

The Eighth Session  
of the Intergovernmental Network Meeting  
of the Malé Declaration on Control and Prevention of Air Pollution and Its Likely Transboundary  
Effects for South Asia; 13 September 2006

## **Report on the Progress of Malé Declaration after the Seventh Session of the Intergovernmental Meeting (IG7)**

### **I. INTRODUCTION**

1. This report is prepared to review the progress of Malé Declaration activities after the Seventh Session of the Intergovernmental Meeting (IG7) held in New Delhi, India on 12 October 2005.

2. The report reviews the progress with a focus on each of the 6 objectives of the Phase III implementation of the Malé Declaration:

1. strengthen the regional cooperation and stakeholders participation under the Malé Declaration;
2. strengthen the capacity building programmes initiated during Phase II;
3. enhance the capacity of NIAs on emission inventory development and Integrated Assessment Modeling
4. to enhance the analytical and impact assessment capability at the national level through integration of findings from local pollution studies and conducting assessment studies;
5. provide decision support information for policy formulation and air pollution prevention ; and
6. raise awareness for action through targeted dissemination

### **II. STRENGTHEN THE REGIONAL COOPERATION AND STAKEHOLDER'S PARTICIPATION UNDER THE MALÉ DECLARATION**

#### **II-1 Intergovernmental meeting, stakeholders meeting cum coordination meeting**

3. The Seventh Session of the Intergovernmental Meeting was organized together with the Second Session of the Regional Stakeholder meeting and the first regional coordination meeting in NRC-Delhi, India during 11-15 October 2005. The meeting was inaugurated by the Chief Guest Shri Namo Narain Meena, Honourable Minister of State for Environment and Forest, India. In his inaugural address, he stressed the importance of the generation of air quality data including continuous measurements and real time dissemination to stakeholders. He said that through the Malé Declaration Programme, the participating countries have initiated the process of understanding issues arising from transboundary air pollution.

4. Major conclusions included: the process initiated by this first coordination meeting under the Malé Declaration needs to be continued; other initiatives on air pollution such as

CAI-Asia need to be encouraged to participate in this regional forum; apart from the regional coordination, coordination of ongoing activities within countries should also be encouraged. National Advisory Committees and National Stakeholders Meetings under the Malé Declaration could provide the forum for the coordination of national level activities; sharing of newsletters among the participating initiatives needs to be encouraged. The recommendation and suggestion from regional coordination meeting and regional stakeholder meeting are extremely valuable for the policy makers since it indicates the need of the region

5. The Secretariat compiled the proceedings of the meetings and distributed them through the internet. ([www.rrcap.unep.org/md/Maléreport/](http://www.rrcap.unep.org/md/Maléreport/))

## II-2 Evaluation

6. The Sixth Session of the Intergovernmental Meeting on Malé Declaration requested the Secretariat to conduct a review of the implementation process. The Secretariat engaged Mr. Rajamani, regional facilitator of Malé Declaration to conduct the review process. The objective of the review is to provide recommendations on how to improve future implementation of Malé Declaration with a particular attention to the following modalities with a focus on increasing the ownership in the region:

- Capacity-building at the national level
- Organizational structure
- Financial sustainability

7. The review process has been completed by the regional facilitator and the review report will be submitted to the Eighth Session of the Intergovernmental Meeting.

## III. STRENGTHEN THE CAPACITY BUILDING PROGRAMMES INITIATED DURING PHASE II

### III-1 National training programmes

8. A one-week hands-on training program on monitoring transboundary air pollution was organized together with the Pakistan Environmental Protection Agencies (Pak-EPA) in Islamabad, Pakistan during 6-10 December 2005. The technical training included basic theory on air pollution and related issues, followed by lectures and hands-on exercises on sampling and analysis of transboundary air pollutants using the equipments provided under the Malé Declaration. Four technical personnel from the Department of Meteorology and eight technical personnel from Pak-EPA were trained on sampling and analysis of air pollutants. The practical training was held in laboratory at Pak-EPA office. The trainees showed much enthusiasm and the test paper as well as the evaluation showed the training had been successful.

9. A training programme on Atomic Absorption Spectrophotometer (AAS) was held in Bangladesh on 26 – 27 February 2006 at Department of Environment, Khulna divisional

laboratory in Khulna, Bangladesh. The training was attended by nine participants from DoE. It was followed by the installation of AAS at the Kulna divisional laboratory.

