



MALÉ DECLARATION ON CONTROL AND PREVENTION OF AIR POLLUTION AND ITS LIKELY TRANSBOUNDARY EFFECTS FOR SOUTH ASIA

Past, Present and Future



Malé Declaration Secretariat
UNEP Regional Resource Centre for Asia and the Pacific
April 2008

This report has been prepared as part of the phase III implementation of the Malé Declaration on Control and Prevention of Air Pollution and Its Likely Transboundary Effects for South Asia. The contents of the report do not necessarily reflect the views, policies or opinions of any participating country and organisation.

National Focal Points (NFP) and National Implementation Agencies (NIA) of Malé

Bangladesh	Bhutan	India	Iran
NFP: Ministry of Environment and Forest NIA: Department of Environment, Dhaka	NFP and NIA: National Environment Commission	NFP: Ministry of Environment and Forests NIA: Central Pollution Control Board, Delhi	NFP and NIA: Department of Environment, Tehran
Maldives	Nepal	Pakistan	Sri Lanka
NFP: Ministry of Environment, Energy and Water NIA: Department of Meteorology, Malé	NFP: Ministry of Environment Science and Technology NIA: International Centre for Integrated Mountain Development(ICIMOD), Kathmandu	NFP: Ministry of Environment NIA: Pakistan Environment Protection Agency, Islamabad	NFP: Ministry of Environment and Natural Resources NIA: Central Environmental Authority, Colombo

Coordinating Agencies

UNEP Regional Resource Centre for Asia and the Pacific (UNEP RRC.AP) Bangkok, Thailand 	South Asia Co-operative Environment Programme (SACEP) Colombo, Sri Lanka 	Stockholm Environment Institute (SEI) Stockholm, Sweden 
---	---	--

Financial Support

Sida, the Swedish International Development Cooperation Agency, is funding this part of the Malé Declaration Implementation as part of the Regional Air Pollution in Developing Countries (RAPIDC) programme. 

Distributed by

The Secretariat, Malé Declaration on Control and Prevention of Air Pollution and Its Likely Transboundary Effects for South Asia,
United Nations Environment Programme
Regional Resource Centre for Asia and the Pacific (UNEP RRC.AP)
Outreach Building, Asian Institute of Technology
P.O. Box 4, Klong Luang, Pathumthani 12120 Thailand

FOREWORD

It is an honor to pen the foreword for this publication on the history of the Malé Declaration on Control and Prevention of Air Pollution and Its Likely Transboundary Effects for South Asia. Nearing completion of three implementation phases spread over almost a decade, the Malé Declaration is out of its infancy and has a strong base for further action.

South Asia, home to more than a fifth of the world population, is a unique and complex region. It has some of the fastest growing economies and yet in contrast, a large proportion of the world's poor. Growing consumerism by the burgeoning middle class has left behind in its path, a trail of social and environmental impacts in these countries. In addition, rapid growth of cities, together with associated growth in industry and transport systems, has made the region increasingly concerned with emissions of air pollutants.

Realising the need for regional cooperation on air pollution, High Level Officials from the South Asian countries agreed on a draft declaration for regional cooperation during a policy dialogue hosted by the United Nations Environment Programme (UNEP) and the Stockholm Environment Institute (SEI) in Bangkok during March 1998. This draft declaration was approved by the Environment Ministers present in the seventh meeting of the Governing Council of South Asia Co-operative Environment Programme (SACEP) at Malé, Maldives in April 1998. Thus was born the Malé Declaration.

During the last nine years of implementation, the Malé Declaration has succeeded in building up regional cooperation, establishing baseline figures, strengthening capacity in monitoring and impact assessment and building awareness on the issue. It is expected that the future activities would result in the control and prevention of air pollution issues in South Asia.

The progress on the implementation of the Malé Declaration is a successful example of what can be achieved through inter-governmental cooperation, and a testimony to the successful partnership built among many stakeholders. This publication has come at an apt moment, as the partnership takes stock of the past and prepares to leapfrog towards its goal of achieving clean air in South Asia.

Surendra Shrestha
Regional Director
UNEP ROAP/RRC.AP

ACKNOWLEDGEMENTS

The Secretariat would like to thank many individuals and institutions who have contributed to the preparation of this report. Individuals included are from the National Focal Points and National Implementing Agencies of the Malé Declaration. A full list of National Focal Points and National Implementing Agencies are included in the Annex III. Special appreciations are extended to:

- Mr. Raghunathan Rajamani, the Regional Advisor for preparing the report;
- Senior officials of the Eighth Session of the Malé Declaration's Inter-governmental Meeting for providing invaluable inputs;
- Dr. Johan Kulesenian and Dr. Kevin Hick of the Stockholm Environment Institute (SEI) for reviewing and providing inputs to this report, and
- The Swedish Development Cooperation Agency (Sida) for providing the funding support to the report.

Malé Declaration Secretariat Team

Surendra Shrestha

Mylvakanam Iyngararasan

Naw Wah Wah Htoo

Wenman Liu

TABLE OF CONTENTS

Chapter 1 Background	1
1.1 Air pollution	2
1.2 Transboundary air pollution	2
1.3 Increase in air pollution – major causes	3
1.4 Impacts of air pollution	3
1.5 Air pollution problems in Europe 1960-2002	4
1.6 Focus on prevention of air pollution	5
Chapter 2 Concerns of South Asia	6
2.1 Background	7
2.2 Policy dialogue on air pollution	7
2.3 Regional Haze Action Plan in ASEAN	9
2.4 Decision of the SACEP Governing Council	9
Chapter 3 Malé Declaration	10
3.1 Thrust of the Declaration	11
3.2 Significance of the Declaration	11
Chapter 4 Implementation	12
4.1 Phase I	13
4.2 Phase II	14
4.3 Phase III	15
Chapter 5 The way forward	17
5.1 Data Analysis	18
5.2 Knowledge network to combat local air pollution	18
5.3 Impacts on health, crop, soils and materials	18
5.4 Awareness	18
5.5 Adoption of preventive (or alternative cleaner) technologies	19
5.6 Protocols on transboundary air pollution	19
Annex I	20
Annex II	24
Annex III	26

CHAPTER I

BACKGROUND

1.1 AIR POLLUTION

Clean air is critical for life. Every person on the planet breathes, on average, 12,870 liters of air each day. Air pollution visible to the human eye (such as nuisance dust and smoke) and invisible air pollutants (such as fine particulate matter and noxious gases) make the air unhealthy to breathe. Sensitive population groups, such as babies, children, the elderly, and people who suffer from heart and respiratory disease, are most at-risk from polluted air.

