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

STATUS REPORT

for Submission
to
The Governing Council of SACEP/Environmental Ministers

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

STATUS REPORT

1. Malé Declaration

On 19th and 20th of March 1998 a round-table policy dialogue regarding the rapidly increasing problem of regional air pollution, with a focus on South Asia, was organized at the Asian Institute of Technology (AIT), Bangkok, Thailand. Objectives of the meeting included: (1) discuss the issue of transboundary air pollution; (2) discuss the mechanisms to address the issue; and (3) explore a draft declaration. The meeting was attended by a distinguished group of senior level environmental ministry officials from South Asian countries, analysts and policy influencers and representatives of key environmental organizations in the area. The meeting agreed on the need for action. The meeting, noting the experience of Europe decided to work on a draft declaration. The meeting approved the draft declaration in principle and decided to submit to the Seventh Governing Council of South Asia Cooperative Environment Programme (SACEP) for approval.

The Seventh meeting of the Governing Council of SACEP was held in April 1998 in Malé, the Republic of Maldives, and adopted the declaration naming it the "*Malé Declaration on Control and Prevention of Air Pollution and its likely Transboundary Effects for South Asia*". The Malé Declaration stated the need for countries to carry forward, or initiate, studies and programmes on air pollution in each country of South Asia. The first stage in this process is to document current knowledge and information/institutional capacity in each nation relevant to air pollution issues. To this end it was agreed that baseline studies would be developed. Gaps in the current status of knowledge and capacity would become apparent and national action plans to fill these gaps could then be implemented, creating a solid scientific basis for the policy process. Implementation of the action plan will put in place expertise, equipment and information for quantitative monitoring, analysis and policy recommendations for eventual prevention of air pollution.

2. Phase I implementation

Phase I implementation was started with the adoption of the implementation plan by the first network meeting held on February 1999. Phase I saw the establishment of a network of organizations to implement the declaration and the compilation of baseline information on air quality monitoring and management in the participating countries. Baseline studies provided valuable information on tackling the transboundary air pollution in the participating countries and clearly identified the gaps in the existing monitoring systems. Action plans provide the national priorities in implementing the Malé Declaration. Phase I outputs were reviewed and adopted at the 2nd meeting of the network held on March 2000. Findings of the Phase I are summarized in the following sections for each country separately.

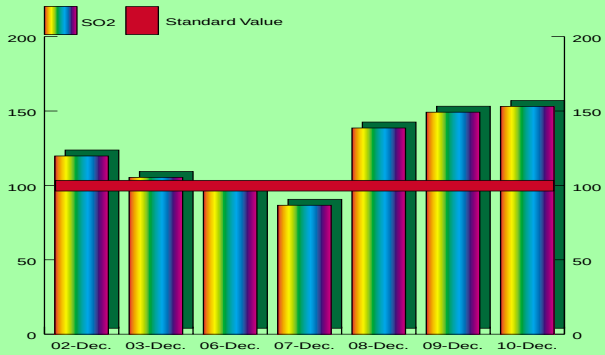
2.1 Summary of Phase I Findings for Bangladesh

Malé Declaration: Ministry of Environment & Forest is the National Focal Point for the Malé Declaration and the Ministry appointed the Department of Environment as the National Implementing Agency. Scientific work for the implementation of Malé Declaration is being carried out by the Department of Environment in association with Bangladesh Center for Advanced Studies and Management Consulting Group. Baseline studies and a national action plan for the implementation in Bangladesh has already been prepared.

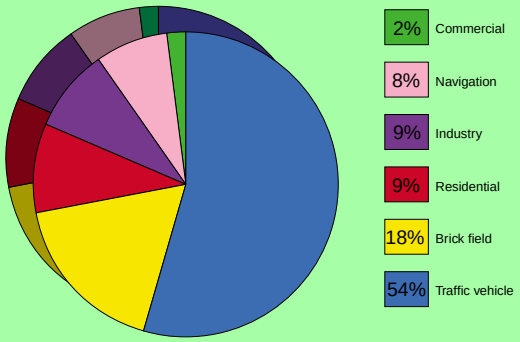
Air Pollution: In Bangladesh, vehicular emissions, coal burning and industrial emissions are the major sources of air pollution. These sources are mainly concentrated in the major cities. In Dhaka city, more than 50 per cent of SO_2 and NO_2 emissions are contributed by vehicular traffic. In addition, numerous brick kilns are working seasonally (in dry season) all over Bangladesh. Almost all of these kilns use coal as their source of energy.

Summary of baseline information

Nature of problem	Vehicular Industrial
Status of monitoring	No systematic Monitoring; Random Monitoring exist
Pollutants monitored	SPM, SO_2, NO_X, CO, and Pb
Number of monitoring stations	4
Capacity of Monitoring stations	Limited
AQ Standards notified	Env. Conservation rule 1997 covering SPM, NO_X, CO, and SO_2



Concentration of SO_2 (µg/m3) in Dhaka city, 1998



Daily estimated NO_2 emissions by various sources in Dhaka in winter 1995-96

National response to air pollution

LEGAL	
The Brick Burning (Control) Act, 1989 (Act number 8 of 1989)	This Act has been promulgated to control brick burning.
The Brick Burning (Control) (Amendment) Act, 1992	This Act was promulgated in July 1992 and was intended for certain amendment of the Act of 1989.
Bangladesh Environmental Conservation Act, 1995 (ECA 1995) (Act 1) (Air pollution related)	Prohibit driving of vehicles emitting smoke that is injurious to health and environment; make provision for the affected (or likely to be affected) person to apply to the Director General.
Environment Conservation Rules, 1997 (ECR, 1997)	Among other things, these rules set: The National Environmental Quality standards for ambient air, various types of water, industrial effluent, emission, noise vehicular exhaust, etc.
VEHICULAR EMISSION CONTROL	
Lead free Gasoline (1999/2000 fiscal budget)	Importing unleaded and low sulphar gasoline.
Phasing out 2-Stroke Engine	Proposed activities for phasing out existing 2-stroke engines within 3-5 years and banning new registration. Programme for conversion of existing 2-stroke engine to CNG & LPG on experimental bases has also been taken up.
Emissions checks (1995)	Strictly enforcing regulations on road test, emissions checks and fitness tests.
Road network improvement	Dhaka Urban Transport Project has been undertaken to improve the road network.
Fuel switching (1985)	In 1985-86 Bangladesh Petroleum Corporation started a project to use CNG in vehicles instead of Gasoline.

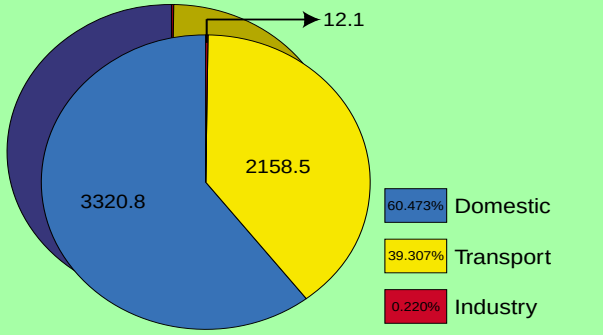
2.2 Summary of Phase I Findings for Bhutan

Malé Declaration: National Environment Commission (NEC) is the National Focal Point for the Malé Declaration. NEC is also the National Implementing Agency to carry out the scientific work required in the implementation of the Malé Declaration in collaboration with national and sub-regional experts. Baseline study and a national action plan for Bhutan has bee prepared.