### III-2 Regional training in programme

10. The Fourth regional training on monitoring transboundary air pollution was held at United Nation Environment Programme Regional Resource Center for Asia and Pacific (UNEP RRC-AP), Pathumthani, Thailand during 13 – 16 March 2006. The major objective of the training was to introduce the Quality Control and Quality Assurance (QA/QC) programme; and to discuss the issues encountered in operating the monitoring sites in each country. The training program was attended by laboratory technicians and the project managers who are in charge of the Malé Declaration monitoring stations in participating countries as well as the members of Monitoring Committee (MoC), SEI, IVL, UNEP RRC.AP and AIT as a reference laboratory. Two laboratory sessions on the morning of 15-16 March were conducted at AIT EE laboratory.

11. During the laboratory sessions participants were grouped into three groups and they analysed blind samples for each of the parameters shown in Table 1. Results from each of the group were presented at the end of the program and each of the data points were discussed for possible errors and improvements. The results were also interpreted and each of the groups was evaluated for their performance.

**Table 1: Results of analysis**

Parameter	Reference	Group-1	Group-2	Group-3
Total Hardness (mg/L as CaCO <sub>3</sub> )	100.00	94.00	92.00	94.00
Ca Hardness (mg/L as CaCO <sub>3</sub> )	72.00	67.00	64.00	76.00
Ca Hardness (mg/L as Ca <sup>++</sup> )	28.80	26.80	25.60	30.40
Mg Hardness (mg/L as CaCO <sub>3</sub> )	28.00	27.00	28.00	18.00
Mg Hardness (mg/L as Mg <sup>++</sup> )	6.80	6.80	6.80	4.37
Sulfate (mg/L)	19.00*	18.61	18.00	17.81

12. The regional training program and in-country training programmes are all part of capacity building development which strengthens the monitoring capacity and network based on the common methodologies and standards at the national level. The regional training programme gives the participating countries an opportunity to exchange the experience in developing national monitoring stations and foster a sense of ownership.

### III-3 Central compilation, evaluation, and storage of data

13. The participating countries have submitted their data and related information obtained through the monitoring activities in 2005/06 to the Secretariat. After the quality check by the Monitoring Committee, the data were added to the regional data base. The Secretariat prepared a preliminary draft “Data report” for the discussions at the refresher training

programme held in March 2006. The preliminary draft data report was revised based on the comments at the refresher training and additional data from the participating countries were added to the database after the refresher training . The status of the monitoring activities in the Malé Declaration is summarized in Table 2.

**Table 2: Monitoring data report**

Parameter	Bangladesh	Bhutan	India	Iran	Maldives	Nepal	Pakistan	Sri Lanka
TSP	no	yes	Yes(13 month)	Yes (9 month)	No	Yes (2 times, 2003 & 2005)	No – installation pending	No
PM <sub>10</sub>	no	No	Yes	Yes (9 month)	No	Yes (2 times, 2003 & 2005)	No	No
SO <sub>2</sub> , NO <sub>2</sub> with passive sampler	Yes (19 months)	Yes ( 15 months)	Yes (12 months)	Yes (4 months)	Yes (10 months)	Yes (19 months)	Yes (12 months)	Yes (29 months)
SO <sub>2</sub> , NO <sub>2</sub> with active method	no	Yes (1 month)	Yes	Yes (9 month)	No	Yes (2 times, 2003 & 2005)	No	No
pH (rain water)	Yes (4 months)	Yes (9 months)	No	Yes (6 months)	No	No	No	Yes
pH (Surface water)			Yes					
EC	Yes (2 months)	Yes (9 months)	no	Yes (6 months)	No	No	No	Yes

14. The Secretariat compiled the data report 2006 for the submission to the Eighth Session of the Intergovernmental Network Meetings. The regional database is available online for the NIAs at: [www.rrcap.unep.org/md/](http://www.rrcap.unep.org/md/).

#### IV. ENHANCE THE CAPACITY OF NIAs ON EMISSION INVENTORY DEVELOPMENT AND INTEGRATED ASSESSMENT MODELING

##### IV-1 Training workshop

15. A training workshop on emission inventory preparation, scenarios generation, and atmospheric transport modeling, and integrated information and assessment modeling (IIAM) was conducted in 3 - 8 July 2006 at UNEP RRCAP, Asian Institute of Technology (AIT), Bangkok, Thailand.

