0.4	6.6	3140										
			7-Aug	0.5	5.9	1180										
			8-Aug	0.3	5.9	1500										
			9-Aug	0.6	5.8	740										

ANNEXURE III: Wet Deposition Data from Wet-Only and Bulk Collector

				EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{2-}	Cl^-	NO_3	
			10-Aug	0.3	5.2	1140										
			11-Aug	0.3	5.5	735										
			12-Aug	0.4	5.7	4790										
			13-Aug	0.6	5.9	1835										
			14-Aug	0.4	5.6	1355										
			15-Aug	0.7	5.3	820										
			17-Aug	0.7	5.6	300										
			19-Aug	0.6	5.3	728										
			20-Aug	0.6	5.6	430										
			21-Aug	0.5	5.9	318										
			22-Aug	0.7	5.7	638										
			23-Aug	0.6	5.8	514										
			24-Aug	0.6	5.3	420										
			25-Aug	0.5	5.2	360										
			26-Aug	0.6	5.6	480										
			27-Aug	0.5	5.5	528										
			29-Aug	1.2	6.2	1480										
			30-Aug	3.2	6.3	135										
	2004	Aug		0.6	5.8	1004										Weighted mean calculated.
	2004	Oct	2-Oct	4.8	6.0		520									
			3-Oct	0.5	6.1		2050									
			4-Oct		6.3		1560									
			5-Oct		6.6		970									
			6-Oct	0.8	5.3		2100									
			7-Oct	1.0	4.6		1580									
			12-Oct		5.8		230									

				EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{2-}	Cl^-	NO_3	
	2004	Oct		1.76	5.72		1287									Weighted mean of pH only calculated.
	Annual average 2004			1.4	6.0		1068									Data less , average not representative.
	2007	May	7-May	2.5	6.0	50	800.						Nil			
			16-May	3.5	6.8	50	1200		72.6	11.2	2.8		Nil	104.4		
			19-May	8.0	6.8	50	360		302.2	69.8	27.0		Nil	470.0		
			20-May	7.4	6.2	50	950		178.2	15.0	6.2		Nil	156.6		
			21-May	6.4	7.5	50	690		283.9	29.2	29.9		Nil	443.4		
	2007	May		5.14	6.62		800		175.34	22.80	12.38			234.12		Weighted mean calculated.
	2007	Jul	1-Jul	2.6	6.3	50	1500		201.3	25.2			Nil	320.2		
			5-Jul	6.2	6.5	50	4000		62.4	16.2			Nil	280.2		
			6-Jul	5.1	6.6	50	3000		76.3	11.5			Nil	301.7		
			14-Jul	8.9	6.5	50	560		239.2	28.6			Nil	335.0		
			15-Jul	10.2	6.5	50	700		197.3	21.3			Nil	289.9		
			18-Jul	7.9	6.5	50	650		276.3	45.6			Nil	325.1		
	2007	Jul		5.87	6.4		1735		118.35	18.99				298.56		Weighted mean calculated.
	2007	Aug	12-Aug	5.2	7.0	50	480									
			15-Aug	5.8	7.0	50	900									
			17-Aug	5.1	6.5	50	2550									

ANNEXURE III: Wet Deposition Data from Wet-Only and Bulk Collector

				EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{2-}	Cl^-	NO_3	
			19-Aug	1.5	6.3	50	2000									
			30-Aug	5.1	6.4	50	1000									
	2007	Aug		4.1	6.5	50	1386									Weighted mean calculated.
	Annual average 2007			5.7	6.6		1334									Data less , average not representative.
	2008	May	29-May	9.46	7.33	1000		17.1	423	37.2	30.5	120.	88.2	310.2	92	
	2008	Jun	1-Jun	5.4	7.0	1200		2.7	263.0	21.6	30.4	60.0	13.1	282.0	20.0	
			3-Jun	2.5	6.6	1500		17.2	86.3	17.0	14.3	19.0	9.5	148.0	15.8	
			5-Jun	2.3	6.2	1500		16.9	64.4	16.0	6.4	17.1	6.0	148.0	11.9	
			7-Jun	1.1	6.3	1500		16.4	31.5	8.7	2.4	8.0	3.8	70.5	8.4	
			17-Jun	0.9	6.1	1800		12.5	21.1	6.8	2.2	7.5	2.8	52.0	4.9	
			23-Jun	2.5	6.7	1100		16.8	71.9	14.6	12.5	18.5	15.8	138.0	16.7	
	2008	Jun		2.3	6.4	1433		11.4	82.1	13.6	10.3	20	7.8	131.8	12.3	Weighted mean calculated.
	Annual average 2008			3.5	6.6	1371.4		14.2	137.3	17.4	14.1	35.8	19.9	164.1	24.2	Data less, average not representative.
		Indicates max value for that year														
		Indicates min value for that year														

Bhutan (Wet-only Collector)

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{-2}	Cl^-	NO_3	Note
				mS/m		ml	mm	µmol/l								
	2003	Jul	6-Jul	0.9	6.2	1828										
			7-Jul	0.6	6.5	4848										
			8-Jul	0.3	7.6	4562										
			9-Jul	0.4	6.2	965										
			10-Jul	0.8	6.9	624										
			11-Jul	0.2	6.7	166										
			12-Jul	0.4	7.4	123										
			22-Jul	0.7	6.1	79										
	2003	Jul		0.5	6.8	1649										Weighted mean
	2003	Aug	19-Aug	0.5	6.0	30										
	Annual average 2003			0.5	6.6	1470			1		1		1			Data less , average not representative.
	2007	May	31-May	0.3	4.69	6										Below Data not sure whether of bulk or wet(wet)
	2007	Jun	2-Jun	0.4	5.7	10										
			7-Jun	0.7	5.6	12										
			8-Jun	0.37	4.3	72										
			9-Jun	0.8	5.6	13										
			10-Jun	0.9	4.3	15										
			13-Jun	0.7	5.2	45										

ANNEXURE III: Wet Deposition Data from Wet-Only and Bulk Collector

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{-2}	Cl^-	NO_3	Note
				mS/m		ml	mm	µmol/l								
			14-Jun	0.3	3.5	86										
			15-Jun	0.7	5.7	114										
			16-Jun	0.3	3.6	42										
			17-Jun	0.5	4.8	145										
			18-Jun	0.5	3.2	75										
			20-Jun	0.6	3.0	28.										
			23-Jun	0.7	2.9	40										
			24-Jun	0.5	5.4	222										
			28-Jun	0.5	4.0	144										
			29-Jun	0.6	3.0	43										
	2007	Jun		0.5	4.5	69										Weighted mean
	2007	Jul	1-Jul	0.7	3.5	24										
			6-Jul	0.6	3.5	60										
			9-Jul	0.5	4.2	144										
			13-Jul	0.4	3.5	68										
			19-Jul	0.7	6.2	190										
			31-Jul	0.4	3.7	124										
	2007	Jul		0.56	4.5	102										Weighted mean
	2007	Aug	6-Aug	0.2	3.2	182										
			28-Aug	0.6	4.3	54										
	2007	Aug		0.3	3.5	118										Weighted mean
	2007	Sep	2-Sep	0.3	3.5	51										
			6-Sep	0.3	3.0	94										
			9-Sep	0.3	3.4	209										