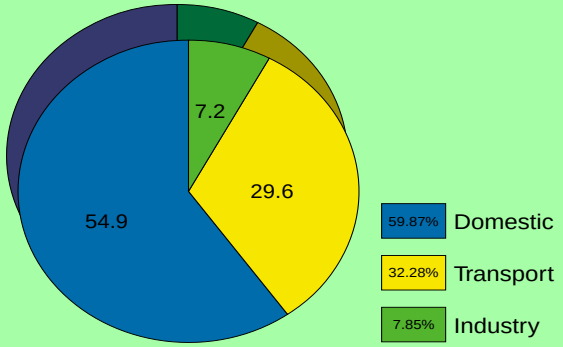
Air Pollution: Bhutan is undergoing significant industrialization and urbanization. More than 16% of the population now live in urban areas compared to around only 5% ten years ago. In urban areas, the number of vehicles and industries has been increasing. Although air pollution is not yet a problem in Bhutan, incidences of urban air pollution are becoming more evident. Urban air pollution is mainly due to pollution from heating appliances using fuelwood and vehicle emissions. Forest fires, industrial air pollution, pollution from fuel wood burning are also becoming prevalent.

Summary of baseline information

Nature of problem	Urban vehicular Industrial Forest fire Indoor air pollution
Status of monitoring	No monitoring Random check on vehicles
Pollutants monitored	SPM, SO_2, NO_X, CO
Number of monitoring stations	3
Capacity to study the air pollution	None
AQ Standards notified	Initial stagehas been started such as data collection



Sectoral breakdown of emissions of SO_2 (tones/y), 1998



Sectoral breakdown of emissions of NO_2 (tones /y), 1998

National response to air pollution

CONTROL OPTIONS APPLIED	
Vehicles	Emission standard and ban on import of re-conditioned cars.
Manufacturing industries	Pollution standard prescribed by NECS/MTI (Ministry of Trade and Industries / National Environment Commission Secretariat)
Mining	Pollution standard prescribed by NECS/MTI
Agriculture	Pollution standard prescribed by NECS/MOA
Forest fire	Fines and Penalties and awareness.
Domestic emission	Alternative sources of fuel like improved stove and biogas support program, rural electrification and electrical household appliances

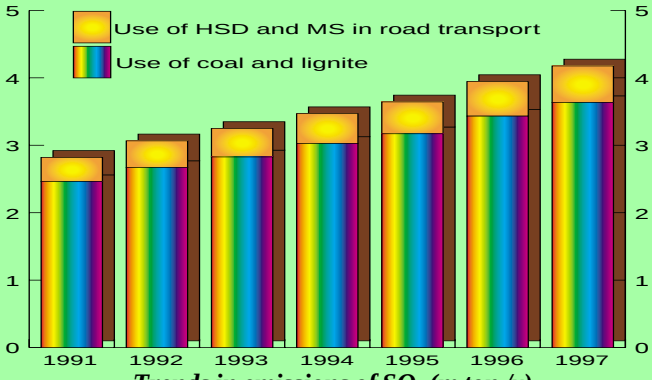
2.3 Summary of Phase I Findings for India

Malé Declaration: Ministry of Environment & Forest is the National Focal Point for the Malé Declaration and the Ministry appointed the Central Pollution Control Board (CPCB) as the National Implementing Agency to carryout the scientific work required in the implementation of the Malé Declaration. Baseline study and a national action plan for the implementation in India has already been prepared.

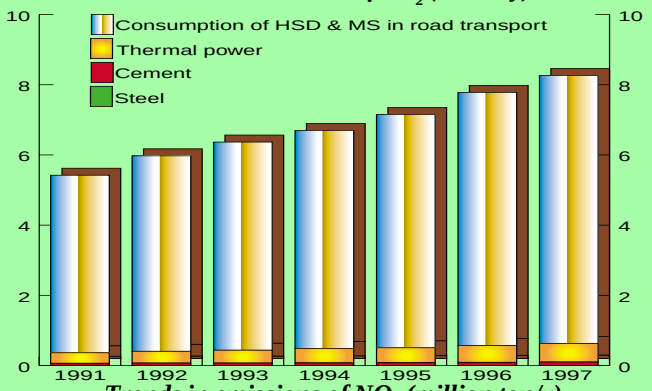
Air Pollution: In India, the problems of air pollution are attributed to natural as well as anthropogenic reasons. The meteorological conditions and edaphic (soil) behavior are, to a great extent, responsible for pollution caused by air borne dust particles particularly in the arid semi-arid areas. Among the anthropogenic factors, combustion of fuel (biomass and fossil fuel) for various activities is the most predominant cause of air pollution.

Summary of baseline information

Nature of problem	Industrial and power sector Urban vehicular
Status of monitoring	Systematic for some industrial and some urban areas
Pollutants monitored	SPM, RSPM, SO_2, NO_2, CO, Pb, PAH, H_2S, NH_3
Number of monitoring stations	280
Capacity to study the air pollution	CPCP, National Environmental Engineering Research Institute
AQ Standards notified	Ambient AQ standard notified under act 1981 for SO_2, NO_2, RSPM, Pb, CO



Trends in emissions of SO_2 (m ton /y)



Trends in emissions of NO_2 (million ton/y)

National response to air pollution

LEGAL	
The Air (Prevention and Control of Pollution) Act, 1981	To prevent, control and reduce the air pollution including noise pollution and to establish Pollution Control Boards at the state level for this purpose.
The Environment (Protection) Act, 1986	Sets out the parameters under which the Ministry of Environment and Forests operates to formulate environmental policies at the national level.
The National Policy Statement on Abatement of Pollution (1992)	To prevent further deterioration of the environment.
The Environment Action Programme (1993)	Aims to improve environmental services in India and to facilitate the integration of environmental consideration into development programmes.
VEHICULAR EMISSION CONTROL	
1. Gasoline Lead Phase Out Programme (June 1994) 2. Diesel Sulphur Phase Out Programme (April 1996) 3. 2-T Oil for 2-Stroke Engine (April 1999) 4. Phasing out of grossly polluting vehicles (1998)	The pollution load has decreased in 1998-1999 in India and ambient air quality monitored in different areas of Delhi also shows a similar trend.

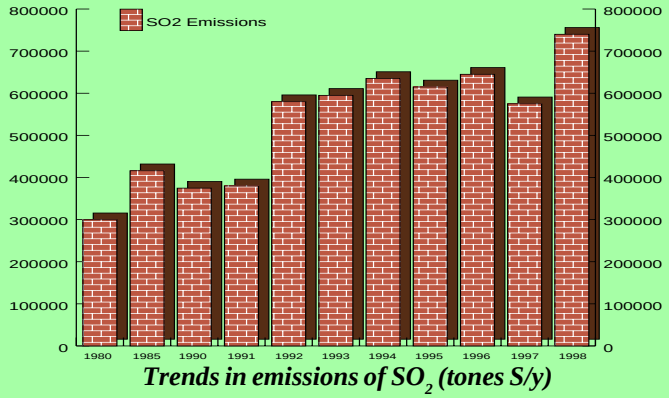
2.4 Summary of Phase I Findings for Iran

Malé Declaration: The Department of Environment is the National Focal Point for the Malé Declaration and the Department of Environment (air pollution research bureau) also acts as the National Implementing Agency to carry out the work required in the implementation of Malé Declaration. Baseline study and a national action plan for the implementation in Iran has already been prepared.