Air pollution can come from natural sources like volcanic outbursts, natural fires in forests, coal mines, marsh gases, among others which are rather sporadic events. But there are also man-made sources ranging from the traditional cooking stove burning fuels such as wood, dung and coal; to emissions from factories and thermal power plants, exhausts of automotive vehicles and from several other sources. Air pollutants from combustion, agriculture and industrial processes include carbon monoxide (CO), sulphur dioxide (SO₂), nitrogen oxides (NO_x), ammonia (NH₃), ozone (O₃), particulate matter (PM), volatile organic compounds (VOCs), heavy metals, and persistent organic pollutants (POPs).

1.2 TRANSBOUNDARY AIR POLLUTION

In the past, air pollution has been perceived primarily as a local phenomenon. And clearly, most air pollution tends to be dominated by emissions from local sources. This is particularly true with the rapid growth and expansion of mega-cities. However in recent decades, a growing body of scientific research has demonstrated that air pollution has increasingly become a regional, hemispheric, and even global phenomenon. Air pollutants can react in the atmosphere and travel hundreds or thousands of kilometers from their sources of origin, having serious impacts on ecosystems and air quality in downwind areas and communities. Air pollution does not respect national or political boundaries – it can cross national boundaries, hemispheres and increase the level of “background pollution” (the amount of pollution in the air before emissions from local sources are included) around the world.

There are a number of “transboundary pollutants including sulphur oxides (SO₂), nitrogen oxides (NO_x), ammonia (NH₃), tropospheric ozone, heavy metals and persistent organic pollutants (POPs). As emissions often give rise to local impacts as well as regional effects after long-range transport, local impacts are considered part of regional air pollution problems.

MALÉ DECLARATION

ON CONTROL AND PREVENTION OF AIR POLLUTION
AND ITS LIKELY TRANSBOUNDARY EFFECTS FOR SOUTH ASIA
Past, Present, and Future

1.3 INCREASE IN AIR POLLUTION- MAJOR CAUSES

The major causes of air pollution are the production of energy by burning of fossil fuels, industrial production processes, automotive fuel combustion, biomass burning, and domestic sources that result in gaseous emissions, some of them are toxic. In almost all cases, the single biggest culprit is the use of fossil fuels like coal, furnace oil, diesel, petroleum, etc. Economic growth bears a high degree of correlation with energy consumption, which in turn requires fossil fuels thereby increasing air pollution.

The energy production processes in thermal power plants mostly use fossil fuels. Very few plants use technologies which reduce or minimise the air emissions. For coal, combustion technologies like fluidised bed combustion can reduce emissions. End-of-pipe solutions in plants commonly used include de-sulphurisation and electrostatic precipitators. However, these end-of-pipe solutions are not as effective as alternative energy production methods such as water, solar and wind-based power. Reducing or even eliminating air emissions by use of waste recycling and other cleaner technologies and using cleaner fuels is also possible among industry.

In the automotive sector, air quality is greatly affected by the emissions of oxides of carbon and nitrogen and some other organic pollutants. As the automobiles, aeroplanes and other vehicles increase in number, air pollution increases and is also transported. Use of cleaner sources like natural gas, solar radiation and hydrogen can reduce this, but the change-over to all these alternative fuels has been minimal for logistical and fiscal reasons.

As mentioned, natural sources of air pollution like volcanic eruptions abound but are mainly sporadic in nature. However, forest fires, which are mostly man-made, can significantly add to air pollution, as happened in the South East Asia in 1997.

1.4 IMPACTS OF AIR POLLUTION

Air pollution can affect people directly through breathing unhealthy air, and indirectly by damaging the environment in which they live. Air pollution impacts health specifically by causing respiratory diseases among others in human beings and even animals. Polluted air can have a series of direct and indirect effects on the environment, including significant damage to crops, vegetation and man-made materials; acidification and eutrophication of ecosystems; degradation of visibility; and effects on climate.

1.5 AIR POLLUTION PROBLEMS IN EUROPE 1960-2002

During the 1950's and 1960's, the main air pollution problems experienced in Europe related to health impacts in urban areas. A number of smog incidents led to large numbers of excess deaths and the resulting public response caused national and urban governments to develop policies to clean the air in cities. This was achieved through policies such as smokeless zones and relocation of industry. Since then, there has been improvement in urban air quality across Europe that continues to this day. The classic pollutants of the 1950s and 60s were a combination of SO₂ and particulate matter that proved very damaging to health. Recent attention has been placed on pollution from transportation sources, which includes pollutants such as CO, NO₂, PAH and benzene.

During the 1960's, it became increasingly clear in Scandinavian countries that lakes were becoming acidified and that this was mainly due to acid deposition derived from emissions outside Sweden and Norway. There was an increased focus on the long-range transport of sulphur and nitrogen pollutants causing acidification, during the 1970's and particularly in the 1980's.

In more recent years, the focus of attention on pollutants has shifted to include the regional distribution of photochemical oxidants, particularly ozone. Ozone has been shown to affect crop yields across large areas of Europe. Of late, transboundary transfer of particulates and the importance of reduced nitrogen emissions from agriculture have been acknowledged in the field of air pollution. Other air pollution problems are heavy metals, such as lead (Pb), mercury (Hg) and cadmium (Cd), and POPs such as dioxins and brominated flame retardants.

