

The First Regional Stakeholders Forum

On

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

**Strategy Paper for
Stakeholders participation**

**8 October 2003
Dhaka, Bangladesh**

Malé Declaration

**Strategy Paper for
Stakeholders participation in a
South Asian regional meeting under the
'Male' Declaration on Trans boundary Air Pollution**

1. Introduction - Impacts of Air Pollution

1.1. "Miraculously clean air" is how the atmospheric air in some mountain areas and rural settlements in South Asia is described even today. Yet, there are large pockets, especially in Industrial and Urban areas where the air is polluted with seen and unseen particles and gases. Knowledge of the harmful effects of such pollutants is slowly increasing. The impacts on the health of human and other living beings are also being realized gradually. Some scientific inputs are also gathering on the impacts even on lakes, crops, soils, monuments, etc. Sulphur and nitrogen oxides, carbon monoxide, particulate matter (TSPM, PM₁₀, PM_{2.5}) and ozone are among the gaseous elements polluting the air, most of them having toxicity and adverse effects on the body via the respiratory system leading to premature death as well as chronic respiratory and heart diseases. They can also cause irritating fog holding up work in the mornings, disrupting flights. Impacts on water, soils, crops, forests and monuments arise from the deposition of sulphur and nitrogen compounds affecting the pH values in water, nutrient changes in soils and corrosion of materials like stone and metal. "Acid rain" is a concomitant phenomenon. Many effects of air pollution are slow and insidious and therefore not readily felt by the people at large and even by practitioners of medicine or soil and agricultural scientists, engineers, architects etc., The upshot of all this can be that the damage not only to natural resources or ecosystems but also human health, agriculture, heritage monuments can reach an irreparable stage unless some preventive action is taken, adopting what is now universally recognized as "Precautionary Principle".

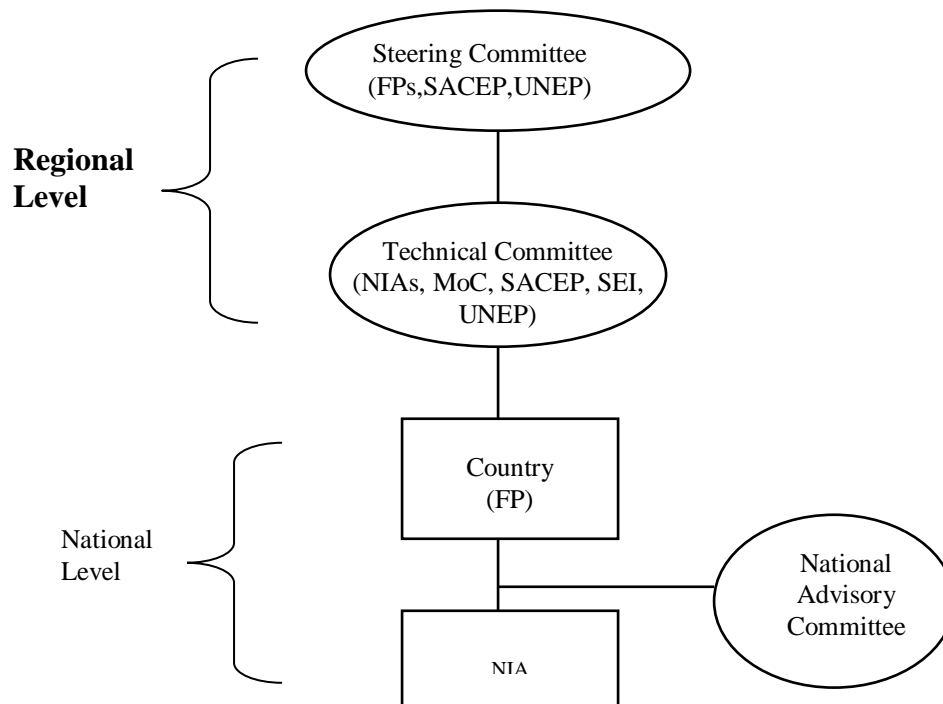
1.2. **Sources:** The sources of pollutants in the air can be industrial and power station emissions, automobile exhausts, gases used in appliances, paints, domestic fuels, construction projects, cement factories, activities such as brick manufacture and even agriculture and burning of vegetation in rural areas. Many of these sources cause localized air pollution, but pollutants can also be dispersed by meteorological phenomena such as winds and be deposited in rain, as gases or particles. This can cause pollution beyond the locality of the

emissions and since it is known that pollutants can travel many hundreds of kilometres in the atmosphere it can give rise to transboundary air pollution where the emission in one country contributes to the pollution load of another. This means that individual countries or states cannot solve their pollution problems on their own and regional cooperation is a necessity.