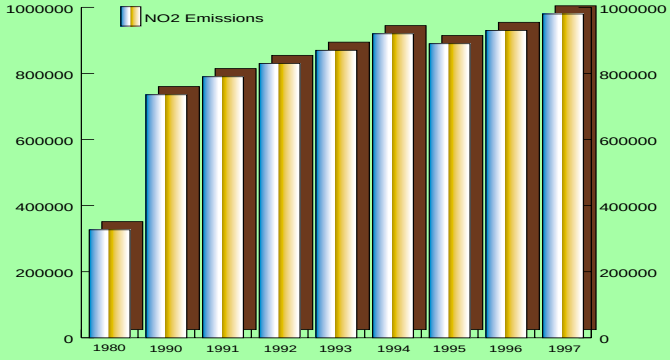
Air Pollution: At present, air pollution in large cities is one of the key environmental problems. Statistics and figures indicate that motor vehicles, factories, industrial workshops and heating commercial instruments are the major pollutants in the country. Transport and domestic sectors are the major source of SO_2 and they contribute nearly 35 and 34 percent of the SO_2 emissions respectively. Transport sector is also the major source of NO_x emissions and contribute to about 50 percent of the total NO_x emissions in the country.

Summary of baseline information

Nature of problem	Urban vehicular Industrial
Status of monitoring	No systematic monitoring; Random monitoring exist in Teheran only
Pollutants monitored	SO_2, NO_X, CO, O_3, THC, TSP
Number of monitoring stations	15 stationary 23 portable
Capacity to study the air pollution	Limited
AQ Standards notified	1995 order of ICA provides for ratification of standards for vehicles and industries



Trends in emissions of SO_2 (tones S/y)



Trends in emissions of NO_2 (tones S/y)

National response to air pollution

LEGAL	
Act comprising 36 Articles and 14 notes was approved in the course of an open session of the ICA in April 1995 and was ratified by the Guardians Council on May 1995.	Chapter 1: Definition of pollution and pollutant classifications Chapter 2: Related to motor vehicles Chapter 3: Related to factories, workshops and power stations Chapter 4: Related to commercial, household and miscellaneous
CONTROL OPTIONS APPLIED	
Industries	Removal of asbestos from industries, Industrial cities construction, Industries transfer to out of large cities, to change the fuel of workshops into gas, Establishment and enforcement of industries standards, Improvement and development of ISO 14000 standards
Transport	Establishment and enforcement of standards, To change the fuel of vehicles into gas, Technical examination of vehicles, Improvement of transport system by enforcement traffic rules, Establishment traffic plan in large cities centers limit
GENERAL	Environmental management , traffic and urban management, planning and training, comprehensive plan of air pollution reduction, use of green technology, use of sustainable energy system.

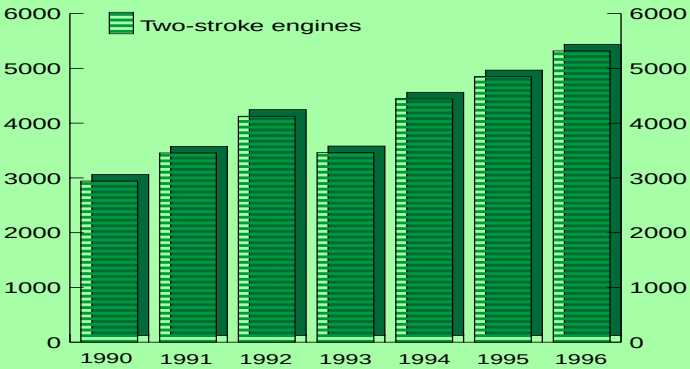
2.5 Summary of Phase I Findings for Maldives

Malé Declaration: Ministry of Home Affairs, Housing & Environment is the National Focal Point for the Malé Declaration and the Ministry also work as the National Implementing Agency to carryout the scientific work required in the implementation of Malé Declaration. A national action plan for the implementation in Maldives have already been prepared.

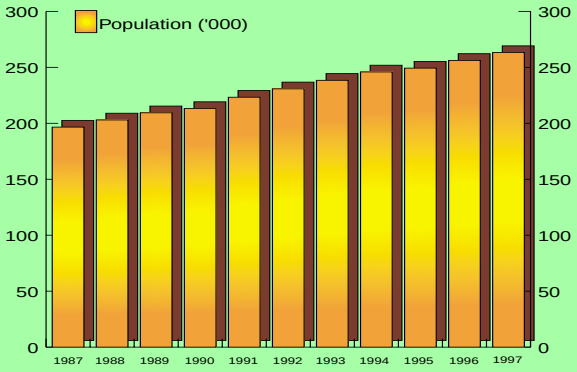
Air Pollution: Though the environment of Maldives is still in a sufficiently pristine state and is pollution free, it is very susceptible to stress from transboundary pollution. Preliminary results of the Indian Ocean Experiment (INDOEX) conducted by an international group of scientists showed that transboundary air pollution dramatically impacts this region.

Summary of baseline information

Nature of problem	Urban Transboundary over ocean
Status of monitoring	No monitoring Data from INDOEX
Pollutants monitored	None
Number of monitoring stations	None
Capacity to study the air pollution	None
AQ Standards notified	None



Trends in the number of two-stroke engines



Population growth

National response to air pollution

The Government of the Maldives formulated in 1999 the second National Environment Action Plan to address the environmental planning and management needs of the country. The second National Environment Action Plan stated that air pollution due to dust, smoke and fumes from motor vehicles is reaching levels of concern in MalØ the capital. Action was called for assessing the environmental and health impacts of road transportation in MalØand enforce measure to ensure that pollution from exhaust gases and cement dust do not reach critical levels. The development and implementation of strategies to reduce the need for motor vehicles in the new growth centers by favoring public transport and providing for safe and appealing bicycle paths and footpaths, is also identified in the second National Environment Action Plan as a priority.

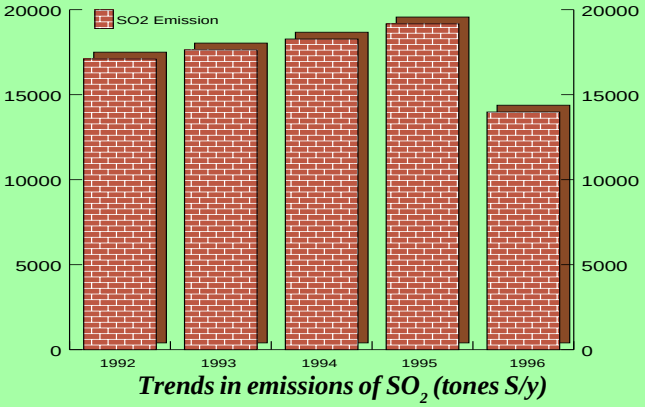
2.6 Summary of Phase I Findings for Nepal

Malé Declaration: Ministry of Population & Environment is the National Focal Point for the Malé Declaration and the Ministry appointed the International Centre for Integrated Mountain Development (ICIMOD) as the National Implementing Agency to carryout the scientific work required in the implementation of the Malé Declaration. Baseline study and a national action plan for the implementation in Nepal have already been prepared.

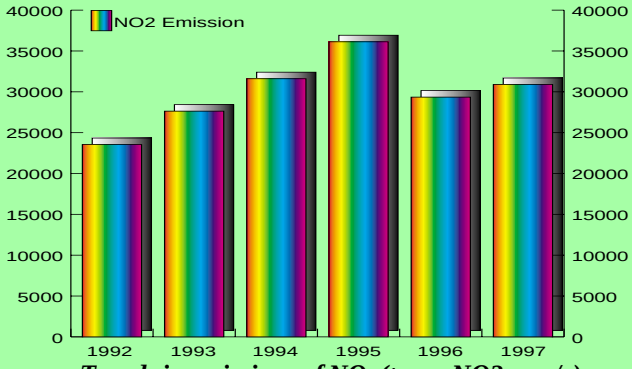
Air Pollution: At present, not only natural factors, but also anthropogenic activities have also added larger amount of macro and micro pollutants to the atmosphere, triggering the environmental problem. The available information reveals that the nature and extent of air pollution is serious in major urban areas and in some industrial sites in Nepal. The major sources of SO_2 are associated with the combustion of sulfur containing fossil fuels. The major industries contributing to SO_2 emission are paper and pulp and brick manufacture.