The acidification problems of Scandinavia formed the initial focus for the development of inter-governmental agreements on air pollution, particularly in the period between 1968 to 1972. Initial work was developed through the Organisation for Economic Co-operation and Development (OECD) between 1972 and 1979, but the main development occurred with the formation of the Convention on Long-range Transboundary Air Pollution (LRTAP) in 1979. The LRTAP Convention was hosted under the auspices of the United Nations Economic Commission for Europe (UNECE), which initiated its work in 1976.

One of the major decisions taken was the setting up of European Monitoring and Evaluation Programme (EMEP) and also the core financing of this body dedicated to modeling and monitoring through the EMEP Protocol (1979/80). In the 1980's, widespread forest decline in Central Europe added impetus to the negotiations. Integrated Cooperative Programmes were established for many air pollution issues such as corrosion, forest health

MALÉ DECLARATION

ON CONTROL AND PREVENTION OF AIR POLLUTION
AND ITS LIKELY TRANSBOUNDARY EFFECTS FOR SOUTH ASIA
Past, Present, and Future

and crops. A key ingredient in developing the policy responses was the development of the Regional Air Pollution Information and Simulation Model (RAINS) integrated assessment model which helped to combine different aspects of air pollution and investigate policy options for emission reduction.

The UNECE LRTAP Convention has developed a series of Protocols on different pollutants. The first was the Sulphur Protocol of 1983, the so-called '30 per cent club.' This was followed by the NO_x Protocol, the second Sulphur Protocol, the Heavy Metal and the POPs Protocols. The latest was the Göteborg Protocol, the so-called 'multi-effect, multi-pollutant' Protocol developed in 1999.

The European community also started to develop agreements and directives beginning from the 1980s. The first ones were related to sources, where the Large-Plant Directive was one of the most well-known. From 1996, Air Quality Directives were developed. In 2001, the 'Ceilings Directive' was developed, referring to SO_x, NO_x, NH_x and VOC_s.

European cities were the first to take action on air pollution. Scandinavian scientists realised the importance of air pollutant's long-range transport for acidification, and this concern led to the development of international agreements. Since these international agreements have been in existence, sulphur emissions have decreased significantly. Other emissions show lesser decreases, but at least emissions have stabilised, showing downward trends in many cases. In the future, more stringent targets are expected.

1.6 FOCUS ON PREVENTION OF AIR POLLUTION

No introduction on this subject would be complete without a consideration of preventive measures to abate and control air pollution based on experiences. Such a survey on air pollution abatement measures has been well presented in a thematic paper presented by Mr. Surendra Shrestha, Regional Director, UNEP Regional Office for Asia and the Pacific (ROAP), on the occasion of the 20th Anniversary of the UNEP Sasakawa Environment Prize celebration in Beijing on September 2004. The paper is reproduced as a reference in Annex I ■

CHAPTER II

CONCERNS OF SOUTH ASIA

MALÉ DECLARATION

ON CONTROL AND PREVENTION OF AIR POLLUTION
AND ITS LIKELY TRANSBOUNDARY EFFECTS FOR SOUTH ASIA

Past, Present, and Future

2.1 BACKGROUND

Economic progress in most South Asia countries started after the end of colonial rule in the late 1940's. This progress resulted in increased consumption of fossil fuels, urbanisation and industrialisation, which produced air and water pollution problems for the region. By 1972, these consequential environmental problems started to emerge when most of the countries participated in the UN Conference on the Human Environment in Stockholm. Exposure to the ideas developed in Europe and elsewhere, and their own scientific findings, helped the South Asian countries acknowledge the problems, as well as initiate policy and legislative processes for tackling problems like air pollution. By the time South Asian countries participated in the UN Conference on Environment and Development in 1992 in Rio de Janeiro (the Earth Summit), most countries had initiated some measures towards waste and emission reduction.

However, as underlined by the conclusions of the Earth Summit, particularly in the context of the Conventions on Global Climate Change and Biodiversity, a growing anxiety among developing countries came to the fore: that their path towards economic progress and elimination of poverty would be hamstrung by inequitable arrangements to tackle air quality, among other negative environmental externalities. The countries of the South (as they were described) wanted differential treatment based on their stage of economic progress; common but differentiated responsibilities and access to cleaner technologies (which had helped the Northern countries to clean their own environment) on attractive terms. In addition, they requested capacity building to further understand and solve problems that surfaced due to adoption of energy-intensive technologies, most of which resulted in increased pollution.

2.2 POLICY DIALOGUE ON AIR POLLUTION

UNEP had taken several initiatives during the 1980's and 90's to focus on problems of Asia, and of South Asia in particular. Its Regional Office for Asia and the Pacific (UNEP ROAP) and UNEP Regional Resource Centre for Asia and the Pacific (UNEP RRC.AP), (earlier UNEP/EAP-AP) highlighted sub-regional and regional State of the Environment, also assisted sub-regional organisations deal with environmental problems by building-up capacity to marshal data, use latest technologies, including Geographical Information Systems (GIS), in order to ultimately analyse data and proffer solutions at the national level. UNEP had by then also already been working closely with sub-regional environmental organisations which had come into being on environmental issues, such as the South Asia Cooperative Environment Programme (SACEP). By 1997, UNEP had clearly identified that

air pollution was a critical emerging issue in Asia. In particular, emissions of sulphur dioxide and nitrogen oxides had been rising steadily in the past three decades.

Rapid growth of cities, together with expansion of industry and transport systems, has made the Asian region increasingly concerned with air pollution emissions. Projections indicate that potentially large increases in emissions may occur during the next twenty to fifty years, should the current trends persist. If this occurs, the impacts which have been experienced in Europe will become apparent in large parts of Asia. These problems include the reduction in crop yield by direct effects of pollutants; acidification of forest soils and lakes (although Asian ecosystems may not be as sensitive as the European ones in this respect); impacts on human health; impacts of corrosion on man-made structures; impacts on soil fertility leading to damaging changes in natural ecosystems (e.g. changes in biodiversity); and impacts on forest and crop growth in sensitive soils.

