

Suggested changes for improving data quality in the Malé Declaration Monitoring Network



Monitoring Committee

September 2006

Monitoring strategy for Phase II

- Focus on strengthening the transboundary air pollution monitoring capacity of NIAs
- Dry deposition parameters: SO₂, NO₂, TSPM, PM₁₀
- Wet deposition parameters: pH, EC, Mg, Na, K, Ca, NH₄, SO₄, NO₃, Cl.
- Only a limited number of sites that can be monitored on a sustained basis will be initially selected.
- The first 5 years of the monitoring programme should be devoted to acidification trend monitoring only.
- Site selection criteria defined for remote sites. 30 sites suggested, final site selection done by NIAs.

For given objectives, the monitoring programme will be successful if 5 factors are in place:

- Sites—proper site selection and an adequate number of sites;
- Data collection—monitoring protocol, equipment functioning, sample handling & analysis, data handling;
- Human resources--training, motivation;
- Organization--should deliver required outputs;
- Back-up with required resources.

1. MONITORING SITES

Current situation

	Site name	Type	Met stn dist
• Bangladesh	Shathkhira	Rural	40-50 km
• Bhutan	Gelephu	To be assessed	0 km
• India	Fort Canning	To be assessed	40-50 km
• Iran	Chamsari	Remote*	40-50 km
• Maldives	Hanimadhoo	Remote*	0 km
• Nepal	Rampur	Rural	0 km
• Pakistan	Bhawlnagar	Rural/urban?	0 km
• Srilanka	Dutuwewa	Remote	40-50 km

** With some interference. Requires further evaluation*

Suggestions for the future

Site classification

- Sites should be clearly classified as remote or rural.
- Objectives of rural sites should be clearly spelt out.
- Determination should be made regarding the classification of the Bhutan and Pakistan sites.
- The extent of interference in Iran and the Maldives should be determined.

- Proposed sites, if to be a part of the network to monitor transboundary air pollution, should be representative, and preferably remote.

Number of sites

- MoC to determine site criteria for ozone sampling at rural sites.
- At least 2 remote sites to be identified in each country, preferably in sensitive areas.
- Possible to do deposition and ecological monitoring at all future proposed sites.

2. DATA COLLECTION, HANDLING & INTERPRETATION

Current problems

- Non-availability of power, poor quality power and power outages at remote and rural sites. This has made operating the HVS difficult.
- The HVS is giving largely non-detect results for SO₂ and NO₂.
- Wet only collector lid disintegrating due to sunlight exposure.

- Wet only/bulk collector bottles fill up too quickly in Bhutan and Nepal.
- Obtaining spares has been difficult.
- QA/QC procedures are yet to get into place.
- Reaching remote monitoring sites difficult in many countries, particularly if samples are to be collected weekly.
- Data reporting formats available, but data handling and data review processes require formulation.

Suggestions for the future

Parameters and monitoring protocol

- Ozone may be monitored at remote and rural sites.
- The MoC may discuss the following monitoring protocol and make suitable recommendations.

- **HVS TSPM/PM10 samples:** 1x24 hr samples [9 am–9 am next day]. Sampling to be done 7 days/month between 10th-20th of each month. Valid sample: when machine up time is >60% of sampling time
- **Diffusive samplers** 1-month samples for SO₂, NO₂ and ozone.
- **Wet only collector** 1-week composite sample, to be collected once a month, between the 10th-20th of each month.
- **Bulk collector** 1-week composite sample, to be collected once a month, between the 10th-20th of each month.

Equipment

- Equipment used in remote sites should not require line power.
- All proposed remote sites should either have an existing local meteorological station within 50 km, else must have one at the site.
- HVS should be discontinued for the measurement of SO₂ and NO₂. The HVS may be continued to be used for TSPM and PM₁₀ measurement at rural sites.
- Each site should have at least two bulk collectors.

- Material of construction of the wet only collector lid requires to be changed.
- Inventory of required spares may be obtained from the NIAs and such spares be provided.
- Countries with sites in high rainfall areas (Bhutan, Nepal) should use two 10-liter collection bottles for each wet only collector and two such bottles for each bulk collector.

Sample handling and analysis

- Wet deposition samples should be made into two parts and one part be analyzed in-country and the other sent to the reference laboratory.
- Blind wet deposition samples prepared by the reference laboratory should be sent to all participating country laboratories at least once a year, preferably twice a year.
- To estimate dry deposition in funnel when no rain occurs, a precise volume of water should be added to the funnels, and the rinse water analyzed for all wet deposition parameters.

Data handling

- The NIAs and UNEP, presently the network secretariat, require a defined procedure for data handling—review data and remove outliers, flag problematic data, data warehousing and retrieval, etc.
- National Advisory Committees in each country should verify collected data before it is sent to the secretariat. This signifies approval of the data by national governments.

3. HUMAN RESOURCES

- To achieve the data quality objectives that the network has set for itself, human capacity building has been made an important objective of Phase III.

Suggestions for the future

- QA/QC procedures must be emphasized.
- NIAs/MoC must ensure that data quality objectives are met.
- R_1 and R_2 should be computed by the NIAs to ensure that the data being generated are of the required integrity.

- Annual audits of the monitoring sites and the laboratory should be done by the NIAs
- An MoC-level person either from the MoC or from the reference laboratory should visit all the monitoring stations and laboratories and hold discussions with the NIA to:
 - Conduct audits of the national monitoring programmes.
 - Discuss with the NIA ways of improving the national QA/QC programme.

Other measures

- Steps have been taken to train NIAs in trajectory analysis and emission inventory.
- There is discussion in the MoC regarding a passive samplers (from the region) inter-comparison programme.

Timeline

- MoC with NIAs should re-work timelines for Phase III

Updates for the technical manual

Integrate technical and instrument user manuals into user-friendly several small manuals as follows:

- o Introduction

 - Malé Declaration

 - Impacts of acidic deposition

 - Types of sites

 - Site selection criteria

 - Parameters to be monitored

- o Basic concepts and theory

 - Air pollution—sources and characteristics

 - Basics concepts in meteorology

 - Long range transport of air pollutants

 - Atmospheric chemistry

 - Units & materials and energy balances

 - Basic concepts in chemistry

 - Basic concepts in statistics

- o Instrument installation, handling, maintenance, calibration, trouble shooting and sample handling
 - High volume sampler
 - Diffusive samplers(including basic theory of diffusive sampling)
 - Wet only collector
 - Bulk collector
 - pH meter
 - Conductivity meter
 - Safety in the field

- o Analytical methods

- Spectrophotometer—principles, features, calibration curves

- Analytical methods for AAQ samples

- Flame photometry—principles, features

- Analytical methods for rain water samples
(different methods to be provided)

- AAS--principles, features, procedures

- Good laboratory practices

- Safety in the laboratory

- o Data management

 - Site description information

 - Reporting of monitoring results

 - Data warehousing

- o Deposition computation

 - Dry deposition

 - Wet deposition

- o QA/QC

- Definitions

- Responsibilities

- Fundamentals of QA/QC

- Data quality objectives

- Site characteristics

- Quality control—sample collection & handling, measurement & analysis, audits

- Quality assurance—external QA programme, data control, audit, capacity building

- Role of Technical Committee in QA/QC

- A Standard Operating Procedures manual will be prepared as part of the technical manual update.

Other suggested measures

- Make CDs on air pollution, site selection, instrument handling and analytical procedures
- Prepare a manual for data manipulation, analysis, interpretation and dissemination

Thank you