Summary of baseline information

Nature of problem	Urban vehicular Industrial Indoor air pollution-rural
Status of monitoring	No systematic monitoring; Random monitoring exist
Pollutants monitored	SO_2, NO_X, TSP, PM_{10}, CO, and Pb
Number of monitoring stations	No continues stations
Capacity to study the air pollution	Limited
AQ Standards notified	No standards for stationay sources; National vechicle mass emission standards introduced for vehicles



Trends in emissions of SO_2 (tones S/y)



Trends in emissions of NO_2 (tones NO2 equ /y)

National response to air pollution

LEGAL	
1. The Constitution of the Kingdom of Nepal 1990 2. Civil Aviation Act, 1959 3. Nepal Mines Act, 1996 4. Nepal Petroleum Products Act, 1983 5. Vehicles and Transport Management Act, 1993 6. Industrial Enterprises Act, 1992 7. Environment Protection Act, 1996 8. Self Governance Act, 1999	There is no coherent legislative framework to control air pollution. Rather air pollution control is spread over various Acts. Listed are the various Acts where control measures for air pollution are mentioned.
CONTROL OPTIONS APPLIED	
Vehicular pollution	Emission standard for petrol and diesel vehicles, Ban new registration of diesel 3-wheeler, Ban the existing diesel 3-wheeler that are plying in the Valley (1999), Introduction of low lead fuel (1998), Introduction of electric vehicles, Introduction of Nepal Vehicle Mass Emission Standard 2056, Ban new registration of Two-stroke vehicles.
Industrial pollution	Industrial pollution control regulations have been drafted and EIA guidelines for industry sector and environment and risk assessment guidelines have been prepared.

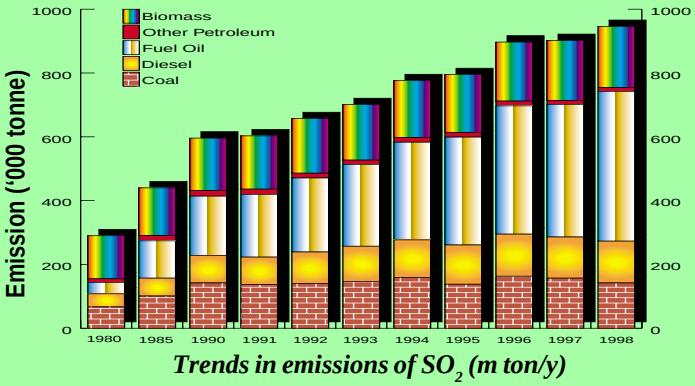
2.7 Summary of Phase I Findings for Pakistan

Malé Declaration: Ministry of Environment, Local Govt. & Rural Development is the National Focal Point for the Malé Declaration and the Ministry appointed the Pakistan Environment Protection Agency as the National Implementing Agency to carryout the scientific work required in the implementation of Malé Declaration in association with Hagler Bailly Pakistan (Pvt.) Ltd. Baseline study and a national action plan for the implementation in Pakistan have already been prepared.

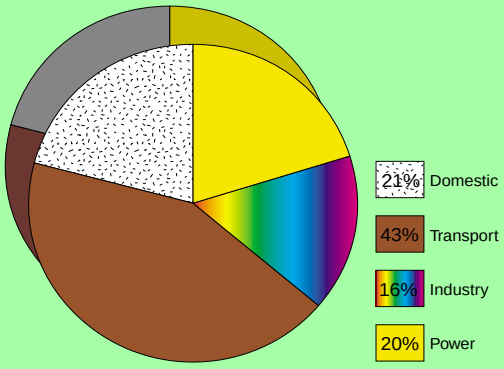
Air Pollution: In Pakistan, the major source of anthropogenic air pollution is the combustion of fossil fuel, biomass and waste. Fossil fuel combustion in transport,power generation and industries account for nearly 50% of the entire energy consumption. As most of it is concentrated in major urban centers, deteriorating urban ambient air quality is a major concern. In the rural areas, biomass (fuelwood, crop residue and cow dung) is still the primary source (nearly 90% of fuel consumption) of energy. Although its combustion does not results in large-scale ambient air quality deterioration but is a major pollutant of indoor air quality.

Summary of baseline information

Nature of problem	Urban vehicular Industrial Indoor air pollution
Status of monitoring	No systematic monitoring; Scaterred monitoring
Pollutants monitored	SO_2, NO_X, PM, CO, Metals
Number of monitoring stations	3 portable/mobile 5 proposed
Capacity to study the air pollution	Limited
AQ Standards notified	Emission standard for industries; Ambient Air Quality standards for power plants operating on oil and coal



Trends in emissions of SO_2 (m ton/y)



Sectoral breakdown of NO_x emissions

National response to air pollution

LEGAL	
The Pakistan Environmental Protection Act, 1997 (Replaced the Pakistan Environmental Protection Ordinance, 1983)	Requires environmental assessment for every new project; Prohibits emission in excess of prescribed standards and makes such an emission a punishable act
National Environmental Quality Standards, 1993 (Revised in 1995 and 1998)	Prescribes emission limits from industrial and mobile sources
Pakistan Environmental Protection Agency (Certification of Environmental Laboratories) Regulations, 2000	Requires certification of environmental laboratories and prescribes requirements for certification
National Environmental Quality Standards (Self-Monitoring and Reporting by Industry) Rules, 2000	Prescribes rules for self-monitoring and reporting of emission from industrial sources
OTHER INITIATIVES	
Fuel Efficiency in road transport project Establishment of Cleaner Production Center for petroleum industry Monitoring and reporting by industries Economic incentives for CNG kit installations in vehicles	Vehicle Tune-up Fuel quality iprovement Pollution control, documentation and reporting Installation of CNG kits in vehicles

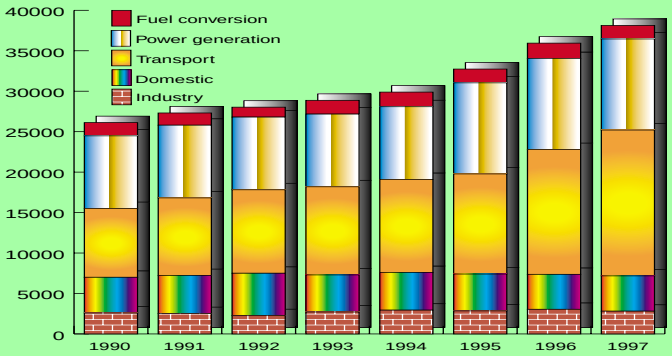
2.8 Summary of Phase I Findings for Sri Lanka

Malé Declaration: Ministry of Forestry and Environment is the National Focal Point for the Malé Declaration and the Ministry appointed the Central Environment Authority (CEA) as the National Implementing Agency to carryout the scientific work required in the implementation of Malé Declaration. Baseline study and a national action plan for the implementation in Sri Lanka have already been pre-

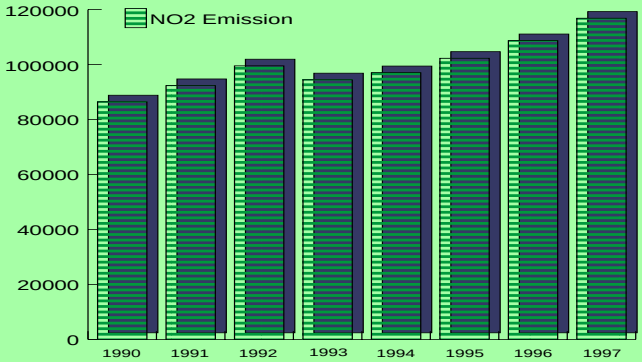
Air Pollution: In Sri Lanka, the region which is most vulnerable is the Western Province namely the Colombo Metropolitan Region (CMR). Found within the borders of the CMR is 80% of the country's industrialisation and over 60% of all vehicles plying Sri Lankan roads. While air pollution in Colombo City appears presently to be at manageable levels, projected rates of economic and vehicular growth could result in deterioration of air quality.