Consequently, UNEP initiated a policy dialogue in collaboration with Stockholm Environment Institute (SEI) which had a track record of working on air pollution related issues with financial support from the Swedish International Development Cooperation Agency (Sida). From 19 to 20 March 1998, senior government officials of the South Asian region and experts on air pollution met at the Asian Institute of Technology (AIT), Thailand. South Asian countries of Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka participated. Regional and sub-regional expert organisations from the sub-region, as well as SEI, Sida and SACEP participated. The presentations highlighted the growing air pollution in South Asian countries due to expansion of the energy, transportation and industrial sectors of their economies. The projections and modeling exercises of the experts showed that further expansion without preventive strategies to control the effects of air pollution would cause long-term damage to the crops, soils, human health and monuments of South Asia. In additions, presentations covered the European experience as well as the more recent developments in the Association of South East Asian Nations (ASEAN) region arising from the forest fires of 1997. It was noted that the environmental group of ASEAN was working on a haze action plan to minimise the severity of haze caused by the forest fires. The meeting also took note of the possibility of localised and national air pollution problems becoming transboundary, as had happened in Europe, and the need to study the phenomena carefully to facilitate prompt sub-regional cooperative action. In the light of these presentations and discussions, the meeting agreed on a draft declaration to be presented to SACEP's Governing Council, which was to have its seventh meeting at Malé in the Maldives in April 1998.

MALÉ DECLARATION

ON CONTROL AND PREVENTION OF AIR POLLUTION
AND ITS LIKELY TRANSBOUNDARY EFFECTS FOR SOUTH ASIA

Past, Present, and Future

2.3 REGIONAL HAZE ACTION PLAN IN ASEAN

As an example of a transboundary air pollution problem, the South East Asian experience of tackling regional haze problems created by the forest fires in Indonesia was discussed in the above-mentioned meeting at AIT, Bangkok. ASEAN's haze task force had been set up since 1995 when smaller fires had then started creating problems. The task force started focused work after the major 1997 haze episode, which impacted human health in three countries. A Regional Haze Action Plan was prepared which prescribed concrete measures to be taken at the regional and national levels in order to prevent, monitor and mitigate the impact of the transboundary haze. National haze action plans had also been developed to complement the regional action plan. It is on the basis of these plans that ASEAN and the concerned member-states have taken action on the haze problem.

Subsequently in 2002, the ASEAN states negotiated a legal instrument called the 'ASEAN Agreement on Transboundary Haze Pollution'. The Agreement gives a legal basis for the on-going activities of the Regional Haze Action Plan.

2.4 DECISION OF THE SACEP GOVERNING COUNCIL

The draft Declaration on air pollution in South Asia, finalised in the aforementioned policy dialogue, was placed before the Governing Council of SACEP in April 1998. The timing was good for some consensus on tackling the likely effects of transboundary air pollution in South Asia. Not only were the countries of South Asia perturbed about the growing air pollution problems in their own countries; the countries also expressed increasing concern on atmospheric issues borne from their recent participations in global negotiations on climate change. Nearer their own area, they had witnessed the concern caused in the ASEAN region by the haze resulting from forest fires. Despite their anxieties about potential capping of their air pollution emissions affecting their economic growth, the countries of South Asia wished to look at local and regional air pollution as separate phenomena demanding their attention. Therefore, the Environment Ministers presented in the meeting of the Governing Council of SACEP considered it was appropriate to give their seals of approval to the Malé Declaration on Control and Prevention of Air Pollution and Its Likely Transboundary Effects for South Asia. ■

CHAPTER III

MALE' DECLARATION

MALÉ DECLARATION

ON CONTROL AND PREVENTION OF AIR POLLUTION
AND ITS LIKELY TRANSBOUNDARY EFFECTS FOR SOUTH ASIA
Past, Present, and Future

3.1 THRUST OF THE DECLARATION

The text of the Malé Declaration is presented in Annex II. The thrust of the Declaration is on the need to study air pollution phenomena, monitor air pollution and its transport, study its impacts and build national level capacities to monitor and analyse data.

3.2 SIGNIFICANCE OF THE DECLARATION

Stimulus for prudent scientific study and capacity building were the key elements of the Declaration which was **the first regional agreement of its kind not only in South Asia but also in the developing world.** The agreement also provided a basis for improving national reporting systems and to continue the process in stages with mutual consultation. Such steps would therefore enable the countries to draw up and implement national and regional action plans and protocols to abate air pollution, based on a fuller understanding of transboundary air pollution issues. There was thus recognition of the scientific uncertainties associated with the process of transboundary air pollution, which had to be studied and monitored in depth. Such requisite understanding of the phenomenon based on the creation of technical capacity where it did not previously exist, together with recognition of the precautionary principle encouraging timely actions to develop and/or adopt “strategies to prevent and minimise air pollution.”

A major outcome of the Declaration was the increased focus given to domestic air pollution (outdoor and indoor) in the member countries. The commissioning of baseline studies, to be dealt with in the next chapter, was a significant stimulus to this process.

The clause covering institutional strengthening for policy and technical requirements at national level and promotion of the involvement of regional, and international bilateral and multilateral agencies was a strategic step that has resulted in greater cooperation not only between the countries but also amongst expert institutions in the region and outside, such as Sida, UNEP, AIT and among others. Iran also later joined as the eighth Malé Declaration country. ■

CHAPTER IV

IMPLEMENTATION

4.1 PHASE I

Network and organisation

The implementation of the Malé Declaration was envisaged to be in phases, keeping in mind the Declaration's objectives, content and thrust. Phase I started with the establishment of a network of organisations to implement the Declaration. In the countries that adopted the Malé Declaration, National Focal Points (NFPs) were identified. And for the detailed follow-up, National Implementing Agencies (NIAs) were identified. In most countries, the NFP was within the Government itself, in the Secretariat dealing with Environment, while NIAs were either pollution control authorities or agencies dealing with implementation of environmental regulation. A list of NFPs and NIAs is given in Annex III.