- 1.3. **'Male' Declaration:** In March 1998 a round-table policy dialogue regarding the rapidly increasing problem of regional air pollution, with a focus on South Asia, was organized by UNEP RRC.AP in collaboration with SEI 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.
- 1.4. It is in the context of such likely impacts of air pollution and its likely transboundary effects that the Members of the Governing Council of SACEP being the Environment Ministers of South Asian Countries resolved in Malé, the capital of Maldives in April 1998 to carry forward, or initiate studies and programmes on air pollution in each Country of South Asia. Iran was one of the parties to the Declaration. (The Declaration is at Annex-I). The aim was to benefit from the studies and programs to understand transboundary issues better. It is implicit in the Declaration that the member countries would use the result of studies to initiate both national and regional action. They were expected too to draw from experience of cooperation not only in the region itself but also in other regions like Europe and Sub-regions of Asia like ASEAN and East Asia. This is significant as the cooperation in these regions has gone beyond the stage of studies and monitoring of air pollution and its impacts to concrete action as in the UN ECE convention on Long Range Transboundary Air Pollution and its protocols, the ASEAN Cooperation Plan, on Transboundary pollution (after the Indonesian Fires in 1991,93&94)

and the development of RAINS ASIA model from East Asia for futuristic study of trends in air pollution based on air quality modeling and forecasting.

- 1.5. **Process:** The process that followed the 'Malé' Declaration so far has been in two phases. In Phase-I between July 1998 and February 2000 the network of National Implementing Agencies (NIA), National Focal points (NFP) and National experts/Institutes was set up. Baseline studies and Databases were prepared based on guidelines (List of NFO's and NIAs is at Annex-II). A summary of the baseline information from countries is given at Annex-III . Thereafter, National and sub-regional action plans were drawn up. The objectives of this phase was to create an air pollution impact network, raise regional awareness on acidification issues, synthesize relevant knowledge and identify short falls in pollution monitoring systems, review and analyse existing policy responses and propose national and regional action plans to cope with regional air pollution. The objectives were partially achieved in terms of the technical and policy responses, somewhat but fell short in raising all round awareness.
- 1.6. Phase-II from April 2000 aims to expand the network, strengthen monitoring capacity and study and analyse the status and effects of air pollution in South Asia. In October 2001 the Monitoring Committee (MoC) for establishing the monitoring network gave its Report and a Technical Manual was also prepared. The key suggestions of the MoC for further work, strategy and recommendations are at Annex-IV.
- 1.7. Four networking meetings were held of NFP's and NIA's up until July 2002. National Stakeholders meeting was held in India in September 2002. Bangladesh and Pakistan are to be held such meetings in 2003/04.
- 1.8. Monitoring stations are now being established in each of the participating countries. Hands-on training programs at national level and regional training programmes on study of wet deposition have also been held. The network meeting of 2002 also suggested institutional arrangements for sustainability of the programme as follows:



- 1.9. In parallel, the project is trying to develop an integrated assessment tool which combines emissions, atmospheric transfers, regional impacts and mitigation options.
- 1.10. The stage is now set for a regional stakeholders meeting to network them following the annual network meeting of 2003. What should be the objectives of such a network?

2.0. Objectives of Regional Stakeholders Network

2.1 The main objectives and aims of a regional stakeholders meeting are;

- Increase the awareness on local and transboundary air pollution
- Share and get views and ideas of stakeholders on implementation of the Malé Declaration.
- Improve exchange of information between those who manage the sources of pollution and those affected by it.