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{-2}	Cl^-	NO_3	Note
				mS/m		ml	mm	µmol/l								
			13-Sep	0.2	5.2	24										
			30-Sep	0.2	4.3	24										
	2007	Sep		0.3	3.5	80										Weighted mean
	2007	Oct	9-Oct	0.7	5.2	18										
			10-Oct	0.9	4.3	33										
			16-Oct	0.8	5.4	33										
			22-Oct	0.7	6.2	10										
	2007	Oct		0.8	5.1	24										Weighted mean
	2007	Nov	7-Nov	0.6	5.2	36										
	2007	Dec	5-Dec	1.0	4.1	5										
	Annual Average 2007			0.6	4.4	16										Data less, average not representative.
	2008	Jan	24-Jan	1.02	8.9	16.										
			27-Jan	2.11	6.1	16										
	2008	Jan		1.57	7.5	16										
	2008	Feb	19-Feb	1.4	6.1	15										
			20-Feb	2.4	6.3	7										
	2008	Feb		1.7	6.2	11										Weighted mean
	2008	Mar	5-Mar	3.0	5.2	6										
			15-Mar	3.8	6.3	15										
			18-Mar	2.7	6.8	11										
			25-Mar	3.2	7.0	6										
			30-Mar	2.5	6.7	34										

ANNEXURE III: Wet Deposition Data from Wet-Only and Bulk Collector

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{-2}	Cl^-	NO_3	Note
				mS/m		ml	mm	µmol/l								
			31-Mar	2.8	5.3	8										
	2008	Mar		2.9	6.4	15										Weighted mean
	2008	Apr	1-Apr	4.1	5.2	14										
			4-Apr	3.5	5.1	59										
			13-Apr	3.0	6.2	80										
			17-Apr	3.4	5.9	5										
			23-Apr	4.0	5.4	8										
	2008	Apr		3.3	5.7	33										Weighted mean
	Annual Average 2008			1.2	5.3	254			1		1		1			Data less, average not representative.
		Indicates max value for that year														
		Indicates min value for that year														

Bhutan (Bulk Collector)

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{-2}	Cl^-	NO_3	Note
				mS/m		ml	mm	µmol/l								
	2003	Jul	5-Jul	0.4	6.8	265										
			6-Jul	0.6	5.9	1748										
			7-Jul	0.6	6.2	4224										
			8-Jul	0.4	6.1	5338										
			9-Jul	0.7	6.2	874										
			10-Jul	0.7	6.9	577										
			11-Jul	0.2	6.4	140										
			12-Jul	0.4	7.5	103										
			22-Jul	0.5	6.0	89										
	2003	Jul		0.5	6.2	1484										Weighted mean
		Aug	19-Aug	0.5	6.0	30										
			26-Aug	0.6	7.5	16										
			27-Aug	0.4	6.7	55										
	2003	Aug		0.5	6.6	36										
		Sep	1-Sep	4.3	6.34	25										
			2-Sep	4.0	7.8	29										
			4-Sep	4.1	7.0	74										
			6-Sep	5.3	7.1	8										
			11-Sep	4.3	6.8	77										
			12-Sep	3.2	6.7	133										
			13-Sep	4.7	7.1	113										
			15-Sep	4.4	6.8	114										
			17-Sep	3.0	6.5	119										

ANNEXURE III: Wet Deposition Data from Wet-Only and Bulk Collector

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{-2}	Cl^-	NO_3	Note
				mS/m		ml	mm	µmol/l								
			19-Sep	4.2	6.8	228										
			27-Sep	4.8	6.9	226										
	2003	Sep		4.2	6.9	112										Weighted mean
		Oct	6-Oct	4.0	7.8	212										
		Dec	15-Dec	4.2	5.7											
			15-Dec	4.5	6.9											
			22-Dec	4.8	6.8											
			22-Dec	6.4	7.0											
			29-Dec	2.4	6.6	6.2										
			30-Dec	10.1	6.7											
			30-Dec	10.4	6.9											
	2003	Dec		5.9	6.8	109										Simple average
	Annual average 2003			3.2	6.7											Data less, average not representative.
	2004	Jan	5-Jan	1.6	6.7	5										
			14-Jan	7.2	7.0											
			14-Jan	10.1	7.3											
			19-Jan	0.6	6.12	19										
			26-Jan	10.7	6.5											
			26-Jan	10.7	6.5											
	2004	Jan		6.8	6.7	12										Simple average
		Feb	2-Feb	8.3	7.9											
			2-Feb	10.2	8.0											
	2004	Feb		9.3	7.9											

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{-2}	Cl^-	NO_3	Note
				mS/m		ml	mm	µmol/l								
		Aug	23-Aug	0.02	5.2	140										
			25-Aug	0.1	5.7	217										
			27-Aug	0.0	5.1	239										
			28-Aug	0.1	5.3	135										
	2004	Aug		0.1	5.3	183										Weighted mean
		Sep	1-Sep	0.1	5.0	210										
			3-Sep	0.01	5.45	133										
			6-Sep	0.1	4.45	16										
	2004	Sep		0.1	5.2	75										Weighted mean
		Dec	23-Dec	10.9	6.8	Nil										
			27-Dec	11.1	6.2	Nil										
	2004	Dec		11.0	6.5											Simple average
	Annual average 2004			4.8	6.2											Data less, average not representative.
	2005	Jan	6-Jan	12.1	5.9	14										
			10-Jan	11.3	6.0	Nil										
			17-Jan	10.8	5.4	6										
			24-Jan	11.0	4.7	3										
	2005	Jan		11.6	5.6	3										Weighted mean
		Indicates max value for that year														
		Indicates min value for that year														

ANNEXURE III: Wet Deposition Data from Wet-Only and Bulk Collector

Iran (Wet-only Collector)

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{-2}	Cl^-	NO_3	Note
				mS/m		ml	mm	µmol/l								
	2006	Jan	14-Jan	0.1	4.4	490			1.4	0.5	7.7	8.0	15.8	7.1		
	2006	Feb	2-Feb	0.1	7.1	485			1.6	1.3	3.8	24.1	42.3	14.2		
			5-Feb	0.1	7.4	500			0.6	0.3	3.4	13.6	24.5	10.6		
	2006	Feb		0.1	7.3	500			1.0	0.8	3.6	18.8	33.2	12.4		Weighted mean calculated
	Annual average 2006			0.1	6.3	492			1.2	0.7	5.0	15.2	33.4	12.4		Data less, average not representative.
	2007	Aug	1-Aug	2.9	6.1								20.8	7.0	15.0	
			18-Aug	3.9	5.4								24.5	3.45	13.8	
	2007	Aug		3.4	5.7								22.61	5.2	14.4	Simple average calculated.
	2007	Sep	2-Sep	3.4	5.3								15.4	11.4	21.3	
			7-Sep	4.9	5.8								18.6	8.9	26.2	
			14-Sep	8.2	6.0								30.2	2.5	35.6	
			21-Sep	4.8	6.2								1.5	4.0	0.2	
	2007	Sep		5.3	5.8								16.4	6.7	20.8	Simple average calculated.
		Nov	2-Nov	4.3	6.0								1	1.0	0.4	
		Dec	1-Dec	9.2	6.5								1	1.0	0.4	

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{-2}	Cl^-	NO_3	Note
				mS/m		ml	mm	µmol/l								
	Annual average 2007															Data less, average not representative.
	2008	Jan	1-Jan-	25.0	6.3								10.0	50.0	1.6	
			10-Jan-	25.0	6.3								10.0	5.0	1.6	
	2008	Jan		25.0	6.3								10.0	27.5	1.6	Simple average
	2008	Feb	1-Feb	41.8	6.5								1.4	6.95	0.4	
	2008	Mar	1-Mar	39.4	6.0								1.8	10.9	0.3	
	2008	Apr	2-Apr	29.2	7.0								1.6	5.96	0.6	
	Annual average 2008			32.01	6.4								4.9	15.8	0.9	Data less, average not representative.