The first intergovernmental meeting for the Declaration held in February 1999 had adopted the Phase I Implementation Plan. The countries agreed to prepare the baseline studies and also action plans reflecting national priorities to meet the Declaration's objectives.

Under the guidance of the NFPs, the NIAs, in association with experts and institutions undertook the production of baseline studies in the first year, compiling information on air quality monitoring and management in each country.

Baseline Studies

The air quality baseline studies were based on data collected from different agencies in the countries relating to the structure, modalities, regulations, institutions and capacities available, to address the problems of local air pollution. Such information were similarly relevant to transboundary air pollution. Gaps were also identified in air pollution monitoring systems. The capacity to set up the instrumentation was deemed a necessary requisite for the collection and analysis of data.

The baseline studies revealed a spectrum of initiatives and gaps in each country's knowledge and capacity. Some countries had an established national air quality and meteorological network. Most had a regulatory framework in place, prescribing standards for emissions and ambient air quality. Some had the institutional capacity to measure and control air pollution at the national level while others were in the process of setting it up. Interestingly, the studies became a compendia of each country's state of air pollution and the status of preventive and control measures for tackling it. In many cases the Malé process itself resulted in improvements on existing measures and new initiatives were taken to tackle local air pollution contributing to reductions in transboundary air pollution.

Action Plans and Dissemination to Stakeholders

The baseline studies led to the formulation of National Action Plans by NFPs and NIAs,

indicating requirements in terms of monitoring equipment and capacity building for the measurement and analysis of air quality data. The priority issues were also established. In the second inter-governmental meeting, held in March 2000, the Phase I outputs in terms of the studies as well as the national and sub-regional plans were reviewed and adopted.

The second inter-governmental meeting also agreed that national and sub-regional stakeholders' meetings would be held to disseminate the results of the Malé Declaration's implementation. The NIAs were to be guided in the implementation by stakeholders drawn from various sectors such as academia, civil society, industry, youth groups, etc. The first such workshop was held in the Maldives during the month of April 2000.

Monitoring Committee

An important decision of the second network meeting was that a mechanism to monitor transboundary air pollution and build capacity was essential. For this purpose, the creation of a Monitoring Committee (MoC) comprising experts on air pollution was recommended by the second session of the inter-governmental meeting. Such a committee came into place with three experts experienced in measurement, monitoring and analysis of both air pollution and meteorological data.

The MoC has the backing of the science staff from UNEP RRC.AP and SEI in their work. The MoC was mandated to study the national needs related to monitoring and capacity-building and recommend a plan for filling the existing gaps in the monitoring system.

By June 2001, before the conclusion of Phase I, the MoC prepared a strategy paper for the Phase II implementation. The paper included the strategic criteria for selecting monitoring sites in remote areas near the borders, measuring both dry and wet deposition. The MoC also prepared the outline for a technical manual to assist in training and capacity building. This manual was based on the Acid Deposition and Monitoring Network in East Asia (EANET) manual.

4.2 PHASE II

The implementation plan for Phase II was to put in place expertise, equipment and information for quantitative measurement and monitoring, analysis and policy recommendations for eventual prevention/control of air pollution.

The third session of the inter-governmental meeting was held during June 2001 in Colombo, Sri Lanka, and reviewed the strategy for Phase II with NIAs. The session also adopted the outline of the technical manual for training and requested the MoC to develop a full-fledged manual on the basis of the agreed outline. It was also agreed to start the training programmes for building capacity and to set up monitoring stations in remote areas

MALÉ DECLARATION

ON CONTROL AND PREVENTION OF AIR POLLUTION
AND ITS LIKELY TRANSBOUNDARY EFFECTS FOR SOUTH ASIA
Past, Present, and Future

identified by the MoC in consultation with the countries. As such, the first regional training programme was conducted at UNEP RRC.AP in May 2002. Benchmark criteria for the location of monitoring stations were drawn up. These details were discussed in the fourth session of the intergovernmental meeting held at Kathmandu in July 2002.

The first transboundary air pollution monitoring station under the Malé Declaration was set up in Nepal (Rampur, Chitwan district) in March 2003, along with a training programme. During 2003, monitoring stations were set up in all the countries. In Bhutan the monitoring station was located in Gelephu, in Sri Lanka at Dutuwera and at Hanimaadhu in Maldives, in Bangladesh at Shatkira district, in India at Canning Town of South Parganas District, West Bengal, in Iran at Chamsari of Ilam Province, and in Pakistan, at Bahawalnagar in the Punjab Province.

The second regional training workshop was held in India in August 2003, run by the Central Pollution Control Board (CPCB-NIA). This was soon followed by the fifth session of the inter-governmental network meetings at Dhaka, Bangladesh in October 2003. Country presentations on setting-up the monitoring stations, advisory committees, stakeholders' meetings, listing of pollutants measured, training programmes and capacity building efforts were made. This was followed by presentations of SEI on parallel activities on emission inventories compilation and air pollution modeling. An important development in this network meeting was the development of a vision for Phase III which would comprise: continued monitoring beyond Phase II and set-up of additional monitoring stations; introduction of ozone monitoring; training and refresher courses; analysis and impact studies including emission inventories and mitigation options.

The first regional stakeholders' meeting was held after this meeting. The stage was set to enter into the Declaration's Phase III implementation through in-country training programmes throughout the period from 2003 to 2004 and the continued setting-up of monitoring stations.