2.2 The sharing of views and information on these matters should be based on careful identification and choice of the stakeholders and their respective roles and assessment of the best way to form a regional stakeholders' network. The network

should be a platform to generate enthusiasm and knowledge about the issues involved in transboundary air pollution across diverse interests and aid policy makers like Governments of the region as well as civil society and groups of persons who contribute to and also get affected by air pollution in arriving at the right mix of policies and actions that can keep the air 'clean' if not 'miraculously clean'. Best results can flow from a careful identification of stakeholders and an analysis of their requirements for improving awareness, information, policy mixes and the role of 'regional stakeholders network' in heightening this process.

3.0 Identification of Stakeholders in local and transboundary Air Pollution

3.1 Anatomy of the Stakeholder: In a situation where the problem such as pollution is localized, stakeholders can be drawn from a smaller circle of influence. The influence can be inferred not only from how a decision or action (like a project say, a dam or a factory or a mine) affects some persons or institutions but also from how either they or another set of persons or institutions influence the decision or action itself either by promoting it or laying down policies for it. Stakeholder analysis which is developing as an art and science by itself recognizes not only these features of stakeholders but also goes beyond to look at the dimensions of their influence on both themselves and their socio economic as well as natural environment.

3.2 An example of an analysis for a localized situation is described in Lockhart and Ghani (2001). A stakeholder analysis was carried out using structural interviews on mine closures in Russia (in Moscow). Mine visits and discussions with union leaders made Ghani's team group the stakeholders into several camps. The analysis was not only for identifying stakeholders, and clarifying the nature of the problem but also identifying their diverse interests and developing a solution for effective fund transfers based on existing actors. Government Ministries like Ministry of Energy were not seen as neutral agents. Their interests were brought into the open. The impacts due to closure of mines on workers, on different operations in the mine, some technical, some manual and some administrative, were differentiated. The interests of local government which had an interest in the revenues raised from the mines were also taken into account. Substitutes for the growth engineered by the mines had to be looked for.

The social services like schools and hospitals which were affected, impacted on the personnel. Cumulatively these factors led to forming an Interagency Coal Commission. Stakeholders were used to create a system of checks, balances and independent assessment of conformity to mine closure plan.

3.3 The example of the Moscow mine was given here to lay down the basics of stakeholder identification and analysis. It is clear that the distinction between stakeholders having interest and stakeholders having influence has to be kept in mind. But the distinction may not be hard and fast as stakeholders having interest may also have influence and vice versa.

Stakeholders in Air Pollution

3.4 When we look at localized air pollution issues it is possible to identify stakeholders in as simple a matrix as in the coal mine case. The broad distinction will be between those who cause or contribute to air pollution and those who are affected by it directly or through their assets. Thus manufacturers and owners of automobiles with inferior technologies that result in wrong emissions and the industrialists running factories with air pollution load will be those who influence air pollution. Those who are pedestrians or cyclists or even police men breathing automobile exhaust are the stakeholders having interest in abatement of air pollution. Other stakeholders having varying degrees of interests and influence are the Governments that can regulate the pollution load or the local bodies who can help change road width, land use etc., to moderate affects of air pollution. Scientists, Technologists, experts, NGOs, and doctors who are aware of the pollution and wish to look at alternative ways of moderating or eliminating it as well its ill effects are also stakeholders, most of whom themselves will also be impacted by it. In the South Asian situations, the poor, the women, tribals or indigenous people are also stakeholders where the air pollution impacts more on them than others. In the Bhopal Gas tragedy, the majority of people who were affected were the shanty dwellers nearby.

3.5 But this is not the ambit of stakeholder influence or interest when the air pollution is not only local but spreads over a wider geographical area including transboundary ones. The pollution can settle on farms affecting

crop yields; it can enter lakes and ponds affecting the nutrient level and fish life. The pollution can corrode houses and monuments even far from the emission source. The forests can also go down in density of cover, including ground vegetation, over a period. All these can impact on the farmers and agricultural labourers who depend on the crops, the fishermen who depend on fish catch, the tourist operators who depend on the upkeep of the monuments and the foresters and villagers for whom forests are a source of living. The number of stakeholders increases in diversity and complexity, as the air pollution spreads far away from the point or moving sources. As the pollution crosses national boundaries it brings in new stakeholders in the form of a larger number of persons interested in and influenced by transboundary air pollution in the other countries. This would include the Governments of those countries as well as all stakeholders like farmers, engineers, fisherman, housewives, doctors, industrialists, youth, local governments, Non-Government Organizations, tribals, the poor, women's groups, etc., Added to this list will be those who influence decisions viz., Parliamentarians, media, academicians, business sector as groups adds to complications in finding solutions.