ANNEXURE III: Wet Deposition Data from Wet-Only and Bulk Collector

Iran (Bulk Collector)

S No	Year	Month	Date	EC	pH	Amount of sample	Precipitation
				mS/m		ml	mm
	2004	Nov	18-Nov	0.1	7.2		
		Dec	9-Dec	0.1	7.1		
	Annual average 2004			0.1	7.2	1	
	2005	Jan	14-Jan	0.0	7.1		
		Nov	15-Nov	0.1	7.2		
		Dec	10-Dec	0.1	7.0		
	Annual average 2005			0.1	7.1		
	2006	Jan	14-Jan	0.1	6.3		
			14-Jan	0.3	7.9		
	2006	Jan		0.2	7.1		
	2006	Feb	5-Feb	0.1	7.0		
			5-Feb	0.1	7.2		
			5-Feb	0.1	7.1		
			14-Feb	0.1	6.8		
			14-Feb	0.1	6.6		
			14-Feb	0.1	7.4		
	2006	Feb		0.1	7.0		
	2006	Oct	14-Oct	0.1	6.6		
		Nov	10-Nov	0.1	7.1		
		Dec	21-Dec	0.1	6.8		
	Annual average 2006			0.1	7.0		
	2007	Jan	5-Jan	0.3	7.5		

S No	Year	Month	Date	EC	pH	Amount of sample	Precipitation
				mS/m		ml	mm
	2007	Feb	14-Feb	0.1	7.2		
		Feb	18-Feb	0.1	7.1		
	2007	Feb		0.1	7.2		

ANNEXURE III: Wet Deposition Data from Wet-Only and Bulk Collector

Maldives (Wet-only Collector)

S No	Year	Month	EC	pH	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{-2}	Cl^-	NO_3	HCO_3	nss Ca	nss K^+	nss Mg^{+2}	nss SO_4^{-2}	nss Cl^-
			mS/m		mm	µg/l													
	2005	Jun	24	-		29	4881	186	660	415	1544	8792	237	1058	228	5	75	314	28
	2005	Jul	13	-		73	3670	140	475	941	1434	6568	380	1920	800	3	35	509	-22
	2005	Aug	3	5.51		148	2674	121	351	499	1327	4521	529	89	396	22	30	653	-281
	2005	Sep	2	5.36		46	4246	182	563	344	1239	7255	176	163	181	24	54	169	-369
	2005	Dec	0	4.67		235	1672	99	230	93	1618	2887	744	-264	29	37	29	1196	-116
	2006	Jan	0	4.74		272	4997	246	737	302	2316	8641	1349	-830	111	61	139	1057	-332
	2006	Jul	7	5.79		30	3172	134	389	567	1125	5612	131	1008	445	16	9	325	-83
	2006	Aug	0	5.56		16	1660	74	207	115	492	2883	75	458	51	12	8	73	-99
	2006	Sep	3	5.71		35	1999	72	238	228	703	3380	170	910	152	-2	-1	199	-210
	2006	Oct	0	5.24		29	707	23	94	37	365	1275	161	493	10	-4	9	187	6
	2006	Nov	1	5.31		12	1121	29	153	35	457	2059	112	1554	-8	-13	18	174	46
	2006	Dec	6	5.12		171	1338	53	163	65	1035	2328	457	1546	14	3	3	698	-74
	2007	Jan	0	4.67		38	7597	326	945	421	3390	1334	1750	1545	130	44	35	1475	-301

Maldives (Bulk Collector)

S No	Year	Month	EC	pH	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{-2}	Cl^-	NO_3	HCO_3	nss Ca	nss K^+	nss Mg^{+2}	nss SO_4^{-2}	nss Cl^-
			mS/m		mm	µg/l													
	2005	Jun					0.7	0.0	0.1	0.1	0.2	1.2	0.0	0.1	0.0		0.0	0.0	
	2005	Jul					0.9	0.0	0.1	0.2	0.4	1.6	0.1	0.5	0.2		0.0	0.1	-0.01
	2005	Aug					0.2	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.0			0.0	-0.02
	2005	Sep					0.8	0.0	0.1	0.01	0.2	1.4	0.0	0.0	0.0		0.0	0.0	-0.07
	2005	Dec					0.2	0.0	0.0	0.0	0.2	0.3	0.1	-0.03				0.1	-0.01
	2006	Jan					0.2	0.0	0.0	0.0	0.1	0.3	0.0	-0.0				0.0	-0.01
	2006	Jul					0.3	0.0	0.0	0.1	0.1	0.5	0.0	0.1	0.0			0.0	-0.01
	2006	Aug					0.4	0.0	0.0	0.0	0.1	0.6	0.0	0.1	0.0			0.0	-0.02
	2006	Sep					0.7	0.0	0.1	0.1	0.2	1.1	0.1	0.3	0.1			0.1	-0.07
	2006	Oct					0.1		0.0		0.1	0.2	0.0	0.1				0.0	
	2006	Nov					0.2	0.0	0.0	0.0	0.1	0.4	0.0	0.3				0.0	0.01
	2006	Dec					0.0				0.0	0.0		0.0				0.0	
	2007	Jan					0.0				0.0	0.0							

ANNEXURE III: Wet Deposition Data from Wet-Only and Bulk Collector

Nepal (Wet-only Collector)

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{2-}	Cl^-	NO_3	NOTE
				mS/m		ml	mm									
	2006	Jul	Jul-06	4.5	5.8						13.0					Monthly summary
	2006	Aug	Aug-06	4.4	6.2						8.5					Monthly summary
	2006	Sep	Sep-06	6.0	6.1	2050.0				32.5	10.5					
	2007		14-Feb-07	27.5	6.6		250									30.0
	2007	Aug	1-Aug-07	2.9	6.1		5000	Data not correct				20.	7.0	15.		
			18-Aug-07	3.9	5.4		4970						24.5	3.5	13.8	
	2007	Aug		3.4	5.7		4985						22.6	5.2	14.4	Weighted avg
		Sep	2-Sep-07	3.4	5.3		5000						15.4	11.	21.3	
			7-Sep-07	4.9	5.8		4975						18.6	8.9	26.2	
			14-Sep-07	8.2	6.0		4855						30.2	2.5	35.6	
			21-Sep-07	4.8	6.2		2370						1.5	4.0	0.2	
	2007	Sep		5.4	5.8		4300						18.6	7.2	23.8	Weighted avg
	2007	Nov	2-Nov-07	4.3	6.0		1000						1.0	1.0	0.4	
	2007	Dec	1-Dec-07	9.2	6.5		1000						1.0	1.0	0.4	
	2008		1-Jan-08	25.0	6.3		870						10.0	50.	1.6	
			10-Jan-08	25.0	6.3		870						10.0	5.0	1.6	
				41.8	6.5		960						1.4	7.0	0.4	
				39.4	6.0		940						1.8	10.	0.3	
				29.2	7.0		810						1.6	6.0	0.6	
				29.2	7.0		810						1.6	6.0	0.6	
			31-Jan-08	18.3	6.6		785	4.2			10.0	3.3	6.7	6.6	3.9	End date