4.3 PHASE III

In March 2004, a workshop on rapid urban assessment, health impacts and corrosion was held at New Delhi, India, under the Regional Air Pollution in Developing Countries (RAPIDC) Programme, with technical inputs from SEI and IVL, Sweden. The member countries of the Malé Declaration participated and discussed various subjects including air pollution in the context of the Malé Declaration, impacts on health, epidemiological studies, corrosion studies among others. This paralleled the efforts under the Malé Declaration process, whilst also feeding into it.

The sixth session of the inter-governmental network meeting was held in Teheran, Iran in October 2004. First, a review of Phase II implementation was made. It was noted that all the countries showed their commitment to the long-term objectives of the Malé Declaration through their initiatives to set-up the air quality monitoring stations. Also, the institutional structure was developed and local capacities in monitoring local and transboundary air pollution had been increased. Phase II had also helped in developing a common methodology, to train technical staff, strengthen monitoring stations and establish scientific and stakeholder networks.

The meeting also adopted the plan of implementation for Phase III. The general objective of Phase III was to continue to promote the scientific base for prevention and control of transboundary air pollution in South Asia, and to encourage and facilitate coordinated interventions of all the stakeholders on transboundary air pollution at the national and regional level. It was also agreed that the focus of Phase III would include: (i) strengthening regional cooperation and Stakeholders' participation under the Malé Declaration; (ii) strengthening capacity building programmes initiated during Phase II; (iii) enhancing the analytical and impact assessment capabilities at the national level through integration of findings from the monitoring stations, local pollution prevention studies and conducted impact assessment studies; (iv) providing decision-support information for prevention; and (v) raising awareness for action through targeted information dissemination.

The seventh session of the inter-governmental meeting was held in New Delhi, India, on 13 October 2005. Countries made a presentation of their plans for Phase III which will be implemented from the end of November 2005 to August 2008. The progress after the sixth session of the inter-governmental meeting was reviewed along with the data report. The data reports from the air samplers and air concentration analysis graphs for sulphur dioxide and nitrogen oxide were presented by all countries. The graphs showed the trends for varying periods between 2003 and 2004. It was agreed that more information flow from all countries for continuous periods would be required to draw conclusions. Meanwhile, capacity building would continue and an initiation of information flows for policy and impact studies would be made during Phase III. ■

CHAPTER V

THE WAY FORWARD

5.1 DATA ANALYSIS

Phase III is nearing its end and data generated by the monitoring stations are being analysed by the countries. It is expected that the technical capacities for air quality monitoring established in each country with the support of UNEP, SEI, IVL and Sida will lead to meaningful conclusions on the state of transboundary air pollution in South Asia. The establishment of trends in air pollution is usually reliable within five to seven years of continuous monitoring.

5.2 KNOWLEDGE NETWORK TO COMBAT LOCAL AIR POLLUTION

In the meantime, the countries of South Asia will continue to address the problem of local air pollution (both indoor and outdoor), which if prevented and/or controlled can help mitigate transboundary air pollution. Countries already well-equipped to study, prevent and control air pollution, as well as others on the way, can benefit from the exchange of information and ideas through a knowledge network. Such a network can transmit information on various pollutants, measuring devices and methodologies, such as development of standards, regulatory mechanisms, fiscal incentives and disincentives to reduce air pollution and to employ the use of cleaner technologies, both in respect of renewable and non renewable fuels. In UNEP's Collaborative Assessment Network (CAN) meeting in November 2005 in Bangkok, a knowledge network has been agreed upon, which will be a very good vehicle for the Malé Declaration countries to partner with in order to access relevant information and knowledge.

5.3 IMPACTS ON HEALTH, CROPS, SOILS AND MATERIALS

There is a need for more studies on the impacts on both human and animal health, soils, crops and materials, due to air pollution. Results of available studies have to be translated into action plans for mitigation and prevention. Priority issues to be tackled include childhood asthma caused by air pollution and changes in pH levels in soils and water bodies.

5.4 AWARENESS

Greater awareness among those affected by air pollution and other relevant stakeholders is a prime requisite at this stage not only to push through measures, regulatory and otherwise to prevent and control air pollution, but also to reduce the impacts mentioned above. Raising awareness will have to be a combined effort of the scientific community, policy-makers, Governments, NGOs, doctors, industrialists, farmers, students, audio visual and print media and the general public.

5.5 ADOPTION OF PREVENTIVE (OR ALTERNATE CLEANER) TECHNOLOGIES

Many pollution preventive technologies are now available in South Asian countries, some of them based on indigenous efforts. Solar, wind, water, and others are already in-use and have to be multiplied with a view to move towards a phase-out of fossil fuels. Bio-fuels are also a promising area, depending on the resource endowments of the country and competing uses for the land required to grow such fuels. In the interim stage when fossil fuels have to be used, better and optimal combustion technologies which minimise emissions both at source and end-of-the-pipe are a must. The adoption of these technologies will depend not only on regulation and policy measures but also on trend-setting by both producers and consumers. Recycling of waste, and non-motorised transport is not uncommon in South Asia, whose population have traditionally practiced a simple lifestyle with further efforts required to build upon this ethos by disseminating knowledge of more modern but cleaner and cost-effective technologies.

5.6 PROTOCOLS ON TRANSBOUNDARY AIR POLLUTION

Earlier, the European experience where studies of air pollution's impacts on natural resources such as water and soils led to the evolution of protocols in the European Union, was discussed. The efforts in ASEAN to tackle the haze problem, which is a subset of air pollution, were also noted. As the results of the studies on air pollution occurrences and their impacts continue to flow-into the realm of knowledge and science, the time may come for South Asian countries to reflect on the need for soft laws of a sub-regional character to take the Malé Declaration a few notches higher up to aptly respond. It would be wise for the stakeholders and policy makers as well as civil society to start debating these issues from now on in this populous region of the world which has much to suffer and even more to offer! ■

ANNEX I

AIR POLLUTION REQUIRES A FOCUS ON PREVENTION

UNEP Sasakawa Environment Prize was celebrated in Beijing, China during 28 – 30 September 2004. UNEP Regional Director, Mr. Surendra Shrestha presented a thematic paper on air pollution at this ceremony. His presentation is presented here.