3.6 This stakeholder identification adds to complications in finding solutions, especially in transboundary air pollution, as it is extremely difficult to spot and bring together all those influencing and influenced to raise awareness, look at issues, heighten understanding of the options and arrive at solutions which reduce air pollution without causing problems to anyone. The identification of a small number of persons who can represent the various stakeholders is the optimum solution to be tried as in this regional stakeholders' meeting. A responsibility then lies on those represented here to reach out to their own constituencies to explain all the dimensions of both the problems and solutions. They would be expected to give a feedback on the reactions and ways to balance sacrifices against gains. This will depend on the stakeholder analysis which will cover issues involved requiring discussion in a network, the gains and losses, evolution of optimal solutions and communication strategies.

4. Stakeholder Analysis

Issues for Discussion

4.1 Based on the experience in Phase-I and Phase-II of the project and national stakeholders' discussions, the following can be identified as issues for discussion.

- I. Do the scientific findings so far justify the need for more collective action rather than only by those who control or regulate air pollution?
- II. Does transboundary air pollution loom larger than local air pollution issues? If so, what should regional stakeholders do both by way of prevention and control? If not, what should regional stakeholders expect to do both to increase their own awareness and also spread it?
- III. What is the role expected of national regulators and policy makers in regional issues? At what stage should the 'Malé' declaration get into more formal legal structures?
- IV. More specifically what is expected from NFP's and NIA in
 1. Increasing awareness
 2. Transparency and effectiveness in standards setting
 3. Support to experts and academia for continuing research into the nature of air pollutants and measures to moderate their ill effects
 4. Strengthening of the monitoring network to measure regional air pollution
 5. Preparation of action plans from time to time and their implementation
- V. What is the role of business and industry in the network? Is it to be passive or proactive in
 - a) getting involved in academic studies and technological choices to discharge less wastes into the atmosphere
 - b) self regulation to cut out wasteful practices and end of the pipe solutions which add to environmental problems
 - c) Involvement with local farmer communities, organizations for the poor and women and other stakeholders for an understanding of the effects of air pollution and what are the compromises to be made in production, distribution and marketing to become models of 'green business'.
- VI. What can S&T institutions and academia do to understand in advance the likely problems posed by more and more air pollutants and ways to prevent their

emergence or to control them? Should S&T for production processes have an organic connection with other institutions looking at socio-economic and health effects? Can these institutions in partnership with NGO's verify monitoring of air pollution independently?

- VII. What is the role of medical science and clinical medicine in coping with the challenges of local and regional air pollution? Is the South Asia framework for epidemiological studies adequate and if not what measures should be taken to change this? What should be the involvement of the other stakeholders in this?
- VIII. The role of agricultural and veterinary institutions and allied farming in looking at impacts on vegetation, animals, and soils, etc.
- IX. The role of engineers and architects on the corrosion of materials and monuments
- X. The role of the non-regulatory, non-business, non S&T stakeholders such as youth, women, NGOs working on socio economic problems like poverty, illiteracy and ill health and on evolving alternate styles of development and life. Can this be clearly spelt out such that neat and agreed solutions are offered in both an activist and non activist mode?
- XI. What should persons who can influence policy and laws like bureaucrats, parliamentarians and think tank institutions do to address these issues and place Malé Declaration in greater focus in national and local debates on environmental policy?
- XII. What is the role of local self governance in ensuring feed back on problems of air pollution and ensuring better package of practices including land use and fiscal changes to ensure compliance with laws?
- XIII. Can the media play a wider role in creating awareness and promoting exchange of views and information within and across national borders?
- XIV. When all this has been discussed, what are the practical steps to be taken to carry forward the work of the regional network? What should be the organizational links and funding mechanisms?

4.2 As XI above is critical, there has to be a strategy to determine gains & losses and optimal solutions. What should be the frame work for that?