Summary of baseline information

Nature of problem	Urban vehicular Power production
Status of monitoring	No systematic island wide monitoring; Random monitoring exist
Pollutants monitored	Urban (SO_2, NO_2, PM_{10}, CO, O_3) Rural (pH, Cl^-, NO_3^-, SO_4^{2-})
Number of monitoring stations	2 fixed in CMR; 5 using mobile station; 8 metrological
Capacity to study the air pollution	Limited
AQ Standards notified	CEA standards for SO_2, NO_2, TSP, Pb, O_3, CO



Trends in emissions of SO_2 (tonnes SO_2/y)



Trends in emissions of NO_2 (tonnes NO_2 equ/y)

National response to air pollution

LEGAL	
The National Environmental Act (NEA) of 1980	Section 23 J and K prohibit emission of pollutants into the Environment
The National Environmental (Protection and Quality) Regulation of 1990	Sri Lanka Standards Institution has prescribed emission standards for sulphuric acid plants.
The Environmental Impact Assessment (EIA) regulation of 1993	Ensures that any new project undertaken under the prescribed list undergoes a full EIA.
Motor Traffic Act	Considers visible emissions an offence and give greater authority to the Department of Motor Trafic and the Police Department to control Vehicular emissions.
FISCAL INSTRUMENTS AND OTHER INITIATIVES	
Diesel vehicles Clean air 2000 and action plan (CA2AP)	In 1993, the Government increased the conversion charges from petrol to diesel to 35,000 Rs.(before 50 Rs) Approved by cabinet of ministries in 1993

3. Phase II implementation

A committee of experts, the monitoring committee (MoC), has been established to develop a detailed plan for strengthening the monitoring network. The committee submitted its report after visiting all the participating countries and having discussions with National Implementing Agencies (NIAs) and relevant institutions. A network meeting of all NIAs and National Focal Points (NFPs) was held on 29 June 2001 that reviewed and adopted the final recommendations of the Committee. Phase II implementation was designed based on the findings of the MoC.

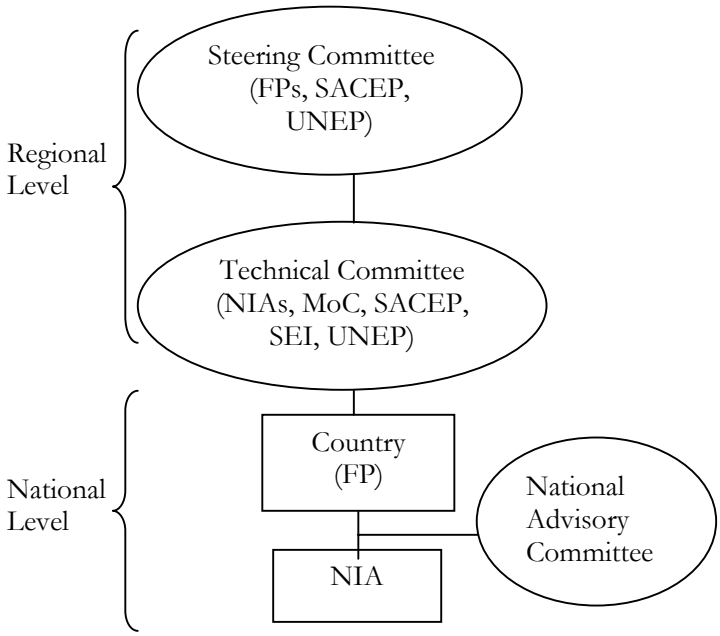
The general objective of Phase II is to put in place the expertise, equipment and information needed for the quantitative monitoring, analysis and policy recommendations for the eventual prevention/control of air pollution. Specific objectives for the Phase II implementation are (1) expanding the network established during phase I; (2) establishing/strengthening monitoring facilities; and (3) studying the transboundary effects of air pollution.

The national level capacity building activities began in May 2002 with a technical training on monitoring and analysis of transboundary air pollution. Additional capacity will be built on through training and strengthening of national monitoring stations during the Phase II implementation. Details on the Phase II activities are given in the Annex 2.

4. Suggestions for consideration

4.1 Institutional Framework

Following the success of Phase I implementation, the process has reached a major stage where monitoring stations will be setup to strengthen the scientific base. Therefore, there is a need to formulate an institutional arrangement in order to ensure the sustainability of the process, data generation and sharing. An institutional setup based on network formulated during the Phase I implementation is proposed as illustrated in the following diagram.



At the national level Ministry of Environments are the National Focal points (FP) for the implementation of Malé Declaration and responsible for policy decisions at national level. FP in each of the participating countries has nominated a National Implementing Agency (NIA) for carrying out the project

implementation at national level.

NIA**s** are specialized institutions on air pollution and will be responsible for national-level planning and implementing programmes including capacity building, data generation, data handling, and reporting, continuation and conducting performance reviews for its programmes. NIAs will also be the responsible body for formulating a national Advisory Committee (AC) at the national level.

An Advisory Committee will be set up in each of the participating countries. **AC** consists of representatives from the NIAs, NGOs, educational and research bodies and industries. The AC will meet at national level and advise the NIAs and other organizations involved in monitoring exercises. It should also act as an information-clearing house, and meeting ground for those interested in this subject.

At the regional level a Technical Committee (TC) will be setup. The committee will consist of the FPs, NIAs, MoC, SACEP, SEI, and UNEP. The TC will be a forum for participating countries to exchange their views and experiences as well as monitor the progress of the project.

Through the consultations, it has been agreed that the Steering Committee (SC), will provide the needed policy and prepare guidance for the implementation of the Malé Declaration. The SC is proposed to meet annually. The membership of SC will include: FPs, SACEP, UNEP and senior donor representatives. UNEP has been requested to provide the secretariat for SC, assist in the mobilization of resources and external technical expertise when needed.

4.2 Financial arrangements

Monitoring networks are being developed by the National Implementing Agencies at the national level. Since the analysis of transboundary air pollution would need data over a period of several years, continuation of monitoring of transboundary pollutants is essential. UNEP and SACEP will continue to support in mobilizing the financial resources for the implementation of Malé Declaration. In order to ensure the sustainability of the monitoring network, national governments are expected to provide voluntarily financial resources for the implementation of Malé Declaration at the national level. National Governments will provide the necessary in-kind contributions for the establishment and operation of monitoring stations under the Malé Declaration.

4.3 Data sharing

Recognizing the need for the data sharing in tackling the transboundary air pollution, the participating countries agree to share their national level data with other countries and institutions within the Malé Declaration network. Other institutions include the institutions identified in the section 4.1 of this report.