I. BACKGROUND

The United Nations Conference on Environment and Development (UNCED), the Rio Summit, held in June 1992 articulated the Agenda 21, a blueprint for action for sustainable development. The World Summit on Sustainable Development (WSSD), held in September 2002 focused on the implementation of this blue print through partnerships to achieve tangible results for sustainable development. The Summit, participated by 104 Heads of State and Government, also set sustainable development as the target for national governments. Society, economy and environment are considered the three pillars of sustainable development.

Social Development: World population has more than doubled over the last half century, from 2.5 billion in 1950 to 6.5 in 2004. It is projected that the population will stabilise at 9 billion in the next 50 years. During the past half century, life expectancy has increased throughout the world with advances in public health, vaccines, antibiotics, and food production. There is, however, disparity in these advances and poverty remains the major challenge for the 21st Century. 2.5 billion to 3 billion people now live on less than \$2 a day. Approximately 1 billion people in Asia live in extreme poverty on less than US\$1 a day, which is around 2/3 of the world's poor. The poor are the most vulnerable to environmental changes. For example, between 2 and 3 times as many disaster events were reported in the United States in 1999 as in India or Bangladesh but there were 14 times and 34 times more deaths in India and in Bangladesh than in the United States, respectively.

Economic Development: The global economic output has grown from just under \$7 trillion (in 2001 dollars) of goods and services in 1950 to \$46 trillion in 2000, a gain of nearly sevenfold. Average income per person worldwide nearly tripled during the period from 1950 to 2000, and the same time the population doubled. The global economy is expected to grow at 3.1 percent during the next 15 years. Asia will be the engine of growth with an average growth rate of 6 percent during the next 15 years.

Environment: World primary energy consumption increased by 2.9 percent in 2003. The demand for primary energy is expected to double every 28 years; in Asia, demand doubles every 12 years. The demand for energy has increased the pressure on the environment; land, air, water and biodiversity.

II. CURRENT SITUATION

The steep development trajectory followed since the industrial revolution has resulted in the release of air pollutants into the atmosphere at a rate beyond nature's capacity

to absorb. For example, atmospheric CO₂ levels rose from an estimated 280 ppm at the beginning of the industrial era in 1760 to 373 ppm in 2002. The concentration of CO₂ has increased by 1.3 ppm per year since 1960. Approximately 28.2 billion tons of CO₂ are being released into the atmosphere annually. Based on the average absorption rate of a U.S. commercial forest, around 9.6 billion hectares of forest is required for sequestering the CO₂ annually released. This is 2.5 times the current forest area which is around 3.8 billion hectares. It is estimated that annual SO₂ emission, another major air pollutant, in Asia alone will reach 80 million tons by 2010 or 110 million tons by 2020. UNEP's Global Environment Outlook report shows that of the 15 cities in the world with the highest levels of particulate matter, 12 are located in Asia. Six of these cities also have the highest levels of SO₂.

The late 1990s and early 21st century have been marked by increasingly "extreme" weather and climate-related events. Millions of lives around the world are adversely affected by climate-related environmental crises each year. Natural disasters cost the world over \$60 billion in 2003 up from around \$55 billion the year before. Poor air quality in urban areas is related to approximately 0.5 million deaths each year in Asia and contributes to the plight of millions who suffer from asthma, chronic lung and cardiovascular diseases, and lung cancer. India is spending over \$100 billion every year on treatment of diseases caused by air pollution. Cost of air pollution in China is estimated at 7 percent of GDP. These costs are estimated to rise to 13 percent of GDP by 2020. According to the Asian Development Bank (ADB) air pollution is costing Indonesia US\$400 million a year and this could increase tenfold by 2010 in the absence of pollution controls.

Temperature rise caused by global warming has accelerated the natural process of glacier melting to a great extent. For example, with the temperature rising by 10°C, the Alpine glaciers have shrunk by 40 per cent in area and by more than 50 per cent in volume since 1850. In Africa, mapping of Mount Kilimanjaro between 1912 to 2000 shows that its snow cover has shrunk by 82 per cent. It is predicted that by 2015 it will have no snow cover. A recent study by the United Nations Environment Programme (UNEP) and International Center for Integrated Mountain Development (ICIMOD) shows that the Himalayan glaciers are retreating up to 30 meter per annum. Himalayan glaciers are extremely sensitive to global warming. Scientific discoveries within the last decade have revealed that long-range transport of gases and particles in air has lead to widely distributed haze layers. Initial impact studies shows that the haze layers will have significant impacts on human health, on crop yield and the water budget, through changes to the seasonal monsoon pattern.

Urbanisation is another issue coupled with air pollution. In 2000, 47 percent of the world population lived in urban areas and the number is expected to increase to about 60 percent by 2030. The urban transition, coupled with economic growth, will further stimulate the knowledge based economy. The urban sector will receive massive investments over the

next 50 years, especially on motorisation and infrastructure, which will determine resource and energy consumption patterns for decades.

III. FUTURE CHALLENGES

Legal measures: Since air pollution issues are transboundary in nature, legal frameworks through intergovernmental cooperation could provide effective means of addressing air pollution issues. In Europe, the UNECE Convention on Long-Range Transboundary Air Pollution (LRTAP) was established to address transboundary air pollution, particularly the threat from 'acid rain'. The Convention is recognised as one of the earliest and most effective examples of international collaboration on environmental problems. The most recent example is the 2002 Agreement on Transboundary Haze Pollution of the Association of Southeast Asian Nations (ASEAN), which entered into force in November 2003. The agreement, signed by the 10 member countries of ASEAN, is the first such regional agreement in Asia that binds a group of contiguous states to tackle transboundary haze pollution resulting from land and forest fires. The agreement also has the provision to include other air pollutants in the future.