16. The training workshop was aimed at capacity building in eight Malé Declaration countries for studying air pollution issues, especially transboundary transport of air pollutants, their potential impacts, and consequently enabling them to design science-based, integrated policy options to mitigate the adverse effects of air pollution. Thus, the workshop was designed to provide a technical hands-on training to the participants from Malé Declaration countries on compilation of emissions inventories of major regional air pollutants, generation and analysis of various scenarios, atmospheric transport/transfer/deposition modeling, and design of integrated approach to abate impact of air pollutants, in particular those species that lead to acidification.

17. Major outcomes of the workshop include:

- The Malé Declaration air pollutant emissions inventory manual (draft) accompanied by a workbook (Excel) for compilation of activity data and computation of emissions of major air pollutants;
- Input for the development of a comprehensive manual for the development of emission scenarios for air pollution prevention and control in South Asia, and Policy options for air pollution prevention and control in South Asia;
- Introduction of MATCH model for atmospheric transport/transformation and deposition, and HYSPLIT model for air mass trajectory computation;
- An integrated information and assessment model (IIAM) and Users' Manual; and
- Trained personnel from all the participating countries on emission inventory and integrated assessment model.

18. The Secretariat compiled the proceedings of the workshop and distributed through internet. ([www.rrcap.unep.org/md/Maléreport/](http://www.rrcap.unep.org/md/Maléreport/))

#### IV-2 Email Forum

19. The participants of the workshop held on 3-8 July 2006 requested an electronic discussion forum to facilitate the technical discussions on emission inventory, scenario, and modeling. The Secretariat has established an email discussion forum. Participants can send their technical concerns to the following email, which will automatically be distributed to all participants: [MD\\_IAS@rrcap.unep.org](mailto:MD_IAS@rrcap.unep.org) .

20. This forum is dedicated to providing timely solutions for the technical issues faced by the Malé Declaration expert network on IIAM, emission inventory, scenario, and modeling. Members of the Malé Declaration network are encouraged to email to this discussion forum frequently and raise their technical issues or provide prompt answers to the issues raised by others in the network.

#### V. ENHANCE THE ANALYTICAL AND IMPACT ASSESSMENT CAPABILITY AT THE NATIONAL LEVEL

21. Secretariat contacted the NIAs for identification of expert institutions and initialization of capacity building activities on 4 specific areas:

- Develop urban integrated assessment capacities,
- Strengthen knowledge on human health impact assessment,
- Strengthen knowledge on crops impact assessment,
- Strengthen knowledge on corrosion impact assessment, and

22. Terms of Reference for each of the impact assessment programmes have been developed (given in the Annex 1). All the countries expressed interests to participate in the impact assessment studies. Due to the limitation in the financial resources, it has been recommended to conduct case studies in selected countries. Methodologies and results of the case studies will be disseminated through regional level training programmes and all countries will be involved in training activities wherever possible.

23. After the consultation with the NIAs, the following case studies are chosen for the implementation:

- Case study on urban integrated assessment in Nepal;
- Case study on human health impact in Bangladesh;
- Case studies in crop impact in Bhutan, India, Iran, Pakistan and Sri Lanka;
- Case studies in corrosion impact India, Iran, Nepal and Sri Lanka.

## VI. PROVIDE DECISION SUPPORT INFORMATION FOR POLICY FORMULATION AND AIR POLLUTION PREVENTION

24. Decision support information focuses on two major areas:

- Promote case studies in practical options to reduce air pollution;
- Study good practices for local, national and regional level legal and financial measures and provide options tailored for each country.

### VI-1 Case studies

25. An eco-village demonstration project ('Damniyangama' eco-village) has been completed in Sri Lanka. The eco-village, funded by several donor agencies as part of tsunami reconstruction and constructed by Sarvodaya (a local large peoples movement in Sri Lanka), was ceremonially opened by His Excellency Mahinda Rajapaksa, the President of Sri Lanka, in March 2006. It is one of the six such demonstration sites currently being supported by UNEP. The "Damniyangama" eco-village provides a model for village developments not only in Sri Lanka but also in the region.