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{2-}	Cl^-	NO_3	NOTE
				mS/m		ml	mm		mg/l							
	2008	Jan		30.2	6.5		864						4.7	13.	1.2	Weighted avg
	2008	Feb	29-Feb-08	2.4	6.2		975	0.6	1.4		3.9	0.8	1.1	13.	0.3	End date
	2008	Mar	31-Mar-08	3.1	6.4		970	0.8	1.8		3.9	2.4	1.4	11.	0.3	End date
	2008	Apr	30-Apr-08	3.4	5.9		890	1.1	1.4		2.4	3.2	0.9	12.	0.7	End date

Nepal (Bulk Collector)

S No	Year	Month	Date	EC	pH	Amount of sample	Precipitation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{2-}	Cl^-	NO_3	NOTE
				mS/m		ml	mm	mg/l								
	2006	Jul	Jul-06	4.6	5.9											
	2006	Aug	Aug-06	3.9	6.0											Monthly summary
	2006	Sep	Sep-06	6.4	6.0	11565							23.3	8.3		
	2006	Nov	Nov-06	38.2	7.2	370							30.0	8.0		
	2006	Dec	Dec-06	31.5	7.0	620							25.0	7.0		
	Annual average 2006			16.9	6.4											Data less, average not representative.
	2007	Jan		35.3	6.7	150							25.0	7.0		
	2007	Feb		29.5	7.0	380							30.0	6.0		
	2007	Mar		35.7	6.4	565							26.0	14.	15.0	
		May		18.2	5.8	1270							21.0	15.	12.0	
		May		15.5	6.1	4530							24.0	4.0	9.0	
	2007	May		16.9	6.0								22.5	9.5	10.5	Simple average calculated.
	2007	Jun		19.0	6.3	5000							24.0	4.0	9.0	
		Jun		10.6	6.2	575							30.5	2.5	16.3	
		Jun		6.1	5.8	3495							20.0	2.9	18.8	
	2007	Jun		11.9	6.1								24.8	3.1	14.7	Simple average calculated.
		Jul		7.1	5.6	5000							10.8	3.5	20.6	

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{2-}	Cl^-	NO_3	NOTE
				mS/m		ml	mm		mg/l							
		Jul		3.8	6.2	5000							15.6	48.	13.8	
	2007	Jul		5.5	5.9								13.2	26.1	17.2	Simple average calculated.
	Annual average 2007			18.1	6.2	1							22.7	10.7	14.3	Data less , average not representative.

Pakistan (Wet-only Collector)

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{2-}	Cl^-	NO_3	NOTE
				mS/m		ml	mm	mg/l								
	2007	Jan	26-Jan	29.2	7.7		0									
		Feb	3-Feb	23.0	8.0		7									
			10-Feb	26.0	7.2											
			11-Feb	27.0	7.2		22									
			14-Feb	16.0	6.2		Nil									
			17-Feb	83.0	7.5		2									
			24-Feb	386.0	7.6		3									
	2007	Feb		35.0	7.3											Simple average calculated.
		Apr	3-Apr	NIL	Nil		Nil									
			7-Apr	212	7.6											
			10-Apr	38.6	7.6											
			17-Apr	228	8		6									
			18-Apr	33	7.7											
			25-Apr	70.6	7.6											
	2007	Apr		35.8	7.7		1									Simple average calculated.
		May	3-May	197.4	8.1											
			10-May	269	7.9		Trace									
			17-May	265	8		Trace									

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{2-}	Cl^-	NO_3	NOTE
				mS/m		ml	mm	mg/l								
	2007	May			8.0											Simple average calculated.
		Jun	10-Jun	157.7			18									
		Jun	17-Jun	43.0	7.4		32									
			18-Jun	29.7	7.6		22									
			19-Jun	24.4	7.5		65									
			24-Jun	57.4	7.8		36									
			26-Jun	18.9	7.4		25									
	2007	Jun		34.7	7.5		33									Simple average calculated.
		Jul	3-Jul	93.1	7.9		8									
			8-Jul	57.1	8.0		4									
			17-Jul	57.7	8		4									
			24-Jul	123.2	8.2		3									
	2007	Jul		82.4	8.0		3									Weighted mean calculated
		Aug	3-Aug	23.9	NIL		19									
		Sep	5-Sep	138.9	8.1		10									
		Dec	6-Dec	120.5	7.5		5									
	Annual Average 2007			69.1	7.6											

ANNEXURE III: Wet Deposition Data from Wet-Only and Bulk Collector

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{2-}	Cl^-	NO_3	NOTE
				mS/m		ml	mm	mg/l								
	2008	Jan	3-Jan				15									
			11-Jan				3									
	2008	May	24-May	97.0	8.0		16									Value reported in µS/cm

Pakistan (Bulk Collector)

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{2-}	Cl^-	NO_3	NOTE
				mS/m		ml	mm	mg/l								
	2007	Jan	26-Jan	348.0	7.8		0									
		Feb	3-Feb	250.0	8.0		7									
			10-Feb	53.0	7.2											
			11-Feb	29.0	7.2		22									
			14-Feb	136.0	6.2		nil									
			17-Feb	174.0	7.5		2									
			19-Feb	nil	nil		trace									
			24-Feb	173.0	7.6		3									
			28-Feb	nil	nil		trace									
	2007	Feb		135.8	7.3											Simple average calculated.
	2007	Apr	3-Apr	Nil	Nil		0									
			7-Apr	250.0	7.8		0									
			10-Apr	157.8	8.0		0									
			17-Apr	229.0	7.9		6									
			18-Apr	127.4	7.9		0									
			25-Apr	264.0	7.8		0									
	2007	Apr		205.6	7.9		0									Simple average calculated.

ANNEXURE III: Wet Deposition Data from Wet-Only and Bulk Collector

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{2-}	Cl^-	NO_3	NOTE
				mS/m		ml	mm	mg/l								
			3-May	262.0	8.1		0									
			10-May	399.0	8.1		Trace									
			17-May	173.0	8.0		Trace									
			24-May				Trace									
	2007	May		278.0	8.1											Simple average calculated.
			3-Jun	153.0	8.1		Nil									
			10-Jun	141.0	8.0		18									
			17-Jun	42.0	7.4		32									
			18-Jun	31.0	7.5		22									
			19-Jun	26.0	7.4		65									
			20-Jun	126.0	8.2		Nil									
			24-Jun	65.6	7.8		36									
			26-Jun	35.5	7.5		25									
			28-Jun	292.0	8.0		Trace									
			29-Jun	51.8	8.2		Nil									
	2007	Jun		48.0	7.6		33									Weighted mean calculated
			3-Jul	143.6	8.0		8									
			8-Jul	100.3	8.0		4									
			17-Jul	141.2	8.3		4									
			24-Jul	190.7	8.2		3									
	2007	Jul		140.1	8.1		5									Weighted mean calculated

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH_4^+	Na^+	K^+	Mg^{2+}	Ca	SO_4^{2-}	Cl^-	NO_3	NOTE
				mS/m		ml	mm	mg/l								
	2007	Aug	3-Aug	56.0	7.7		19									
	2007	Sep	5-Sep	275.0	9.6		10									
	2007	Dec	6-Dec	210.0	8.0		5									
	Annual Avg 2007			154.7	7.8											
	2008	Jan	3-Jan	104.9	7.8		15									
			11-Jan	373.0	7.8		3									
	2008	Jan		150.9	7.8		9									
	2008	Apr	12-Apr	393.0	7.9		9									
	2008	May	24-May	236.0	8.0		16									
			25-May	100.1	8.0		19									
	2008	May		162.2	8.0		18									Weighted mean calculated
			12/Jun/08	126.0	8.2		20									
			19/Jun/08	146.5	7.9		36									
	2008	Jun		139.2	8.0		28									Weighted
	Annual Avg 2008			211.4	7.9											Data less , average not representative.