Annex 1: Malé Declaration on Control and Prevention of Air Pollution and Its Likely Transboundary Effects for South Asia

Recognizing the potential for increase in air pollution and consequential phenomena due to concentration of pollutant gases, acid rain or acid deposition as well as the impacts on the health of humans and other living organisms in all our countries due to man made and natural causes; and also

Recognizing the potential for increase in transboundary air pollution as a corollary of air pollution in each country; and

Realising that the potential for air pollution increase and its transboundary effects will accumulate in the absence of national measures to abate and prevent such potential; and

Reiterating in this context Principle 21 of the UN declaration on the Human Environment in 1972 which stated that States have, in accordance with the charter of the United Nations and the principle of international laws, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states or of areas beyond the limits of national jurisdiction;

Keeping in mind that need for constant study and monitoring of the trends in air pollution with a view to understand the extent of our potential for damage to the environment and health in the member countries and taking consequential measures to strengthen and build capacity for such activities;

Stressing the need for development and economic growth that will help build up the quality of life and incomes of all the people of all the region, in particular the poorer sections of the population, having due regard to the need to have a clean and healthy environment;

Emphasising that air pollution issues have to be analysed and managed in the wider framework of human and sustainable development within each country and within the region; and

Drawing from the experience of co-operation in the region in matters like cultural exchange and also from the experience in other regions like Europe and sub-regions of Asia like ASEAN and East Asia.

We declare that countries of this region will initiate and/or carry forward programmes in each country to

1. Assess and analyse the origin and causes, nature, extent and effects of local and regional air pollution, using the in-house in identified institutions, universities, colleges etc., building up or enhancing capacities in them where required;
2. Develop and/or adopt strategies to prevent and minimise air pollution;
3. Work in co-operation with each other to set up monitoring arrangements beginning with the study of sulphur and nitrogen and volatile organic compounds emissions, concentrations and deposition;
4. Co-operate in building up standardised methodologies to monitor phenomena like acid depositions and analyse their impacts without prejudice to the national activities in such fields;
5. Take up the aforesaid programmes and training programmes which involves then transfer of financial resources and technology and work towards securing incremental assistance from bilateral and multilateral sources;
6. Encourage economic analysis that will help arriving at optimal results
7. Engage other key stakeholders for example industry, academic institutions, NGOs, communities and media etc. in the effort and activities.

We also declare that we shall constantly endeavor to improve national reporting systems and strengthen scientific and academic effort in the understanding and tackling of air pollution issues.

We further declare that we shall continue this process in stages with mutual consultation to draw up and implement national and regional action plans and protocols based on a fuller understanding of transboundary air pollution issues.

We declare that in pursuit of the above, we shall evolve, as appropriate, institutional structures at the national level, including networking, both for the purposes of policy and the technical requirements, and we shall use the good offices of regional, international bilateral and multilateral agencies in this, as appropriate.

Annex 2: Proposed Activities under the Phase II Implementation of Malé Declaration

A. Network

Activity no. 1: Annual network meeting
An annual meeting of Malé Declaration network will be organized each year to facilitate the exchange of information and disseminate the results to policymakers. The network meeting will guide the implementation process, and will be organized once each year. NIAs and national focal points will attend.

Activity no. 2: Stakeholders meeting
At the national level NIAs will be guided by the stakeholders from all the sectors such as academics, NGOs, industrial etc. Although NIAs are encouraged to organize National Stockholders meetings in each of the participating countries, during the current phase 3 stakeholder meetings are proposed due to the financial constrains. The main objective is to obtain collective view of all the stakeholders. This will also facilitate the dissemination of project findings to all the stakeholders.

Activity no. 3: Regional NGO Workshop
One regional NGO Workshop will be arranged during the Programme period. Participants from NGOs, media and industry will be invited to discuss and review the Malé Declaration implementation process. The 2003 Annual network meeting will be followed by an NGO workshop.

Activity no. 4: Helpline setup
The Task Force will set up a helpline and querying service by email. The website should provide answers to frequently asked questions. If an NIA or NGO continues to have a problem, an expert from the nearest country should be sent to provide the necessary help.

Activity no. 5: Publication of newsletter
The Task Force will publish a quarterly newsletter that includes network and other news, views, abstracts of recent research papers, study results, queries, etc.

B. Monitoring and Capacity Building

Activity no. 6: Finalization of implementation plan and technical manual
MoC report have been finalized after the 2001 annual network meeting and circulated to all the participating countries. A technical manual currently under preparation by the MoC will also be finalized by the first quarter of 2002.

Activity no. 7: Equipment procurement and related formalities
The MoC has identified the type of equipment suitable for South Asia. An agreement with equipment venders needs to be secured. NIAs main responsibility will include official clearance for transferring equipment into the country, and installation and maintenance of monitoring stations at the national level.

Activity no. 8: Training on technical issues related to monitoring
A central training programme for NIA personnel will be needed before the regular monitoring begins. This workshop should cover monitoring/survey site choice, monitoring/ survey frequency, measurement parameters, monitoring/survey procedures (sampling and on-site measurements, sample storage and transportation), analytical procedures, quality assurance and control, data reporting formats, instrument maintenance, procuring consumables, spares and services for instruments. Two participants from each country are expected to participate in this training. One representing the NIA who will be implement the monitoring and the other participant could from the analyzing laboratory.

Activity no. 9: Installation of monitoring equipments
Monitoring equipment will be installed in the identified sites during the 3 rd and 4 th quarters of 2002. NIAs will take the lead role at the national level and installation will start with the countries that prepared for installation first.

Activity no. 10: In-country training for monitoring and data handling
With the installation of monitoring equipment, training will also be provided for the technicians on managing the stations and data handling. NIAs should identify the staff who will do the sampling, analysis and data handling. These staff will be the participants for this training and assist the MoC and equipment venders during the installation of monitoring stations.

Activity no. 11: Conduct monitoring
NIAs will take the responsibility of conducting the monitoring activities. The main activities include sampling, analysis and maintenance of the stations. Monitoring results will be systematically managed at the NIAs and report quarterly to UNEP RRC.AP

Activity no. 12: Development of a centralized monitoring database
A centralized database will be developed at UNEP/RRC-AP to store monitoring results in a systematic database management system.

Activity no. 13: Update monitoring database with monitoring results
Monitoring data from the NIAs will be received and the centralized database will be updated regularly by UNEP RRC.AP. The database will also be mirrored at SACEP.

Activity no. 14: Refresher courses
Short refresher courses will be conducted during 2003 and 2004 to review the problems experienced in the monitoring/surveys and to discuss the results.

Activity no. 15: Analysis of monitoring results
Transboundary air pollution and local effects will be studied based on the monitoring data and other inputs received from the national implementing agencies.

C. Parallel Studies

As parallel to the main activities as outlined above, an initial attempt will be made to the following two activities. NIAs are expected to provide their input during the annual network meetings.

Activity no. 16: Integrated Assessment Model for South Asia

An integrated model will be developed to support science/policy interactions in South Asia. The model will be developed by programmers at AIT using experience with developing such models elsewhere.

Activity no. 17: Emission inventories in South Asia

Using existing information a manual and spreadsheet based workbook will be developed in collaboration with South Asian expertise. The workbook will include consideration of emission prevention and control options so as to allow the development of different emission scenarios, which may be used in conjunction with the Integrated Assessment Model.

Annex 3: Malé Declaration Phase II: Calendar of Events

Year	Month	Date	Events
2001	Jun-Dec		MoC activities and Annual Network meeting
2002	Jan	25	Final MoC report ready
	Feb	1	Initiate contract with NIAs for Phase II
	Mar	15	Final Technical manuals ready
	Mar	29	MoU with NIAs for national level implementation
	Apr	12	Publication of Malé Newsletter
	Apr	30	Complete equipment procurement and related formalities
	May	29-31	Training on technical issues
	Jul	16-17	Annual Network meeting
	Aug		
	Sep	24	National Stakeholders meeting, India
	Oct		
	Nov	15	Publication of Malé Newsletter
	Dec	20	Centralized database
2003	Jan	31	Setup helpline
	Feb		Receive monitoring results
	Mar		Update monitoring database with the data
	Apr	11	Publication of Malé Newsletter
	May	13-15	Refresher course
	Jun		
	Jul	16-17	Annual Network meeting
	Jul	18	NGO Workshop
	Aug		
	Sep	2	National stakeholders meeting, Pakistan
	Oct	15	National stakeholders meeting, Bangladesh
	Nov	14	Publication of Malé Newsletter
	Dec	20	First draft of report on analyzed monitoring results
2004	Jan		
	Feb		Receive monitoring data and update the database
	Feb	17-19	Refresher course
	Mar	31	Publication of Malé Newsletter
	Mar	31	Dissemination of analysis of monitoring results

July 2002 – Dec 2002: Installation of monitoring equipments will be followed by an in-country training in each of the participating countries. It will take approximately 1 week for a country. Schedule will be finalized in consultation with individual NIAs.

