

The Seventh Senior Technical Managers' Meeting
of the Acid Deposition Monitoring Network
in East Asia
1-3 August 2006, Yangon, Myanmar

REPORT OF THE MEETING

I. Introduction

1. The Seventh Senior Technical Managers' (STM7) Meeting of the Acid Deposition Monitoring Network in East Asia (EANET) was held in Yangon, Myanmar on 1–3 August 2006. The Acid Deposition and Oxidant Research Center (ADORC) as the Network Center (NC) for EANET organized this meeting in collaboration with United Nations Environment Programme Regional Resource Centre for Asia and the Pacific (UNEP RRC.AP) serving as the Secretariat for EANET, and in cooperation with Department of Meteorology and Hydrology (DMH), the Ministry of Transport of Myanmar.
2. The Meeting was attended by the senior technical managers from thirteen participating countries, namely, Cambodia, China, Indonesia, Japan, Lao P.D.R, Malaysia, Mongolia, Myanmar, Philippines, Republic of Korea, Russia, Thailand and Viet Nam, who are responsible for technical issues on EANET activities in each country.
3. The Meeting was also attended by experts from the Chemical Coordinating Center (CCC) of the Co-operative Programme for Monitoring and Evaluation of the Long Range Transmission of Air Pollutants in Europe (EMEP), from Japanese university and Japanese institute as resource persons. Representatives of host country government and researchers from relevant offices of Myanmar were invited as observers.
4. The list of participants is attached as Annex.

II. Opening of the Meeting (Agenda Item 1)

5. During the Opening Ceremony His Excellency Col. Nyan Tun Aung, Deputy Minister for Transport, Myanmar delivered his inaugural address.
6. On behalf of the Secretariat of EANET Ms. Adelaida Roman, Programme Officer delivered the opening address.
7. Dr. Hiromasa Ueda, Director General of ADORC, presented the introduction of the meeting objectives and organization.

III. Election of the officers (Agenda Item 2)

8. Ms. Wong Fook Lian from Malaysia, Mr. Tun Lwin from Myanmar and Ms. Leonita D. Baetiong from the Philippines were elected as Co-chairpersons of the Meeting.

IV. Adoption of the agenda (Agenda Item 3)

9. The Meeting adopted the agenda as proposed by NC.

V. Review of the recent EANET activities of since STM6 (Agenda Item 4)

10. NC presented a brief report on the scientific and technical activities of EANET since the Sixth STM Meeting (STM6). The progress and important achievements of EANET including capacity building activities, joint research projects with the participating countries and public awareness activities were observed. Regarding hemispheric transport and transboundary air pollution issues the current situation with the trends of primary energy consumption, emissions of SO₂ and NO_x in East Asia and cooperation with the Task Force on Hemispheric Transport of Air Pollution (TF HTAP) of the Convention on Long-Range Transboundary Air Pollution (CLRTAP) were introduced.
11. NC introduced the overview of the questionnaire survey on the national training activities in the participating countries in 2005 including the contents of the training.
12. The Secretariat made a presentation on the Outcomes of the Seventh Session of Intergovernmental Meeting (IG7) held in Niigata, Japan on 21-22 November 2005 and the Third Session of the Working Group on Future Development (WGFD) of EANET held in Pathumthani, Thailand on 17-18 May 2006. The summary of the major decisions at the IG7 were highlighted including adoption of the Decision 1/IG.7 (Niigata Decision); launching of the Report for Policy Makers (RPM); endorsement of the general framework of the Five-Year Medium Term Plan (MTP) for EANET; adoption of the Guidelines on Administration and Financial Management for the Secretariat and the Network Center; and adoption of the Work Program and Budget in 2006 for EANET. Similarly, the outcomes of WGFD3 were emphasized which include, among others: the proposal for the new Terms of Reference (TOR) of WGFD (2007-2008); Components of the Instrument to Provide a Sound Basis for Contribution to EANET (preliminary draft) need to be prepared for discussion at the next session of the WGFD; discussion on the Revised Draft MTP and Relevant Budget Information for Its Implementation; discussion on the Review of the RRC.AP/AIT system and establishment of a trust fund for EANET as well as on the Revision of Procedures and Guidelines for Contribution to EANET.

13. NC made a presentation on revisions of the draft Five-Year Medium Term Plan (MTP) for EANET done after STM6. The process of revision by WGFD after consideration at IG7 was explained with introduction of comments and suggestions by participating countries. Major clarifications and suggestions were as follows:

- The MTP is prepared for the purpose of the whole activities of EANET to be implemented under cooperation among the participating countries, their National Focal Points (NFPs) and National Centers, and EANET bodies including the Secretariat, NC, SAC and IG.
- Responding to suggestion to inform STM7 participants on the comments from participating countries on revised MTP, NC distributed supporting document EANET/WGFD S2/5/3 on comments and revision of MTP after WGFD3.
- Activities on the improvement of monitoring network described in MTP were discussed in particular on increasing monitoring sites. A design plan on the development of monitoring network was proposed to be prepared by the Scientific Advisory Committee (SAC) and NC under the coordination with the participating countries and their national centers.

14. The progress on preparation of the Periodic Report on the State of Acid Deposition in East Asia (PRSAD) was presented by NC. The outcomes of the Second Meeting of the Drafting Committee (DC) for PRSAD were introduced as well as status of the draft report and relevant follow-up activities. Major clarifications were as follows:

- All participating countries prepared their national assessments which should be included in Part II of PRSAD and NC will make formatting and editing them in accordance with recommendation of DC and lead authors.
- The revised draft of PRSAD will be discussed at the Third Scientific Workshop on Evaluation of on the State of Acid Deposition in East Asia (SWS3) in September 2006 and SAC6 in October 2006 after circulation among NFPs, SAC members and other relevant experts as well as external reviewers.