### VI-2 Good practices

26. Initial discussion has taken place with the NIAs on mitigation and areas for coordination. The following steps are considered for implementation: (i) identify the areas for pollution control and abatement in each of the participating countries; (ii) collate success stories (for pollution control and abatement); (iii) dissemination of success stories in the participating countries. Detailed ToRs are being formulated to compile good practices for local, national and regional level legal and financial measures and provide options tailored for each country.

## VII. RAISE AWARENESS FOR ACTION THROUGH TARGETED DISSEMINATION

### VII-1 Publication

27. The Sixth Session of the Intergovernmental Meeting of the Malé Declaration requested the preparation of a publication focusing on the past, present, and future of Malé Declaration. The Secretariat with input from the regional facilitator has completed the first draft of the publication for the discussion and possible adoption by the Seventh Session of the Intergovernmental Meeting.

### VII-2 Newsletter

28. The Malé Declaration network newsletter was launched in 2002 to disseminate Malé Declaration related information to the public and stakeholders. The content of the newsletter has largely been reports on the network's activities. One issue of the newsletter has been published during the reporting period to date: Vol. 4; Number 1; April 2006.

### VII-3 Information sharing

29. The Secretariat updated the Malé Declaration website by posting relevant information on Malé Declaration activities, such as training programmes, meeting documents, and the newsletter. Relevant scientific and technical information was disseminated among the participating countries, as well as other countries, relevant organizations, and individuals.

### VII-3 Networking with youths

30. Established link with South Asia Youth Environment Network (SAYEN). Representative from SAYEN will participate the stakeholders meeting as the first time in September 2006. SAYEN will be involved in the dissemination of air pollution related information in South Asia.

## **Annex 1**

### **TOR for crop impact activities**

#### **I. Introduction**

1. The aim of this activity is to develop capacity within all NIAs of the Malé Declaration countries to assess the risk caused to agricultural crops from air pollution. The risk assessments will be performed using standardized bio-monitoring techniques (i.e. exposing either sensitive or chemically protected plants to ambient air pollution concentrations). These standardised experimental protocols will be applied across south Asia, indicating regions where both the risks from air pollution impact and the magnitude of the impacts (e.g. yield losses) are expected to be high. The information generated can potentially be used in conjunction with the Malé Declaration Integrated Assessment Model activity to inform regional policy to target emission control and agricultural policy.

2. Training workshops will be held for personnel designated by NIAs to undertake the bio-monitoring experiments, based upon the protocols developed in the first year of Phase III. Two protocols will be applied i) for clover-clone bio-monitoring which will assess impacts to resistant and sensitive cultivars and ii) for chemical protectant studies which will assess yield losses to a key agricultural crop of the region. The resulting information will provide evidence of real effects from air pollutants to crops and how yield losses vary across the south Asian region. These results will be incorporated with provisional modelling and mapping risk assessments and interpreted in relation to national socio-economic information to drive appropriate policy formulation.

#### **II. Qualifications of nominated institutions**

3. Ideally the institute chosen would have experience of working with plants, access to plant growth facilities and access to a suitable “field site”. This site should be large enough to house 50 to 100 plant pots, be secure from animal invasion, and have access to a water supply.

#### **III. Scope of the work**

- The NIAs will be required to appoint a suitable institute and one suitable person who will be given sufficient time and assistance to attend the training workshops and complete the bio-monitoring activities.
  
- Ideally, the people chosen would be educated to university degree level (or equivalent), have experience in the biological sciences (i.e. be comfortable establishing a small experimental field site, growing up plants from seed and cuttings, using and applying chemicals, harvesting, drying and weighing plant material) and be computer literate with experience of using Excel spreadsheet software.



- There will be a number of sites where the two types of crop studies may be undertaken. For countries where the studies are not undertaken, suitable people will be able to attend the training courses.

#### **IV. Technical assistance**

4. Two workshops will be held during Phase III at which 1 person from each bio-monitoring team will be trained, by technical advisers from SEI, in performing the bio-monitoring studies using standardised protocols. The individuals undergoing training should be the same people who will actually perform the bio-monitoring. The workshops will be held in South Asia and southern Africa coinciding with other Malé Declaration meetings where possible.

## **TOR to develop urban rapid integrated assessment capability**

### **I. Introduction**

1. The aim of this activity is to develop capacity within the Malé Declaration countries for the quantification of emissions and pollutant concentrations and link this to health effects through comparison of population exposure to outdoor air pollution, and the geographic delineation of this exposure, and comparison to dose-response relationships. This work will be based on the development of a spatially distributed emission inventory using relatively rapid techniques tested in phase II.

