

## **Report of the sixth Regional Training Programme and Refresher Course under the Malé Declaration held at AIT Conference Center, Thailand during 25 to 28 March 2008**

### **Background**

The common objective of regional refresher training program are to strengthen the monitoring network based on the common methodologies and standards at the national level and to exchange the experience on developing national monitoring stations. Quality Assurance and Quality Control (QA/QC) is crucial in ensuring the quality of the monitoring programme and has been identified as a priority area. As part of the capacity building in QA/QC, five regional level training programme's have been held so far. In these programme's, participants from the countries are trained in the correct procedures for lab analysis and QA/QC checks. This is the sixth Regional Training Programme and Refresher Course which was held at AIT Conference Center, Thailand, during 25-28 March 2008. The agenda is enclosed as Annexure 1.

### **Participants**

Thirteen participants from six countries attended the training programme. They were drawn from the national implementation agencies and national focal point supporting the monitoring programme under the Malé Declaration. The resource persons are from SEI, IVL, NUS, UNEP RRC.AP, and AIT. The list of participants and resource persons is given as Annexure 2.

### **Opening Section**

The opening session was facilitated by Mr. Mylvakanam Iyngararasan, Head, Early Warning, UNEP RRC.AP. After a round of self introduction, Mr. Iyngararasan made an introductory presentation on the atmospheric issue, status of the implementation of the Malé Declaration with an overview of the monitoring programme, impact assessment, and awareness on air pollution and plan on IV. The objective of the refresher course was also explained. The presentation is enclosed as Annexure 3.

### **Report of Country monitoring programme**

After the opening session, the representative from Bangladesh, Iran, Nepal, Pakistan, Maldives and Sri Lanka presented the status of implementation of Male' Declaration in their country. Following are some of the points highlighted during their presentation.

Bangladesh: Electricity supply to the site at Shyamnagar, district of Satkhira is under construction and High volume sampler will be installed after the electricity arrives to the site. Bangladesh NIA is also working to establish the second Monitoring Station, which site selection is under process. The detail of the presentation is enclosed as Annexure 4a.

Iran: The status of monitoring at Ilam station, Chamsary region in Dehloran township, near to the Iran-Iraq border was presented briefly. High Volum Sampler is put in the roof of the station. The analysis of HVS shows that in Summer and winter, the level of Particulate Matter is high. The problem of equipment and the monitoring sampling faces at the monitoring site were also mentioned. The detail of the presentation is enclosed as Annexure 4b.

Maldives: The brief situation of the monitoring site at Hanimaadhu, co-located with the ABC site was presented together with the data collected from the site. Recently the decrease in pH was observed in the data analysis report and the need to study on the trend of pH was mentioned. Therefore, pH monitoring network is establishing. NIA is in the process of cooperation with Health Ministry and outside international agency (MISU) to use their laboratory facilities to analyze the data. The presentation is enclosed as Annexure 4c.

Pakistan: The brief situation on the monitoring site at Bahawalnagar was presented with the scale diagram and photos. The industries around the monitoring stations are also mentioned. It was mentioned that the data from monitoring site are not reported accordingly due to coordination between the departments. It was also mentioned that the rain water analysis was not able to perform properly due to the new laboratory instruments are under commissioning at Pak-EPA office. But the problem has been solved recently and will get the data regularly. The presentation is enclosed as Annexure 4d.

Sri Lanka: The brief situation on the monitoring site at Dutuwewa was presented with the data collected and analytical method used during analysis of the data. The detail of the presentation is enclosed as Annexure 4e.

### **Introduction on soil acidification**

This is the first training workshop on soil acidification under Male' Declaration and six participants join the workshop from Bangladesh, Iran, Nepal, Pakistan and Sri Lanka. The introduction on potential risk of acidification in South Asia was presented to all the participants including regional training participants by Dr. Kevin Hicks, Stockholm Environment Institute (SEI). The detail of the presentation is enclosed as Annexure 5.

### **Fine Particulate Matter and Method for PM<sub>2.5</sub> measurement**

Dr. Nguyen Thi Kim Oanh, Asian Institute of Technology, Thailand, made a presentation on Particulate Matter (PM) with ambient level, composition and source apportionment study in Asia, Europe and North America. Detailed presentation is given in Annexure 6. Highlight of the presentation was on PM and their effect and the study done so far including analysis done in AIT laboratory with the data collected from the monitoring site inside AIT campus. The modeling on PM analysis was also presented.