Preciptation value reported as rain.

Sri Lanka (Wet-only Collector)

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH^{4+}	Na^{+}	K^{+}	Ca^{2+}	Mg^{+2}	SO_4^{-2}	Cl^{-}	NO^{3-}	NOTE
				mS/m			mm	µmol/l								
	2003	Nov	28	7.6	5.4	281		9.6	38.6	4.6	13.7	5.2	6.4	23.1	5.7	
	2003	Dec	5	8.7	5.9	1450		32.7	38.3	3.3	8.9	5.3	7.7	29.3	5.0	
	2003	Dec	27	37.5	5.6	119		45.1	168.	18.5	18.9	24.6	33.9	151.	23.9	
	2003	Dec		10.9	5.8	785		33.6	48.2	4.5	9.7	6.8	9.7	38.5	6.4	Weighted mean calculated
	Annual average 2003			17.9	5.6	617		29.1	81.8	8.8	13.8	11.7	16.0	67.8	11.5	
	2004	Jan	5	19.2	5.9	470		25.9	202.	24.1	56.0	29.0	46.3	223.	38.2	
	2004	Jan	21	10.8	5.2	92		0.0	52.3	5.0	5.0	7.3	8.8	43.1	7.9	
	2004	Jan	31	13.2	4.9	406		22.6	83.1	7.7	4.4	9.9	12.9	40.0	7.9	
	2004	Jan		15.9	5.4	323		22.1	138.3	15.4	29.5	18.9	28.7	129.6	22.6	Weighted mean calculated
	2004	Mar	6			50		6.6	72.7	15.5	11.0	10.1	19.2	56.3	17.9	
			12	4.3	5.1	1318		4.4	37.5	252.	25.0	15.3	4.1	13.5	5.5	
			20	22.0	4.3	310		25.4	35.4	7.9	16.6	7.2	28.2	18.9	37.7	
			26	8.4	4.9	3865		0.0	21.6	4.4	6.6	3.2	11.6	10.7	14.4	
	2004	Mar		8.2	4.9	1831		2.5	63.6	11.6	6.4	10.8	12.2	12.2	13.6	Weighted mean calculated
	2004	Apr	1	7.6	4.6	2813		0.0	11.9	2.0	0.1	1.5	6.8	9.3	11.8	
			9	6.6	5.1	822		0.0	11.0	1.7	0.0	1.3	6.7	9.9	11.6	
			15	10.1	4.9	84		8.4	28.9	4.6	7.5	4.3	10.0	21.7	34.8	
			23	6.0	5.0	172		0.0	14.2	3.5	6.6	2.6	5.7	11.8	14.8	

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH^{4+}	Na^{+}	K^{+}	Ca^{2+}	Mg^{+2}	SO_4^{-2}	Cl^{-}	NO^{3-}	NOTE
				mS/m			mm	µmol/l								
			30	6.7	5.6	172		0.0	35.1	6.4	4.3	4.4	4.4	25.6	5.0	
	2004	Apr		7.3	4.8	313		0.2	13.1	2.2	0.7	1.7	6.7	10.5	12.1	Weighted mean calculated
	2004	May	22	5.3	4.9	584		0.0	23.8	2.0	2.8	3.2	4.6	21.7	1.9	
	2004	Jun	10	26.5	5.5	49		0.0	106.	28.1	35.0	20.5	15.4	93.8	1.8	
	2004	Jul	1	16.3	6.6	249		0.0	68.3	5.9	28.3	12.6	12.4	67.6	14.0	
	2004	Aug	27-Aug	0.5	6.1	715		3.4	38.9	2.0	5.3	0.5	3.5	28.0	2.0	
	2004	Sep	19-Sep	0.5	6.2	1050		3.4	39.3	1.7	5.4	0.5	4.1	29.6	2.5	
		Oct	16-Oct	0.5	6.3	395		4.3	41.5	1.6	5.1	0.5	3.8	27.5	2.7	
			22-Oct	0.5	6.2	250.		4.2	41.4	1.4	5.2	0.4	3.2	28.9	2.3	
	2004	Oct		0.5	6.3	323		4.2	41.4	1.5	5.1	0.5	3.6	28.0	2.7	Weighted mean calculated
		Nov	1-Nov	5.1	6.8	3670		10.6	124.	4.8	15.5	17.3	5.0	6.1	3.5	
			10-Nov	0.5	6.3	3010		3.8	39.2	1.7	6.0	0.5	3.0	26.0	2.0	
			16-Nov	0.4	6.2	3125		2.9	38.1	1.7	2.7	0.5	2.2	28.2	2.1	
			22-Nov	0.7	6.1	1075		6.9	44.7	5.5	7.2	4.8	2.4	52.3	3.4	
			30-Nov	0.6	6.4	1950		3.4	31.3	1.9	5.8	0.5	2.1	24.1	1.8	
	2004	Nov		1.8	6.4	2566.0		5.7	62.4	2.9	8.0	5.7	3.2	22.8	2.5	Weighted mean calculated
		Dec	9-Dec	0.4	6.8	5000		3.2	40.0	1.3	4.8	0.5	3.2	27.0	1.9	

ANNEXURE III: Wet Deposition Data from Wet-Only and Bulk Collector

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH^{4+}	Na^{+}	K^{+}	Ca^{2+}	Mg^{+2}	SO_4^{-2}	Cl^{-}	NO^{3-}	NOTE
				mS/m			mm	µmol/l								
			17-Dec	0.4	6.4	3020		3.7	39.2	1.6	5.1	0.6	2.9	28.9	2.3	
			24-Dec	0.5	6.3	1110		2.9	41.5	1.6	4.5	0.7	3.1	30.9	1.9	
	2004	Dec		17.9	5.6	617		29.1	81.8	8.8	13.8	11.7	16.0	67.8	11.5	Weighted mean calculated
	Annual Average 2004			4.1	6.1	1598		3.3	48.2	4.1	8.7	4.1	4.9	33.2	3.6	
	2005	Jan	16-Jan	0.4	6.3	2855		3.0	41.6	1.3	5.2	0.5	1.9	28.5	2.6	
		Feb	27-Feb	0.5	6.2	145		3.4	42.3	1.6	5.3	0.6	3.0	31.8	2.2	
			5-Mar	0.5	6.3	1880		3.8	43.5	1.9	7.0	0.5	3.6	34.4	3.4	
			12-Mar	0.5	6.1	780		3.2	40.0	1.3	6.1	0.5	3.0	32.2	3.2	
			25-Mar	0.5	6.3	1875		2.9	41.6	1.7	6.3	0.6	2.9	31.7	3.4	
	2005	Mar		0.5	6.3	1512		3.3	42.1	1.7	6.6	0.5	3.2	32.9	3.4	Weighted mean calculated
			3-Apr	0.5	6.2	275		3.2	41.6	1.4	6.0	0.7	2.7	30.9	4.0	
			10-Apr	0.5	6.1	1750		3.4	41.6	1.3	6.1	0.6	3.0	31.2	3.4	
			23-Apr	0.5	6.2	3495		3.9	42.0	1.5	6.2	0.7	3.1	29.1	3.7	
			30-Apr	0.8	6.7	1050		25.0	68.9	3.2	13.0	4.8	4.7	52.5	3.0	
	2005	Apr		0.5	6.3	1643		7.1	1.7	7.2	1.3	3.3	33.5	33.5	3.5	Weighted mean calculated
			14-Aug	0.5	6.3	850		1.8	42.5	1.5	4.9	0.5	2.3	30.8	3.5	
			22-Aug	0.5	6.4	620		2.7	42.0	1.6	5.3	0.6	2.9	31.0	3.8	
	2005	Aug		0.5	6.3	620		2.1	42.3	1.5	5.1	0.6	2.5	30.9	3.5	Weighted mean calculated