2. The urban rapid integrated assessment methods were trialled in Hyderabad in Phase II and are now ready for implementation in Phase III of the Malé Declaration. It is the intention that the methods will be applied in at least one city of the Malé region. Institutions from each country need to be nominated for training in the methods.

### **II. Qualifications of required institutions**

3. There will be training and an institution which would have the capability for leading such a study would need to be involved. The methods will be applied in Kathmandu city in the region. The city needs to have a population of about 2 million people or less. The city authorities would need to be enthusiastic for the study and have facilities for GIS and manipulation of satellite imagery or links with such an institution.

### **III. Scope of the work**

4. Under the guidance of the NIA the selected institution(s) will carry out the following tasks:

- Receive training in the Rapid Urban Assessment methods. Preferably, personnel and institutions are required that can use GIS and manipulate satellite images and personnel are also required to undertake the top-down emission inventory, monitoring campaign, modelling.

### **IV. Technical assistance**

5. Two workshops will be held during Phase III at which 1-2 people from country will be trained, by technical advisers from IVL and SEI. The individuals undergoing training should be the same people who will actually work on the project.

6. At the first workshop in Year 1 practitioners from all countries will receive training in the methods such that they have a clear understanding of the data and skill requirements for successful implementation of the methods. At a second workshop in Year 1 the most likely candidate cities will be invited and the implementation plan for year 2 discussed. The application of the methods will be undertaken for the city in Year 2-3. In the final year all nominated institutions will be able to review the application in one city in the region.

## **TOR to strengthen knowledge of impacts on health**

### **I. Introduction**

1. The aim of this activity is to develop capacity within NIAs of the Malé Declaration countries to assess the impacts of air pollutants such as particulate matter and ozone on human health. Training will be provided in the assessment of impacts of air pollution on health, and wider societal impacts, using concentration data and dose-response relationships.

2. The study will develop a network of health professionals (medical practitioners, epidemiologists or other appropriate personnel as nominated by NIAs). Through this network the different available methods for health impact assessment will be discussed at workshops and applied, thus learning by doing. This will include collecting pollution monitoring and population data for cities in the respective countries and bringing these data to a workshop on methods and application where the data will be used to show how the methods may be applied. Furthermore, economic and social assessments of health impacts are more frequently being made in South Asia, but again there are questions as to the applicability of the methods used. This will also be examined and discussed at the training workshop.

### **II. Qualifications of nominated institutions**

3. The NIAs will be required to appoint an institution that will participate in training. These should be medical or health institutions with an interest, and preferably experience, in air pollution and health.

### **III. Scope of the work**

4. Under the guidance of the NIA the selected institution(s) will carry out the following tasks:

- Attend training workshops, collect results of studies undertaken in their country, participate in discussions of methods for health impact assessment from city (or cities) to the training workshops to be used in the learning-by-doing method application.

### **IV. Technical assistance**

5. Workshops will be conducted and the project closely monitored by the technical advisors. The workshops will be held in S. Asian countries coinciding with other Malé Declaration meetings where possible.

## **TOR for corrosion impact studies**

### **I. Introduction**

1. The aim of this activity is to develop capacity within Malé Declaration countries to assess the impact of air pollutants on materials and objects of cultural heritage.
2. *Assessment of corrosion rates at sites using exposure of standard samples* – an exposure rack with standard materials will be set up a suitable site, ideally close to a place where environmental variables are measured.

### **II. Qualifications of nominated institutions**

3. NIAs need to nominate an institute that ideally has experience of corrosion related work or at least the potential to conduct the required studies.

### **III. Scope of the work**

4. Ideally, the personnel chosen for training would be educated to university degree level (or equivalent), have experience in the chemistry related sciences (i.e. be comfortable establishing a small experimental field site and working in a chemical laboratory) and be computer literate with experience of using Excel spreadsheet software.

### **IV. Technical assistance**

5. Workshops will be held during Phase III at which nominate personnel from Malé counties will be trained, by technical advisers from the Swedish Corrosion Institute (SCI). SCI will also supervise the establishment of all new corrosion exposure sites. The individuals undergoing training should be the same people who will actually work on the project. The workshops will coincide with other Malé Declaration meetings where possible.