S. K. Gupta, Managing Director from Envirotech Instruments Pvt. Ltd, India made a brief presentation on suitable method for PM2.5 measurement in Ambient Air with the effect on health from particulates Matters. It was mentioned and noted that the US EPA standard for the new primary PM2.5 standards for 24-hour average, set at 65 µg/m<sup>3</sup> was changed to 35 µg/m<sup>3</sup> for the protection against the PM-related health effects found in community studies. Suggestions on the two suitable equipments were introduced. One is E-BAM, online monitor based on beta gauge technique and the other one is BGI PQ200-Manual Sampler. The presentation is enclosed as Annexure 7.

### **QA/QC and Monitoring programme**

Development of Integrated Information Assessment System (IIAS) on Male' Declaration was presented on how to use and its function by Ms. Pwint Phyu Aung from UNEP RRC.AP. The main purpose of this IIAS system is for the NIAs to quantify the deposition and impacts of regional air pollutants within South Asia, both now and in the future. This will enable informed regional planning for the prevention and control of transboundary air pollutant emissions. The heart of the IAM is the atmospheric transport model. The model currently being used is MATCH (Mesoscale Atmospheric Chemistry model). This presentation was followed by presentation on "Monitoring and modeling of the data" using IIAS system by Ms. Karin's presentation prepared by Dr. Hicks. The aim are to introduce the concept of atmospheric transport and integrated assessment models and what they can be used for; to analyse the Malé monitoring results compare with modelled values to date and highlight the usefulness of such comparisons; to introduce the use of trajectory analysis and to demonstrate the importance of site selection and impact studies. The detail presentation is enclosed as Annexure 8.

Status of data reporting from each monitoring site and the equipment provided are presented by UNEP RRC.AP with the correction on the data for Monitoring committee (MoC). This was followed by discussion on the reporting format which needed suggestion from participants for their comments. The detail of the presentation is enclosed as Annexure 9. After the presentation the bilateral discussion with each participant on data report from each country was continued. Overall there is a significant improvement in the data that is being submitted to Secretariat. A list of country specific follow up action was discussed and mentioned in table below:

Table: Country Specific Follow Up

Country	<ul style="list-style-type: none"> <li>• Follow up action</li> </ul>
Bangladesh	<ul style="list-style-type: none"> <li>• Follow up on completion of steady power supply</li> </ul>
Iran	<ul style="list-style-type: none"> <li>• Detail of New monitoring site</li> <li>• Site audit and installation of met station</li> <li>• Spare part for Iran station               <ul style="list-style-type: none"> <li>- Battery and door for Wet Only Collector</li> <li>- Funnel for Bulk Collectors</li> </ul> </li> </ul>
Maldives	<ul style="list-style-type: none"> <li>• Installation of HVS in Male'</li> </ul>

Nepal	<ul style="list-style-type: none"> <li>• Larger distillation unit</li> </ul>
Pakistan	<ul style="list-style-type: none"> <li>• Automatic Distillation Unit for Ammonia (NH<sub>3</sub>-N) automatic distillation unit for ammonium ion (NH<sub>4</sub>-N) in rain water along with 300ml test tubes+test tubes stand(one piece if possible)</li> <li>• papers (whatmann) for high volume air sampler (PM10)</li> </ul>
Sri Lanka	<ul style="list-style-type: none"> <li>• Installation of New monitoring site and move old site report</li> <li>• Installation of Met station</li> <li>• Follow up on steady power supply</li> <li>• Request for Passive sampler / bulk collector Parallel analysis</li> </ul>

QA QC on monitoring and data analysis was presented by Ms. Karin Sjöberg from IVL. The presentation included the potential QA/QC activities during sampling and data analysis and various issues faced by the countries in operating the monitoring stations and mistake on the data report. The detail of the presentation is enclosed as Annexure 9.

Result analysis of the site audit performed in Bangladesh, Bhutan, Maldives, Nepal and Sri Lanka was presented. The details of the reports are also available for each country. The detail of the presentation is enclosed as Annexure 10.

Suggestion on revised of Male' Declaration wet and dry deposition monitoring manual was presented for participant comments.