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH^{4+}	Na^{+}	K^{+}	Ca^{2+}	Mg^{+2}	SO_4^{-2}	Cl^{-}	NO^{3-}	NOTE
				mS/m			mm	µmol/l								
			3-Oct	0.5	6.3	530		3.0	43.5	1.5	5.0	0.8	2.1	33.9	3.5	
			10-Oct	0.4	6.2	2720		3.4	37.0	1.4	5.1	0.6	2.3	28.5	3.4	
			17-Oct	0.5	6.1	4490		3.5	39.7	1.1	5.5	0.5	2.2	31.6	3.5	
			24-Oct	0.8	6.1	1560		2.8	39.9	1.1	6.1	0.6	2.4	0.0	3.5	
			30-Oct	0.5	6.1	1305		2.6	41.5	1.4	7.4	0.0	2.5	31.5	3.3	
	2005	Oct		0.5	6.1	2121		3.3	39.4	1.2	5.7	0.5	2.3	26.3	3.5	Weighted mean calculated
			13-Nov	0.9	6.1	2050		5.1	62.7	1.7	16.7	0.0	4.5	57.3	5.9	
			20-Nov	0.5	6.2	5000		1.9	44.0	1.4	10.4	1.0	2.2	33.7	3.4	
			27-Nov	0.5	6.3	5000		1.9	46.4	1.1	7.1	1.0	2.2	34.2	4.2	
	2005	Nov		0.6	6.2	4017		2.4	48.2	1.3	10.1	0.8	2.6	37.9	4.2	Weighted mean calculated
	Annual Average 2005			0.5	6.2	2012		4.2	44.3	1.5	7.1	0.8	2.8	32.4	3.5	
	2006	Jan	15-Jan	0.7	6.2	2300		3.9	19.6	20.5	8.0	0.4	3.4	23.7	1.9	
			22-Jan	0.6	6.3	1250		4.5	25.3	2.3	4.9	0.4	2.1	20.6	1.6	
			29-Jan	0.7	6.2	1640		4.4	25.8	2.1	5.3	0.4	2.1	20.6	1.6	
	2006	Jan		0.7	6.2	1730		4.2	22.9	10.3	6.4	0.4	2.7	22.0	1.8	Weighted mean calculated
	2006	Apr	15-Apr	0.8	6.3	1110		3.5	22.3	1.9	4.5	0.4	2.4	28.0	4.2	
			7-Oct	0.4	5.4	2940		3.3	33.0	17.1	4.0	4.9	2.7	27.9	4.1	
			14-Oct	0.6	6.2	765		3.5	34.4	2.2	3.8	0.5	2.1	23.0	4.3	
			21-Oct	0.6	6.3	730		3.4	30.0	2.1	4.1	0.5	2.4	20.2	4.4	

ANNEXURE III: Wet Deposition Data from Wet-Only and Bulk Collector

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH^{4+}	Na^{+}	K^{+}	Ca^{2+}	Mg^{+2}	SO_4^{-2}	Cl^{-}	NO^{3-}	NOTE
				mS/m			mm	µmol/l								
	2006	Oct		0.5	5.7	1478		3.3	32.8	12.1	4.0	3.4	2.5	25.8	4.2	Weighted mean calculated
		Nov	4-Nov	0.6	6.3	4150		2.9	28.5	1.8	3.5	0.4	1.9	18.4	3.5	
			11-Nov	0.7	6.2			4.5	28.5	1.9	4.3	0.5	2.1	22.9	4.7	
			18-Nov	0.6	6.3			4.7	32.7	2.1	3.5	0.5	2.5	25.9	3.7	
			26-Nov	1.8	7.1			11.9	98.7	3.4	21.8	12.8	16.7	36.7	8.1	
	2006	Nov		0.6	6.3			2.9	1.8	3.5	0.4	1.9	18.4	18.4	3.5	Simple average calculated.
		Dec	2-Dec	0.5	6.2			3.4	36.6	2.4	10.2	0.4	2.7	23.4	4.9	
			9-Dec	0.5	6.3			3.5	41.5	2.0	10.4	1.2	3.9	27.6	3.4	
	2006	Dec		0.5	6.3			3.5	39.0	2.2	10.3	0.8	3.3	25.5	4.1	Simple average calculated.
	Annual Average 2006			0.7	6.3			4.4	35.1	4.8	6.8	1.8	3.6	24.5	3.9	
	2007		16-Apr	0.5	6.3			3.3	48.2	1.7	10.3	0.8	4.0	30.9	3.5	
			23-Apr	0.5	6.4			3.0	44.6	1.6	7.8	0.8	4.0	26.9	3.4	
	2007	Apr		0.5	6.4			3.2	46.4	1.7	9.1	0.8	4.0	28.9	3.4	Simple average calculated.
			20-May	0.5	6.3			2.7	45.8	1.6	5.4	0.9	3.3	37.0	3.5	
			27-May	1.8	8.1			93.1	82.5	45.1	18.9	10.8	19.0	71.5	27.1	
	2007	May		0.5	7.2			47.9	64.2	23.4	12.2	5.8	11.1	54.3	15.3	Simple average calculated.
			7-Jun	0.5	6.2			4.5	36.9	1.4	6.3	0.6	2.7	25.4	3.6	

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH^{4+}	Na^{+}	K^{+}	Ca^{2+}	Mg^{+2}	SO_4^{-2}	Cl^{-}	NO^{3-}	NOTE
				mS/m			mm	µmol/l								
			24-Jun	0.5	6.3			4.8	35.5	1.7	7.4	0.6	2.8	29.8	4.3	
	2007	Jun		0.5	6.3			4.7	36.2	1.6	6.9	0.6	2.7	27.6	4.0	Simple average calculated.
			15-Jul	0.5	6.2			5.4	41.9	1.1	6.4	0.5	2.3	32.7	4.5	
			21-Jul	0.5	6.3			5.7	41.0	1.4	5.6	0.6	2.3	32.8	4.4	
	2007	Jul		0.5	6.3			5.5	41.4	1.3	6.0	0.6	2.3	32.7	4.5	Simple average calculated.
	2007	Aug	19-Aug	5.0	6.3			5.2	33.3	1.2	5.9	0.7	2.6	31.7	4.5	
	Annual average 2007			1.1	6.5			14.2	45.5	6.3	8.2	1.8	4.8	35.4	6.5	
	2008	May	29-May	9.4	7.3	1000	1000	16.5	408.	36.7	118.0	30.5	87.4	298.	90.0	
	2008	Jun	1-Jun	5.4	7.0	1200	1200	2.7	257.	20.9	58.0	30.4	13.0	2.0	19.0	
			3-Jun	2.5	6.6	1500	1500	16.5	85.7	16.5	18.5	14.3	8.8	148.	15.0	
			5-Jun	2.3	6.2	1500	1500	16.0	63.6	16.0	16.3	8.4	6.0	148.	11.0	
			7-Jun	1.1	6.3	1500	1500	15.8	30.8	8.5	7.8	2.4	3.6	70.5	8.0	
			17-Jun	0.9	6.1	1800	1800	11.5	20.5	6.6	7.2	2.2	2.5	49.0	4.5	
			23-Jun	2.5	6.7	1100	1100	15.9	70.0	14.2	18.4	12.5	14.8	134.	16.0	
	2008	Jun		2.3	6.4		1433	13.2	80.5	13.3	19.4	10.7	7.4	91.6	11.6	Weighted mean calculated