4.3 Gains and Losses & Optimal solutions : Air Pollution is an off-shoot subject of a developmental process that increases natural availability of industrial products and energy that are said to enhance the standard of living. South Asia is still in the first few rungs of the ladder in these processes, if one goes by yard sticks of per capita consumption of electricity, chemical fertilizers, food grains, oilseeds,

pulses, milk, and animal protein, textiles, housing, etc. The manufacturing and industrial process which gives a boost to all this are seen as gains. The losses are of depletion of natural resources of air, water, soils and biodiversity. But the gains have become important in a World where there is competition for material goods and services. The losses are some times understood faintly and implications for intergenerational equity are also at the back of most minds. But short term gains both to get out of the vicious circle of poverty and to keep up with the Joneses are prevailing over these losses.

- 4.4 The regional network should, with the help of biologists, medical scientists, economists and policy makers who are wedded to sustainable development and civil society evolve alternative paradigm of getting same type of gains with less losses and re-orienting the regional and world order to look at things dispassionately without commitments to trodden paths. Yet, ignoring history and transfer of resources on exploitative terms rendering this an inequitable world cannot obviously last long.
- 4.5 The solutions may lie in the hands of technologists who can offer technologies that do not pollute, economists who can attribute correct values to resources to avoid making wrong project or policy choices, scientists (especially doctors) who can caution people in advance of the pit falls of adopting a wrong style of life, policy makers who engage in constant and transparent dialogue with their own people and erect governance structures that are amenable to quick adjustment to changes noticed in the field thus involving more and more decentralized management of natural resources. Such solutions must be supplemented by action of regional institutions like SACEP, SAARC etc., and the use of leverages for balanced and sustainable development in international environmental conventions, multilateral funding agencies, and organisations like WTO.
- 4.6 Of course in South Asia we have the bulwark of spiritual learnings and teachings of great men of yore which stand us in good stead through thick and thin. But as long as the rest of the World does not share these values and tries to impose its own thinking even on strategies to counter transboundary air pollution, South Asia will have to work out its own way to resist pressures while not losing its natural resources, clean air, and free oxygen being among the most precious of them. The regional network should be an aid in this process of identifying optimal solutions and the way it can help in 'Malé' Declaration can even be a beacon for the World.

5. Framework for the Strategy

5.1 The regional stakeholders have to work out a clear strategy based on answers to some of the questions raised earlier. The strategy should address.

- i. The modalities of partnership between the stakeholders,
- ii. The increasing and more effective role of NFP's and NIA's in assessing and monitoring air pollution and making public the findings from time to time
- iii. The association of Civil Society especially youth, women, tribals, labour, unions and NGO's working on Socio economic issues and academia in the process of monitoring and evaluation of policies
- iv. The changes in business to make it more attuned to sustainable development while not losing competitive edge.
- v. The enhancement of awareness of 'Malé' Declaration in the region as well as the impacts of air pollution and the role of media in it.
- vi. The post phase-III implementation in the 'Malé' declaration and specifically the assembly of information from monitoring stations and getting a total and correct picture of the changes in air quality as well as impacts on vegetation, soil, water, monuments etc., due to local and non local causes. The exact arrangements for sharing of data among the countries keeping in mind the agreement of participating countries in July 2002 to share national level data with the other countries and institutions within the 'Malé' Declaration Network should also be addressed.
- vii. The policy and fiscal changes that may be required within the regional framework.
- viii. Commissioning of more studies on impacts of air pollution on health, crops, soils, waters, monuments etc., both at 'hot spots' of air pollution and likely transport routes.
- ix. Promoting R&D for reversal of damage caused by air pollution and evolving cleaner technologies to prevent wastes discharged into the air. This should include work on identification of pollutants not so far done and measures to prevent their release.
- x. Enable organizations interested in life style changes including energy conservation and use of non polluting sources to bring about awareness on them and link their work to changes in policies of Governments as well as industry

- xi. Giving inputs for creating a cost effective and representative regional stakeholders network for continuous association with the 'Malé' process.



'Male' 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 pollutants 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

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

Reiterating in this context Principle 21 of the UN declaration on the Human Environment in 1972 which stated that State 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 polices, 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.