### **Inter-Laboratory Comparison**

The result from “inter-laboratory comparison” programme was presented by Dr. Kim Oanh which was follow by discussion on the problem, difficulty face by both central lab and NIA during the analysis period. There was suggest from participant to use high detection limit for next attempt on inter laboratory comparison due to the method available in the national lab. (Low concentration should prepare above deduction limit). Iron exchange materials need to provide in case of Bangladesh. The detail of the result and out come from the progamme is mentioned in attached Annexure 11.

### **Passive Sampler inter-comparison**

Dr.Rajasekhar Bala, National University of Singapore, presented the Passive Sampler Inter-comparison study for the Malé Declaration, to compare the performance of different designs of Passive Samplers. He gave a brief introduction about Passive Samplers, theory of sampling, sampling and analysis, result on the programme. It was concluded that all three type of passive samplers could be used for NO<sub>2</sub> and SO<sub>2</sub> in the outdoor environment under urban pollution conditions. Larger variation particularly for SO<sub>2</sub> between the samplers of different types and also within the samplers of the same type is possibly due to analytical uncertainties; the difference in the sampling efficiency based on different coating solutions. These three samplers will continue to expose at Singapore during dry season for another analysis. The detail of the presentation is attached as Annexure 12.

## Laboratory Section

The lab practice sessions on rainwater sample analysis were initiated and the practice was done at the Environmental Engineering and Management Research Lab in AIT. The participants were guided, supervised and helped by the lab personnel led by Ms. Salaya Phunsiri. A brief explanation of the steps to be followed was explained (Annexure 13) before the practice and the participants were divided into groups according to the country and analysed same blind samples. The results of the groups were presented with reference sample as mentioned in table 1:

Table1: Result of analysis

Parameter	Group 1 Bangladesh	Group 2 Iran	Group 3 Nepal	Group 4 Sri Lanka	Group 5 Maldives	Group 6 Pakistan	Group 7 Bangladesh	Ref
pH	10.03	9.99	9.99	9.99	10	9.98	9.99	10
K+ ( $\mu\text{mol/l}$ )	33.36	34.36	34.15	33.48	32.279	36.67	35.43	32.75
Na+ ( $\mu\text{mol/l}$ )	142.08	142.61	142.91	140.82	139.65	152.85	137.52	143.30
Mg <sup>2+</sup> ( $\mu\text{mol/l}$ )	24.29	24.17	24.67	24.93	24.469	27.46	24.33	24.51
Ca <sup>2+</sup> ( $\mu\text{mol/l}$ )	24.29	26.25	28.31	28.10	25.32	25.12	24.25	25.09
NH <sub>4</sub> <sup>-</sup> ( $\mu\text{mol/l}$ )	3360	3344.4	4300.00	3406.66	11.1	4110	3313.33	3453.33
Cl <sup>-</sup> ( $\mu\text{mol/l}$ )	1395.76	1379.78	1295.37	1360	148.89	1346.69	1565.1	1374.08
SO <sub>4</sub> <sup>2-</sup> ( $\mu\text{mol/l}$ )	46.7	31	47.91	47.81	83.811	46.67	39.04	47.09

## Training Workshop Experience and Evaluation

There was active involvement of the participants in the workshop and emphasis was given to QA/QC on practicing the concepts of sample analysis and the monitoring activities. On the last day of the workshop, an evaluation form was filled in by the participants. The summary of the responses is given in below table.

Summary of the final program evaluation on Male' Declaration Training and Refresher Course

Question	Not at all	A little	somewhat	mostly	Completely
Overall objectives and content					
1. Were the objectives clear and precise				53%	47%
2. Were the objectives attained?		7%	7%	73%	13%
3. Was the content linked to the objectives?			7%	60%	40%
4. Was the content well structured?			13%	67%	20%
5. Was the content presented clearly?			7%	67%	27%
Methodology					
6. Was the methodology used appropriate for the training program and you as a professional?			20%	53%	27%
7. Did the methodology help you to share your own knowledge and experience?				60%	40%
<b>Logistics</b>					
8. Was the meeting venue adequate?		7%	13%	20%	53%
9. Was the timing of the agenda comfortable?	7%		13%	40%	33%
10. Was the length of the sessions appropriate?	13%	7%	7%	47%	20%
	Excellent	Good	Average	Unsatisfactory	Poor
11. Overall, how would you rate the training? Please circle one.	40%	60%			