Sri Lanka (Bulk Collector)

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH^{4+}	Na^{+}	K^{+}	Ca^{2+}	Mg^{+2}	SO_4^{-2}	Cl^{-}	NO^{3-}	NOTE
				mS/m			mm	µmol/l								
	2003	Nov	28	21.6	6.0	2810		0.0	34.9	4.8	9.6	55.8	9.7	23.3	4.0	
	2003	Dec	5	20.9	6.3	1446		0.0	58.6	8.4	9.9	47.3	13.3	36.3	5.3	
	2003	Dec	27	68.0	6.1	99		48.7	228.1	32.1	43.4	57.8	44.2	276.6	34.8	
	2003	Dec		23.9	6.3	436		3.1	69.5	9.9	12.0	48.0	15.3	51.7	7.2	Weighted mean calculated
		Annual average 2003		36.8	6.1	1452		16.2	107.2	15.1	21.0	53.6	22.4	112.1	14.7	
	2004	Jan	5	22.5	6.9	462		2.6	71.3	5.2	10.3	13.7	46.9	284.8	40.8	
	2004	Jan	21	11.5	5.3	905		0.0	51.5	4.4	6.6	6.0	9.8	48.3	9.0	
	2004	Jan	31	14.4	5.1	398		7.5	62.5	6.1	8.7	8.8	14.7	48.7	9.2	
	2004	Jan		15.0	5.6	588		2.4	59.2	5.0	8.0	8.6	20.6	110.3	17.4	Weighted mean calculated
	2004	Mar	6	0.0	0.0	48		14.0	82.7	27.3	10.3	19.7	10.5	59.7	13.2	
			12	4.4	5.1	1320		0.0	14.6	3.9	1.8	3.3	3.3	12.4	4.4	
			20	22.4	4.6	304		23.7	38.6	11.6	9.3	20.8	31.6	20.9	44.7	
			26	8.6	5.1	3370		0.0	20.3	3.7	3.9	8.8	11.7	11.3	14.4	
	2004	Mar		8.3	5.1	1261		1.6	4.5	3.7	8.2	10.7	12.6	12.6	13.6	Weighted mean calculated
	2004	Apr	1	7.7	4.8	2818		7.5	21.4	8.3	3.5	5.4	7.5	14.3	12.9	
			9	8.5	5.5	816		0.0	27.2	17.9	2.9	6.4	5.6	20.3	12.1	
			15	37.7	5.7	76		4.4	74.4	93.3	42.3	51.9	16.4	54.1	37.4	
			23	8.2	5.1	161		0.0	29.5	9.1	5.1	11.7	6.3	21.4	14.5	
			30	8.5	5.8	166		0.0	50.2	6.6	5.3	8.5	7.8	31.6	5.7	

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH^{4+}	Na^{+}	K^{+}	Ca^{2+}	Mg^{+2}	SO_4^{-2}	Cl^{-}	NO^{3-}	NOTE
				mS/m			mm								µmol/l	
	2004	Apr		8.5	5.0	807		5.3	25.1	11.8	4.2	6.9	7.2	17.3	13.0	Weighted mean calculated
	2004	May	22	7.8	5.1	576		0.0	38.1	8.8	5.9	6.4	5.1	29.6	0.3	
	2004	Jun	10	58.2	6.5	43		6.7	165.5	54.6	36.6	74.8	29.3	206.5	14.7	
	2004	Jul	1	33.1	6.6	242		0.0	121.8	21.4	24.7	46.1	17.0	117.2	17.4	
	2004	Aug	27-Aug	1.1	5.9	690		5.7	67.4	3.1	4.2	18.9	5.5	74.5	3.4	
		Sep	19-Sep	1.0	6.0	2004		7.3	61.2	2.8	4.2	22.0	5.4	65.4	2.9	
			16-Oct	1.1	5.9	970		6.7	67.0	4.1	4.1	22.5	8.5	71.1	5.6	
			22-Oct	1.1	6.0	200		8.5	63.3	5.1	4.4	23.9	5.4	73.4	4.2	
	2004	Oct		1.1	6.0	585		7.0	66.3	4.3	4.2	22.7	8.0	71.5	5.6	Weighted mean calculated
	Annual average 2004			14.3	5.6	862		4.5	58.1	15.0	10.2	20.0	13.2	67.0	14.1	
	2005	Jan	16-Jan	0.9	6.1	2530		8.5	97.3	3.5	1.2	12.7	4.3	59.2	4.8	
	2005	Feb	27-Feb	0.8	6.4	140		11.0	55.6	2.7	6.0	7.7	3.4	57.2	3.5	
		Mar	5-Mar	0.9	6.8	1745		31.9	49.0	2.6	4.1	10.7	5.9	56.6	4.8	
			12-Mar	1.0	6.6	650		8.2	68.9	3.7	5.3	21.2	5.7	57.0	2.0	
			25-Mar	1.1	6.2	1600		9.3	82.5	4.2	6.7	18.9	6.5	60.2	6.2	
	2005	Mar		1.0	6.6	1332		19.0	65.6	3.4	5.3	15.7	6.1	58.1	4.9	Weighted mean calculated
		Apr	3-Apr	1.1	6.2	260		7.0	80.3	13.2	7.1	13.0	5.0	69.6	3.5	
			10-Apr	1.1	6.1	1675		10.4	79.0	6.9	7.6	7.4	3.3	71.0	2.7	