Annex 4: List of Equipment and Consumables for the Male Network Monitoring Stations and Laboratories

No.	Description	Area of use
1	**Site Equipment**	
1.1	PM10 sampler	DD-hvs:pm, SO_2,NO_2
1.2	Wet and dry collector	WD
1.3	pH/electrical conductivity meter	WD; WT
1.4	Thermometer	WT-pH,ec
1.5	Fridge 60 L	DD; WD; SL; VG; WT; SD
1.6	Bulk collector (Option)	
	Site Equipment Specifications	
1.1	PM10 sampler	
	Filter holder: Suitable for glass microfibre, filter paper size: effective 23 x 18 cms, attachment for PM10: cyclone or impactor, blower: 1.5 auto shutoff timer: 0-24 hrs, flow measurement: based on orifice plate and pressure difference or U-tube manometer, impinger tubes: 4 nos, needle valves: 4 nos, rotameter: 3 lpm capacity, impinger box: insulated ice box with drain, power: 220-240 V, 50-60 Hz AC.	
1.2	wet and dry collector	
	Rain sensor: collector container or funnel opens within one minute of precipitation and closes promptly at the end of the precipitation event, wet deposition side: capacity min 20 lit, should be protected from contamination from dry deposition, collector: collector bucket ad funnel should be chemically inert to major constituents from acid deposition, power: 220-240 V, 50 Hz AC.	
1.3	pH and conductivity meter hand held	
	Should be capable of measuring pH and electrical conductivity simultaneously, water proof construction, calibration data storable electrode, data storage for 100 sets of data, connectable to external printer through a RS 232 port, range: 0.00-14.00, 0-±1999mV, 0-19.99 S/m, operating range: 0-99.9 deg C for pH and 0-80 deg C for EC, power: battery, weight: less than 1 kg, cover.	
1.4	Thermometer	
	Range: -20 to 105 deg C. Least count: 0.1 deg C.	
1.5	Fridge	
	60 L, power: 220-240 V, 50-60 Hz AC.	
	Equipment may require voltage stabilizers or uninterrupted power supply, as required. These will be decided for each laboratory and site on a case-by-case basis.	
2	Laboratory - Equipment	
2.1	Spectrophotometer	DD-hvs:SO_2,NO_2; SL-PO_4; WT-NH_4
2.2	Oven	DD-pm; SL-bd,mc,penet,ec,P,N;WT-pH,ec,a
2.3	Balance	DD; WD; SL; SD
2.4	pH meter	WD; SL

2.5	Electrical conductivity meter	WD; SL
2.6	Thermometer	WT-pH,ec
2.7	Fridge	DD; WD; SL; VG; WT; SD
2.8	Desiccator	SL-pH,SO_4
2.9	Hot plate	DD; WD; SL; VG; WT; SD
2.10	Distallation Unit	
	Laboratory Equipment Specifications	
2.1	Spectrophotometer*	
	a) Vis: Microprocessor-based grating type spectrophotometer with builtin datalogger, RS 232, connection for downloading data to computer. The unit should have builtin self diagnostics and the sample compartment should have compatibility to use round cells, square cuvettes, 16 mm tubes. wavelength range: 350-1000 nm; wavelength accuracy: ± 2 nm; wavelength resolution: 5 nm max; photometric range: 0.125% T, 0.1-2.5 A, 3.0 to 3.0 abs; photometric accuracy: ± 0.005 A; photometric stray light: <0.5% T 3.3 abs, min or 0.05% T max at 340 nm; optical system: grating-based; grating: 1200 grooves nm; light source: quartz halogen(1000 hr life/ tungsten; detector: silicon photodiode; measuring modes: conc, transmittance (% T), absorbance (abs); wavelength selection:automatic; operating temp: 0-40 deg C; power: 220-240 V, 50-60 Hz AC, should operate with rechargeable batteries. accessories: rechargeable batteries; software and cable to connect to connect to computer; 6 batteries; cell holder.	
	b) UV/vis: computer compatible with RS 232 port; optics: double beam or diode array; wavelength range: 190-1100 nm; wavelength readability: better than or equal to 0.2 nm; wavelenggth accuracy: better than or equal to ± 0.5 nm; wavelength repeatability: better than or equal to ± 0.5 nm; spectral bandwidth: provisions should include at least 2.0 nm SBW; scan speed: wide range and provide max limit at least upto 800 nm/min; photometric range: should cover -0.500 to +3.0 ABS; photometric accuracy: better than or equal to 0.005 A at 1 A; photometric noise: <0.0005 A at 0 A; photometric readout: should at least provide ABS (4 digit), % T and concentration modes; stray light: <0.03%; drift: <0.0004 ABS/hr after warmup; power: 220-240 V, 50-60 Hz AC. The system should provide facilities for the storage of spectra/ methods, multi wavelength mode, baseline correction, peak area and other statistical computations.	
	* -- either a vis or a UV/vis spectrophometer would be the standard analytical instrument for the network.	
2.2	Oven	
	temp range: 85-250°C, power: 220-240 V, 50-60 Hz AC, 1KW.	
2.3	Balance	
	a) Electronic balance, range: 10 kg to 0.1kg; readability: 0.1 gm; stabilization time: 3 sec; temperature range: -20 to 60 deg C; RH range: 5-100%; power: 220-240 V, 50-60 Hz AC. b) Electronic balance, range: 100 gm to 0.1 mg, readability: 0.001 mg; stabilization time: 3 sec; temperature range: -20 to 60 deg C; RH range: 5-100%; power: 220-240 V, 50-60 Hz AC.	
2.4	**PH and conductivity meter- hand held**	
	Should be capable of measuring pH and electrical conductivity simultaneously, water proof construction, calibration data storable electrode, data storage for 100 sets of data, connectable to external printer through a RS 232 port, range: 0.00-14.00, 0 - ±1999mV, 0 – 99.9 deg C for pH and 0-80 deg C for EC, power: battery, weight: less than 1 kg, cover.	
2.5	**Thermometer**	