At the national level, legal measures have been successful in phasing out use of leaded petrol in many countries, the use of polluting two-stroke three-wheelers (e.g. Thailand and Nepal) and shifting public transport to natural gas (New Delhi).

Technical measures: A strong focus on prevention is advocated in addressing the mega-issue of air pollution. Intergovernmental initiatives should also be supported by provision of technical measures that national governments could incorporate within their development process. Wind energy generation capacity has increased six fold from 4,800 megawatts in 1995 to 31,100 megawatts by the end of 2002. The advancements in fuel cell technology is setting the stage for the evolution of the hydrogen based economy. The fuel cell is more efficient than an internal combustion engine and it is clean, emitting only water vapour. In 2002, Iceland decided to move from fossil fuels to hydrogen by converting its public transport to the hydrogen fuel.

Hybrid cars are commercially available. Toyota alone expects to sell 130,000 Prius hybrids in 2004 which gives double the mileage of a comparable gasoline car and reduces emissions of CO₂ by 50% and CO, HC and NO_x by 90% below Japanese standards. China and India have announced large investments in hydrogen and fuel cell vehicles.

Fiscal measures: one of the major challenges in tackling air pollution issues is the incorporation of cleaner technologies into the development process at an early stage. It could be achieved by making cleaner technologies financially affordable using fiscal measures. The Thai Government, for example, restructured the vehicle tax system in August 2004 to promote energy saving. According to the new system, a 10 percent duty will be reserved for hybrid, electric-powered, and fuel cell vehicles, well under the 30 percent or higher rates generally levied on passenger sedans.

IV. CONCLUSIONS

The World's gross domestic product (GDP) will increase fourfold in the next 50 years. The Asian economy is projected to grow two times the world average. Rising income levels, middle class and urbanisation coupled with globalisation will have a growing impact on the level of motorisation and infrastructure developments in Asia. This will have significant impacts on energy use and pollution load into the atmosphere. Unless action (example: a major shift towards renewable) is taken now, the planet will face unpredictable challenges that will increase in intensity over the coming decades.

The linkages and interactions between atmospheric and other environmental issues are complicated. Under the framework of existing regional initiatives, scientific capacities need to be developed to provide a quantitative base on which to base policy decisions in an integrated manner, on a regular basis, at the regional level. Legal, financial and technical interventions can be made from the solid scientific base.

Prevention aspects need to be advocated and incorporated as part of economic and social activities with a focus on the ecosystem and changes in the life style. This should lead to a major shift from a high-consumption society to a sustainable society. Awareness for action among political leadership is the key to integration of social, economic and environmental goals.

A circular economy is being promoted in China, especially in Guiyang City which is a participating city under the China Council for International Cooperation on Environmental Development (CCICED). Guiyang had very severe acid rain in the past and ranked as the most polluted city in the world. After 10 years of efforts, the situation has substantially improved. Japan promotes the concept of 3Rs (Reduce, Reuse and Recycle). The Group of Eight (G8) industrialised countries will launch the 3Rs Initiative to encourage more efficient use of resources and materials. The initiative will be formally launched in 2005 at a ministerial meeting in Japan. These are good examples of sustainable development paths. UNEP has taken a lead role in developing a global ten-year framework of programmes on sustainable consumption and production - one of the key outcomes of the WSSD (World Summit on Sustainable Development). ■

ANNEX II

MALÉ DECLARATION ON CONTROL AND PREVENTION OF AIR POLLUTION AND ITS LIKELY TRANSBOUNDARY EFFECTS FOR SOUTH ASIA

Recognising 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

Recognising 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 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 the 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 III

LIST OF NATIONAL FOCAL POINTS (NFP) AND NATIONAL IMPLEMENTING AGENCIES (NIA) OF MALÉ DECLARATION

Country	National Focal Point(NFP)	National Implementation Agency (NIA)
Bangladesh	Ministry of Environment and Forest, Room# 1309 Building 3 Building #6 Bangladesh Secretariat, Dhaka , Bangladesh	Department of Environment, Ministry of Environment and Forest, E/16 Agargaon, Sher-e-Bangla Nagar,Dhaka-1207, Bangladesh.
Bhutan	National Environment Commission, P.O. Box 466, Thimphu, Bhutan	National Environment Commission, P.O. Box 466, Thimphu, Bhutan
India	Ministry of Environment and Forests, Paryavaran Bhavan, CGO Complex, Lodi Road, New Delhi, 110003, India	Central Pollution Control Board (CPCB), Ministry of Environment & Forests, Parivesh Bhawan, East Arjun Nagar, Delhi 110032, India
Iran	Department of the Environment, Environmental Research Centre, Pardisan Nature Park, Shahid Hemat Highway, Tehran-Iran, Islamic Republic of Iran	Department of the Environment, Environmental Research Centre, Pardisan Nature Park, Shahid Hemat Highway, Tehran-Iran, Islamic Republic of Iran
Maldives	Ministry of Environment, Energy and Water, Huravee Building, Malé Maldives	Department of Meteorology, Orchid Magu, Malé, Maldives
Nepal	Ministry of Environment Science and Technology, Singh Durbar, Kathmandu, Nepal	International Centre for Intergrated Mountain Development (ICIMOD) P.O. Box 3226, Kathmandu, Nepal
Pakistan	Ministry of Environment, 5/F, Shaheed-I- Millat Secretariat Islamabad, Pakistan	Pakistan Environment Protection Agency, House #311, Main Margala road, Sector F-11/3, Islamabad 44000 Pakistan
Sri Lanka	Ministry of Environment and Natural Resources, Sampathpaya, No. 82, Rajamalwatta Road, Battaramulla, Sri Lanka	Central Environmental Authority, 104, Robert Gunawardana, Mawatha Battaramulla, Sri Lanka