ANNEXURE III: Wet Deposition Data from Wet-Only and Bulk Collector

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH^{4+}	Na^{+}	K^{+}	Ca^{2+}	Mg^{+2}	SO_4^{-2}	Cl^{-}	NO^{3-}	NOTE
				mS/m			mm	µmol/l								
			23-Apr	1.0	6.1	3220		15.9	41.9	11.1	11.9	6.3	5.9	71.1	4.5	
			30-Apr	1.0	6.1											
	2005	Apr		1.0	6.1	1718		13.7	9.8	10.3	7.0	5.0	71.0	71.0	3.9	Weighted mean calculated
	2005	Jul	9-Jul	1.0	5.9			8.4	62.2	4.0	6.8	18.1	4.4	66.6	3.9	
		Aug	14-Aug	0.9	5.8			7.8	61.5	3.5	7.7	7.8	4.7	59.2	5.7	
			22-Aug	0.9	6.3			5.7	64.7	3.5	8.0	10.4	2.8	62.0	3.8	
	2005	Aug		0.9	6.0			6.7	63.1	3.5	7.8	9.1	3.8	60.6	4.8	Weighted mean calculated
		Oct	3-Oct	0.8	5.8			9.5	64.4	3.7	6.0	8.8	1.9	58.5	4.2	
			10-Oct	0.9	5.8			6.9	48.0	3.7	5.4	16.8	8.6	61.3	3.3	
			17-Oct	1.1	6.1			7.3	51.7	3.9	6.6	12.6	16.7	76.6	4.0	
			24-Oct	1.1	6.2			6.9	67.4	4.6	4.6	5.0	5.5	18.1	3.4	
			30-Oct	1.1	5.8			10.5	53.5	4.1	4.2	6.0	24.7	70.5	7.3	
	2005	Oct		1.0	5.9			8.2	57.0	4.0	5.3	9.8	11.5	57.0	4.4	Weighted mean calculated
		Nov	6-Nov	0.7	5.8			7.3	46.5	4.0	6.0	17.7	2.2	37.2	2.9	
			20-Nov	1.0	6.2			10.4	69.1	3.0	7.8	10.1	7.6	58.1	2.7	
	2005	Nov		0.9	6.0			8.9	57.8	3.5	6.9	13.9	4.9	47.7	2.8	Weighted mean calculated
	Annual average 2005			1.0	6.1	1477.5		10.2	63.5	4.8	6.3	11.7	6.6	59.4	4.1	
	2006		15-Jan	1.3	6.2	1865		7.1	84.8	3.1	4.5	10.7	16.9	76.7	21.0	
			22-Jan	1.2	6.5	220		7.6	79.6	2.8	4.3	10.2	16.0	70.5	15.3	

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH^{4+}	Na^{+}	K^{+}	Ca^{2+}	Mg^{+2}	SO_4^{-2}	Cl^{-}	NO^{3-}	NOTE
				mS/m			mm	µmol/l								
			29-Jan	1.1	6.4	1460		6.0	86.5	3.6	4.1	19.0	15.3	56.7	14.0	
	2006	Jan		1.2	6.3	1182		6.7	85.2	3.3	4.3	14.1	16.2	68.1	17.8	Weighted mean calculated
	2006	Apr	15-Apr	1.2	6.4	1230		9.2	80.9	36.6	0.4	1.5	13.6	64.9	16.4	
			7-Oct	1.8	5.6	2380		8.2	67.8	9.0	0.4	1.5	11.2	67.7	16.2	
			14-Oct	2.2	6.2	815		237.3	901.3	484.	4.9	4.2	11.2	1323.	33.5	
			21-Oct	1.1	6.3	2880		6.7	68.3	2.8	0.4	15.0	0.0	0.0	0.0	
	2006	Oct		1.5	6.0	2025		38.2	179.8	69.9	1.0	8.3	5.9	204.0	10.9	Weighted mean calculated
			4-Nov	0.9	6.2	1810		9.4	67.8	3.6	0.4	10.2	2.0	60.3	16.4	
		Nov	11-Nov	1.2	6.2	3030		8.3	72.2	2.8	0.4	11.5	14.0	61.5	20.0	
			18-Nov	1.2	6.3	1915		10.0	76.1	3.6	0.4	12.2	13.7	77.6	13.4	
			26-Nov	1.2	6.6	12		11.1	71.7	2.8	0.4	13.2	10.9	79.0	17.3	
	2006	Nov		1.1	6.2	1692		9.1	3.2	0.4	11.4	10.7	65.8	65.8	17.2	Weighted mean calculated
		Dec	2-Dec	1.1	6.3	1010		8.9	64.3	3.3	0.7	12.0	15.3	73.3	18.2	
			9-Dec	1.4	6.4	135		6.1	62.2	3.1	0.4	12.2	13.6	36.7	5.2	
	2006	Dec		1.3	6.4	573		7.5	63.3	3.2	0.6	12.1	14.5	55.0	11.7	Weighted mean calculated
	Annual average 2006			1.3	6.3	1443.2		25.8	137.2	43.2	1.7	10.3	11.8	157.5	15.9	
	2007	Apr	16-Apr	1.2	6.1	270		11.1	86.1	3.3	0.7	17.2	11.1	67.7	11.6	
			23-Apr	1.0	6.4	2660		14.4	50.9	3.1	0.4	13.7	10.6	71.4	13.1	
	2007	Apr		1.0	6.4	1465		14.1	54.2	3.1	0.4	14.0	10.7	71.0	11.6	Weighted mean calculated

ANNEXURE III: Wet Deposition Data from Wet-Only and Bulk Collector

S No	Year	Month	Date	EC	pH	Amount of sample	Precipi-tation	NH^{4+}	Na^{+}	K^{+}	Ca^{2+}	Mg^{+2}	SO_4^{-2}	Cl^{-}	NO^{3-}	NOTE
				mS/m			mm	µmol/l								
			20-May	1.2	6.2	440		20.3	81.3	2.8	0.4	14.0	11.7	68.5	10.8	
			27-May	1.1	6.3	710		14.7	80.9	3.3	0.4	14.2	10.6	62.3	12.4	
	2007	May		1.1	6.3	575		16.9	81.0	3.1	0.4	14.1	11.0	64.7	10.8	Weighted mean calculated
			7-Jun	1.0	6.2	1720		13.7	67.0	2.7	0.4	12.3	10.0	54.2	7.1	
			24-Jun	1.0	6.2	405		11.8	67.0	2.7	0.4	11.5	12.9	71.7	9.0	
	2007	Jun		1.0	6.2	1063		13.3	67.0	2.7	0.4	12.1	10.5	57.5	7.1	Weighted mean calculated
			15-Jul	1.4	7.1	145		46.2	87.4	17.0	15.3	24.5	21.0	96.6	18.1	
			21-Jul	1.2	6.2	110		11.8	76.0	5.7	0.5	12.8	10.7	79.4	23.6	
	2007	Jul		1.3	6.7		127.5	31.4	82.5	12.1	8.9	19.4	16.5	89.1	18.1	Weighted mean calculated
	2007	Aug	19-Aug	3.8	7.0	2290		33.3	104.1	4.1	9.0	8.5	25.1	88.2	33.3	
	Annual average 2007			1.4	6.4	972		19.7	77.9	5.0	3.1	14.3	13.7	73.3	15.4	
	2008	May	5/29/200	9.5	7.3	1000		17.1	423.0	37.2	30.5	120.4	88.2	310.2	92.0	
			6/1/2008	5.4	7.0	1200		2.7	263.0	21.6	30.4	60.0	13.1	282.0	20.0	
			6/3/2008	2.5	6.6	1500		17.2	86.3	17.0	14.3	19.0	9.5	148.0	15.8	
			6/5/2008	2.3	6.2	1500		16.9	64.4	16.0	6.4	17.1	6.0	148.0	11.9	
			6/7/2008	1.1	6.3	1500		16.4	31.5	8.7	2.4	8.0	3.8	70.5	8.4	
			6/17/200	0.9	6.1	1800		12.5	21.1	6.8	2.2	7.5	2.8	52.0	4.9	
			6/23/200	2.5	6.7	1100		16.8	71.9	14.6	12.5	18.5	15.8	138.0	16.7	
	2008	Jun		2.3	6.4	1433		14.0	82.1	13.6	10.3	20.0	7.8	131.8	12.2	Weighted mean calculated