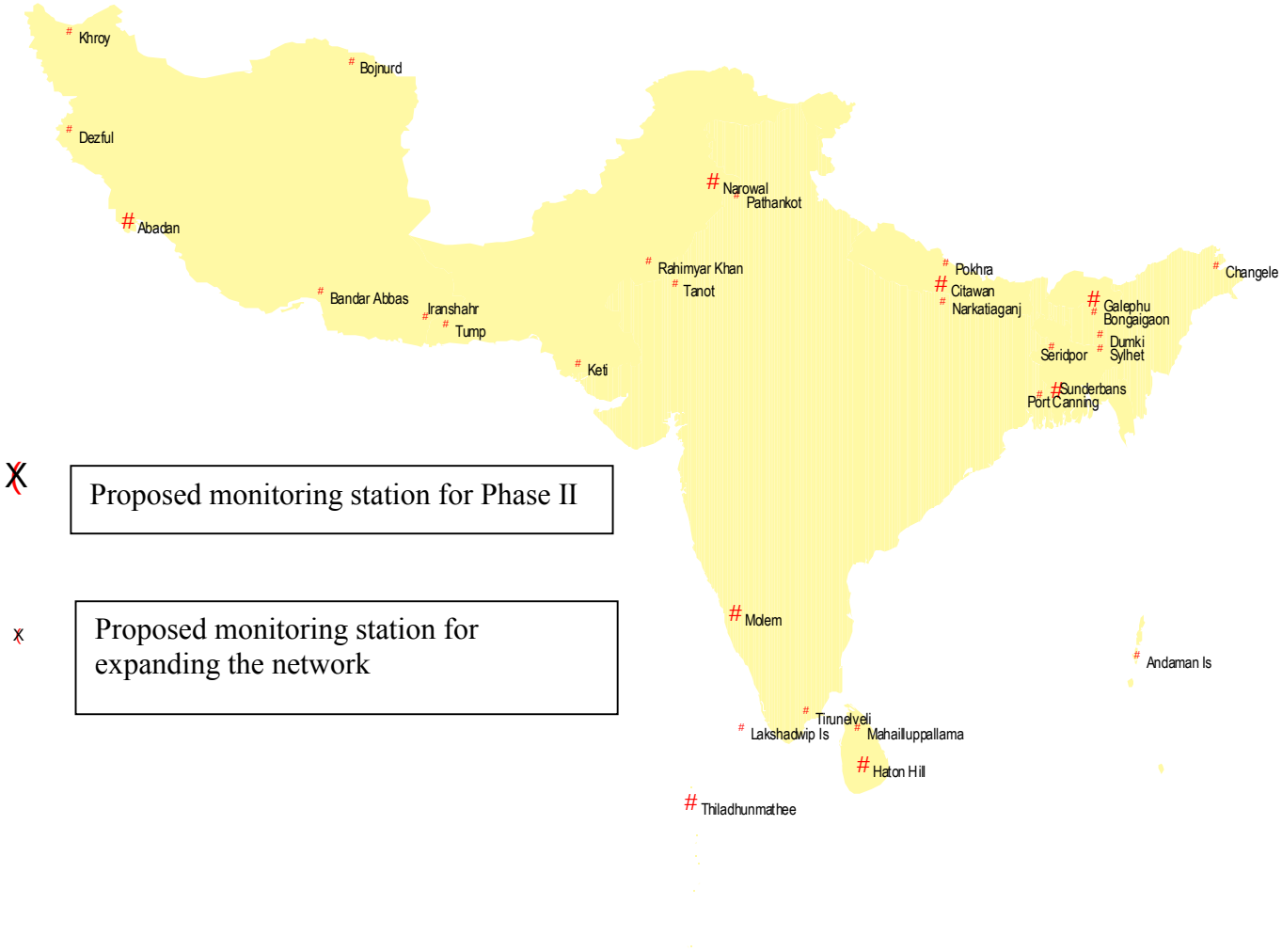
	Range: -20 to 105 deg C. Least count: 0.1 deg C.	
2.6	**Fridge**	
	60 L, power: 220-240 V, 50-60 Hz AC.	
3	Laboratory Consumables	
A	*Glassware and other consumables*	
3.1	Washing bottle with ground glass stopper	DD-hvs
3.2	Measuring cylinder 100 ml	DD-hvs
3.3	Glass tubes with ground-in stopper	WD-NH4
3.4	Volumetric flask 500 ml	DD-hvs;
3.5	Pipette 25 ml	DD-hvs
3.6	Filter paper	
3.7	Bottle polypropylene 1 L	
3.8	Stirrer	
	Chemicals and other consumables	
3.9	Distilled water	
3.10	Sodium tetrachloromercurate or	DD-hvs:SO_2
3.11	Mercuric chloride	DD-hvs:SO2
3.12	Sodium chloride	DD-hvs:SO2
3.13	p-Rosanaline hydrochloride	DD-hvs:SO2
3.14	Hydrochloric acid conc	DD-hvs:SO2
3.15	Formaldehyde or	DD-hvs:SO2
3.16	Sodium metabisulphite	DD-hvs:SO2
3.17	Iodine 0.01N	DD-hvs:SO2
3.18	Starch	DD-hvs:SO2
3.19	Sodium hydroxide soln 0.025 M, 38%, 1 M, 1 N or	DD-hvs:NO2; WD-ea;
3.20	Sodium hydroxide	
3.21	Sulphanilamide or	DD-hvs:NO2
3.22	Sulphanilamide	DD-hvs:NO2
3.23	Phosphoric acid conc (85%)	DD-hvs:NO2
3.24	NEDA soln or	DD-hvs:NO2
3.25	1-naphthyl ethylenediamine dihydrochloride	DD-hvs:NO2
3.26	Hydrogen peroxide (30%)	DD-hvs:NO2
3.27	Standard nitrite soln or	DD-hvs:NO2
3.28	Desiccated sodium nitrite (>97%)	DD-hvs:NO2
3.29	Potassium chloride 1 M, 0.1 M, 0.01 M or	WD-ec,
3.30	Potassium chloride	
3.31	Primary buffer soln	WD-pH
3.32	Sodium carbonate 0.4 M	WD-anions
3.33	Sulphuric acid 1.5 M	WD-anions
3.34	Tartaric acid 1 M	WD-cations
3.35	2,6 Pyridinedicarboxylic acid	WD-cations
3.36	Ammonium chloride	WD-NH4

3.37	Indophenol blue	WT-NH4
3.38	Alkaline phenol or	WD-NH4
	Sodium chloride	WD-NH4
	Phenol	WD-NH4
	Sodium nitroprusside	WD-NH4
3.39	Sodium hypochlorite (5.25%)	WD-NH4; WT-NH4
3.40	Ammonium acetate 1M or	WD-ebc
	Ammonium acetate	WD-ebc
	Acetic acid 1 M	WD-ebc
	Ammonia	WD-ebc
3.41	Washed/dried sea sand	WD-ebc; SL-N
3.42	Ethanol 80%, 96%	WD-ebc,ea
3.43	Acetone	WD-ec
4	Site Consumables	
4.1	Filter paper Whatmans GF/A	DD-hvs:pm
4.2	Impingers	DD-hvs:SO_2,NO_2
4.3	Syringe 100 ml	DD-hvs
4.4	Glass/inert plastic tubing	
4.5	Silicon grease	DD-hvs
4.6	Measuring cylinder 100 ml	DD-hvs
4.7	Pipette 20 ml	DD-hvs
4.8	Passive samplers SO_2, NO_2	DD
4.9	Polyethylene containers 20 ml	DD-hvs
4.10	Distilled water	
4.11	Thymol	WD
4.12	Bucket	WD; WT; AE
4.13	Funnel	WD
4.14	Capped bottles 1 L	WD
4.15	Bags	WD
4.16	Ice box	DD; WT

Abbreviations:

DD: dry deposition, WD: wet deposition, SL: soil, VG: vegetation, WT: inland water, SD: sediment, AE: aquatic ecology hvs: PM10 sampler, NH_4: ammonia, pm: particulate matter, bd: bulk density, penet: penetration resistance, ec: electrical conductivity, a: alkalinity, SO_4: sulphate, CO_3: carbonate, C: total carbon, N: total nitrogen, ebc: exchangeable base cations, exg Al: exchangeable aluminium and hydrogen, PO_4: phosphate, ea: exchangeable acidity, Cl: chloride.

Annex 5: Map showing the proposed monitoring stations



X Proposed monitoring station for Phase II

x Proposed monitoring station for expanding the network