Emphasizing 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. Asses 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 minimize 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 standardized 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.

Annex-II

National Focal Points (NFP) and National Implementing Agencies (NIA)

<p>Bangladesh NFP: Ministry of Environment & Forest NIA: Department of Environment, Dhaka</p>	<p>India NFP: Ministry of Environment and Forest NIA: Central Pollution Control Board, New Delhi</p>	<p>Maldives NFP & NIA: Ministry of Home Affairs, Housing & Environment, Male' NIA: Pakistan Environment Protection Agency, Islamabad</p>	<p>Pakistan NFP: Ministry of Environment, Local Govt. & Rural Development NIA: Pakistan Environment Protection Agency, Islamabad</p>
<p>Bhutan NFP& NIA: National Environment Commission, Thimpu</p>	<p>Iran NFP & NIA: Department of Environment, Tehran</p>	<p>Nepal NEP: Ministry of Population & Environment NIA: International Centre for Integrated Mountain Development, Kathmandu</p>	<p>Sri Lanka NEP: Ministry of Environment and Natural Resources NIA: Central Environment Authority, Colombo</p>

Annex-III

Summary of Base line Information

Country	Nature of Problem	Status of Monitoring	Pollutants Monitored	Equipment used	Number of stations	Capacity	Quality	AQ standards notified
Bangladesh (Note: World bank' Air Quality Management Project' will improve current status)	Vehicular Industrial	No systematic monitoring	SOx NOx SPM Co Pb in SPM	UV/VIS Spectrophotometer UV/VIS Spectrophotometer HVS (height 3m; 8hrs collection comply with WHO) Toxic Gas Monitor AAS	4	Limited	No	Env-Conservation Rule, 1997
Bhutan	Urban vehicular Industrial Forest fire Indoor air Pollution	No monitoring Random check on vehicles	Sox Nox Co		6 sets of vehicle emission testing equipment from Dandia	None	No	At initial data collection stage
India	Industrial and	Systematic	SPM	HVS	290 stations	CPCB	Not	Notified

	Power sector Urban Vehicular	for some industries and some urban areas	RSPM Sox, Nox, CO Pb PAH H ₂ S NH ₃	HVS (Cyclone attached) Colorimetry (modified West & Gaeke) Colorimetry (Modified Jacob & Hocheiser) NDIR AAS Solvent extraction, then GC-FID Colorimetry (Cd SO ₄ - ST Ractan method) Colorimetry (Indophenol blue)	spread over 92 cities/towns	NEERI	adequate for country wide monitoring	under Air Act 1981 for SO ₂ , NO ₂ , RSPM, Pb, CO
Iran	Urban Vehicular Industrial	No systematic random in Teheran only	Sox NOx TSP CO O ₃ THC	Fluorescence caused by ultraviolet Chemo-luminescence Ionized caused by beta (β) Concentrated infrared Ultraviolet rays - absorption Ionization caused by hydrogen				Notification of Standards for vehicles and industries

Maldives	Urban Transboundary over ocean	No monitoring Data from INDOEX	None	None	Note	None	None	None
Nepal	Urban vehicular Industrial Indoor Air Pollution - rural	No systematic monitoring Random exists	TSP PM ₁₀ Sox NOx Co	Envirotech APM 451 Respirable Dust Sampler (India made for TSP, PM ₁₀ , SO ₂ , NOx. 11/min. The samples were partly 24hr. and partly 8hr. during peak daytime traffic. Gravimetric analysis, Whatman GF/A filter (PM ₁₀) and ceramic thimble (non respirable fractions) Pararosaniline method Jacobs-Hochheiser Arsenite, Modified method Roadside spot measurements with Kitegave Precision Gas Detector, Model APS. Gas	No continuous stations	Limited	Some	No standards for stationary sources; National vehicle mass emission standards introduced for vehicles

			Pb, Fe	detector tubes, 5-50 ppm. AAS analysis (Perkin Elmer-2380) of the glass fibre filters				
Pakistan	Urban vehicular Industrial Indoor air pollution	No systematic monitoring Scattered monitoring	PM SO ₂	HVS Size selective inlet (SSI) for high volume sampler to allow inhalable particulate matter sampling Nitrogen oxides analyzer based on chemiluminescent technology (Make: HORIBA: Model: APNA-350 E) Sulphur dioxide analyzer based on ultraviolet fluorescent technology (Make: HORBIBA;m Model: APSA - 350 E) Carbon monoxide analyzer based on gas filtration correlation (GFC)	3 mobile (5 proposed)	Limited	No	Emission standard for industries: Ambient Air Quality

				technology (Make: Thermo Environmental instruments; Model: 48 H) Ozone analyzer based on the ultraviolet photometry technology				
			O ₃					
Sri Lanka	Urban Vehicular Power production	No systematic island wide monitoring; Random monitoring exists	Urban SO ₂ NO ₂ PM ₁₀ CO O ₃ Rural: PH CI NO ₃ SO ₄	UV Photometry Chemiluminescent HVS Infrared Photometry UV Photometry	2 fixed in CMR 5 mobile stations 8 met.	Limited	Some	CEA standards SO ₂ , NO ₂ , TSP, pb, O ₂ , CO

ACRONYMS

- AAS Atomic Absorption Spectrophotometer
- AQ Air Quality

CPCB	Central Pollution Control Board
NDIR	Non-dspersive Infrared Spectroscopy
NEERI	National Environmental Engineering Research Institute, India
SPM	Suspended Particulate Matter
RSPM	Respirable Suspended Particulate Matter (PM ₁₀)
HVS	High Volume Sampler
PAH	Polycyclic Aromatic Hydrocarbons
THC	
TSP	Total Suspended Particulates

Extracts from the Report of the Monitoring Committee October 2001

MoC Decisions

The important decisions that the MoC took in its first two meetings were:

1. The monitoring of transboundary air pollution and urban AAQ, and the study of their respective impacts, would be treated as two separate projects.
2. The monitoring for transboundary air pollution and their impacts would be given immediate priority.
3. The monitoring for transboundary air pollution and their impacts would be done at two levels NIA's and other stakeholders. Accordingly, instrumented and non-instrumented methods would be made available in the monitoring manual so that stakeholders other than NIA's (NGOs, etc) could also effectively participate in this programme. This would help increase the area monitored by this programme.
4. Transboundary air pollution would be monitored by monitoring wet and dry deposition, soils, vegetation, water bodies and aquatic ecology.
5. The parameters for dry deposition would be: SO₂, NO₂, TSPM, PM₁₀, O₃; and for wet deposition would be: pH, electrical conductivity (EC), Mg²⁺, Na⁺, K⁺, Ca²⁺, NH₄⁺, SO₄²⁻, NO₃⁻, Cl⁻.
6. The monitoring and management of urban AAQ would be discussed with each country's NIA to understand: a) the relative importance of this issue, and b) whether the NIA wished to avail of UNEP's help in this regard. The MoC would accordingly make recommendations to the UNEP on the need for a separate project for the monitoring and management of urban AAQ.

Strategy

The following strategy is suggested for the monitoring network:

1. Only a limited number of sites which can be monitored on a sustained basis, even after external support is discontinued, be initially selected
2. The number of sites monitored by NGOs and educational institutions be at least ten times as many as those being monitored by the NIAs. This dual level monitoring exercise would increase the probability of detection of acidification at an early stage. If an acidification process is reported at a particular site by an NGO, the NIA should verify this. If warranted, the NIA should monitor at this site with instrumented methods.
3. The first 5 years of the monitoring programme should be devoted acidification trend monitoring only
4. Paired sites, one on either side of the border, should be established to engender cooperation between neighbouring countries and confidence in the monitoring results.
5. To the extent feasible, the monitoring of all the parameters at set of paired station should be done jointly by scientists from both the neighbouring countries.
6. To the extent feasible, the analysis of samples requiring laboratory analysis, should be done in the country where the samples were collected as well as in the neighbouring country.
7. The monitoring sites suggested in subsection 9.2 are based on the discussion that MoC had with the NIAs and factors such as regional meteorology, source locations, terrain, etc. NIAs may do the final site selection in consultation with neighbouring countries. NIAs may change the site locations, if necessary, in the first year of the monitoring programme, after consulting with the neighbouring country and the Male' Declaration Coordination Committee (for details of the MNCC see section 12.0). thereafter, the sites should be frozen for the next 4 years, unless there are very compelling reasons which convince the MNCC that site adjustments are warranted.
8. The selection of the NIA monitoring sites along a border should preferably be done jointly by NIAs from both countries and if necessary with the help of UNEP. Field visits must be made before a site is chosen.
9. The monitoring manual may be revised after three years to incorporate the experience gained during this period as well as allow for new monitoring methods to be introduced.

Recommendations

1. UNEP should verify that the monitoring sites finally selected by the NIAs meet the requirements set for them. If necessary, UNEP should provide assistance and coordination for the proper selection of monitoring sites.
2. A manual for interpreting the results should be prepared. The monitoring manual should be updated after 3 years.
3. A strong centrally-coordinated effort is required to build and maintain the momentum of this project and deepen the commitment for its. Such an effort is best done by an inter-governmental body, namely UNEP, which should continue to play a key role in this project until such time as the participating countries are in a position to manage this endeavour themselves.
4. Capacity building in every participating country is very important in order to obtain good results. UNEP, through the Task Force, should play a central role in facilitating capacity building in all countries. Bhutan and the Maldives require special attention in this regard.
5. The strengthening of the Male' Network should be facilitated through regular contact and information exchange between network members. The newsletter, the website, holding regular workshops and meetings, the inducting of new network members are important measures to keep the network on the track envisioned in the Male' Declaration. UNEP may initially facilitate the process of strengthening the network.
6. Based on the discussions with various stakeholders (NGOs, industry, educational institutions, media) in the participating countries and the enthusiasm they had expressed for participating in this programme, effort should be made to involve as wide a spectrum as possible of stakeholders in this project, at both the national and the international levels.
7. Some of the countries which have inadequate information regarding their emissions, should be aided technically and financially to collect and compile this information as a part of this programme. This information should include current and future estimates of SO₂ and NO₂ emission quantities and their geographic spread.
8. Any recommendations for additional monitoring stations or for significant changes in the MoC-suggested sites, may be forwarded with justification to UNEP for consideration.
9. NIAs should prioritise the proposed stations and send the list to UNEP.

10. NIAs are responsible for establishing the instrumented stations. The non-instrumented monitoring setup in each country may be set up by such organizations as may wish to do so.
11. Long-term sustainability of the monitoring network is of great importance. NIAs should therefore be as self-sufficient as possible from the inception of this programme. For example, monitoring stations, to the extent possible, should be set up with existing infrastructure; eg, at existing meteorological stations or at similar facilities.
12. NIAs should plan for long-term sustainability of their activities. They should explore the possibility of securing funds for this project from their national government right from now; and any likely contributions should be identified. If some countries, however, feel that they are likely to face special problems in sustaining this programme, they should initiate a dialogue with UNEP and in the SC right away.
13. To minimize transport cost of samples and minimize the chances of their spoilage during transit, facilities for basic analysis should be developed either at the monitoring sites or close to them as possible, eg, a science college, etc.
14. An inventory of existing expertise, monitoring equipment, spares and services available in each country for transboundary air pollution monitoring and its effects should be prepared by the NIAs and compiled by the TF.
15. NIA and NGO representatives should participate in training workshops for non-instrumented and instrumented methods. Provision has been made for such participation. This will provide NIAs and NGOs with an appreciation of all the tools that will be used in monitoring transboundary air pollution air pollutants and their effects.
16. Surface wind data, and where available upper atmospheric wind data, major emission locations and strengths, and land use data for the monitoring sites should be pooled and made available by the NIAs to all other participating countries.
17. Where necessary, solar isolation and mixing depths should also be monitored as part of this programme.
18. Monitoring all the factors, i.e, dry and wet deposition, soil, vegetation, water quality and aquatic ecology may not all be possible from the inception of the programme due to budget considerations. IN that event, the programme should begin with dry and wet deposition. Attempts should be made to have the budget for monitoring the other factors at an early date.

19. To familiarise the participating countries with the set up in all the countries, SC and TC meetings and training workshops should be held in all the MD participating countries in rotation.