VI. Overview of the EANET activities of the participating countries presented by the Network Center and the participating countries (Agenda Item 5)

15. NC presented an overview of national monitoring plans in the participating countries based on updated/confirmed plans after SAC5. Information on new sites of Myanmar and Thailand on wet/dry deposition and three monitoring sites on inland aquatic environment were included. NC distributed CD with the latest information on the national monitoring plans of the participating countries.

- Japanese expert expressed his good impression with regards to increasing of the EANET monitoring sites and importance of quality assurance for the appropriateness of wet deposition data. It was suggested that site criteria described in the Technical Manual should be followed for establishing representative monitoring sites. The new edition of WMO Manual on Precipitation Chemistry is also recommended to be used as reference for selection of monitoring sites.

16. The participating countries made presentations on the EANET monitoring activities in their countries. Major discussions on this topic included the following:

i. Cambodia

- NC asked the possibility to start other items of monitoring, such as dry deposition, soil and vegetation, and inland aquatic environment. It was clarified that their implementation would be expanded step by step after installation of ion chromatographs (IC).
- It was commented that all the mandatory parameters of wet deposition monitoring should be analyzed after the installation of IC.
- NC informed that Technical mission would be dispatched after installation of IC.

ii. China

- The national procedures of the data approval and submission were explained. The data of 2005 had not been received by NC due to delay of the procedures and technical problem on Internet communication; however this will be submitted to NC very soon.
- It was clarified that quality of the wet deposition data of Zhuhai has already been checked by the National Center and laboratory in charge of analysis after the discussion at the Second Drafting Committee meeting in April 2006, and no problem was found. (The possible natural effect was proposed on pH of precipitation in coastal area).
- The data of NO and NO_x (by automatic monitor) in 2005 would be also submitted to NC soon for inclusion in annual Data Report.
- NC requested to start Filter pack sampling as soon as possible after the equipment is installed.

iii. Indonesia

- NC expressed that capacity building activities will be continued this year with dispatching the technical mission for this purpose (in particular, for soil and vegetation monitoring).
- NC clarified that the disseminated estimation on extension of EANET monitoring sites to be proposed for MTP was prepared just as schematic option for brainstorming discussions in the participating countries.

iv. Japan

- The number of QA/QC activities of national monitoring network was introduced by the national center including implementation of the inter-laboratory comparison project once a year, site audit once two years and data checking in cooperation with the verification groups.
- No special clear guideline for site/laboratory audit was prepared up to now, however the use of Technical Manual and check lists are applied for these procedures.
- National survey is conducted in 19 forest areas of soil and vegetation monitoring and two of which are used as EANET sites.
- It was introduced that acidification phenomena have been observed through national long-term surveys in EANET monitoring site Lake Ijira, and intensive studies are carried out in this catchment area from 2005 to 2007. Another long-term trend of pH decreasing was disclosed in

river waters in Nagano Prefecture, Japan. Needs of investigation on the phenomena, mechanisms and solutions were discussed.

v. Lao P.D.R.

- It was clarified that wet deposition monitoring was carried out at interim urban site, and the appropriate monitoring site would be selected for permanent operation.
- It was clarified that Lao P.D.R was ready to implement dry deposition monitoring if the equipment for Filter Pack method was installed.
- The progress on receiving IC supplied by the saving money of the Secretariat was updated with information on its transportation through Bangkok.
- NC was requested to support with the parts of wet-only sampler.
- It was commented that all the mandatory parameters of wet deposition monitoring should be analyzed after the installation of IC.

vi. Malaysia

- The future plan to include analysis of MSA was discussed with reference to the previous studies by CSIRO (Australia).
- The data of wet and dry deposition monitoring in Danum Valley site for 2005 were not ready to send to NC due to some problems and this will be submitted by national center soon.
- The accreditation of ISO17025 for monitoring/analysis procedures was explained. It is important for national organizations in charge of environmental analysis to improve QA/QC activities through implementation of this standard.

vii. Mongolia

- Data on soil/vegetation survey of 2005 in Bogdkhan Mountain were analyzed and they will be submitted to NC after STM7.
- The frequency of filter-pack sampling at remote site was changed to biweekly due to the difficulty of consumable supply and equipment maintenance.
- The application of analysis of bicarbonates for wet deposition samples was mentioned using of the titration, and ion balance (R_1 criteria) becomes better.
- Certain technical difficulties and problems were pointed out in the presentation because of insufficient supply system for consumables and spare parts in Mongolia. The better communication of the national center with NC was suggested to inform as soon as possible on technical problems, necessities, data exchange and other matters.

viii. Myanmar

- The quality control of pH measurements was clarified with calibration procedure of pH meter for every measurement of samples. Precipitation samples were collected on rain-event basis.
- National expert representing Forest Department introduced their experience on forest health investigations. Although monitoring activities are initiated by DMH as the National Center of EANET, DMH expressed its willingness to coordinate among national organizations.

- Based on the request of Myanmar, the Secretariat will plan to support the holding of National Workshop on Public Awareness on acid deposition in the near future upon the approval of IG.
- NC was requested to install new wet-only sampler in near future.
- DMH informed the Meeting that there are some national budgets allocated for the up-grading of the laboratory in DMH in this fiscal year.

ix. Philippines

- The improvement of QA/QC was due to strict compliance to documented Standard Operating Procedures (SOPs), such as calibration of equipment, using quality control samples (working standards or reference materials) as well as an active participation in inter-laboratory comparison projects. It was pointed out that use of quality control samples can determine performance of equipment, quality of chemicals, reagents, and distilled water, and performance of laboratory analysts.
- Proposal to prepare document on experiences how to improve QA/QC shall be included in the section of Chapter on QA/QC activities in PRSAD to share this information among the participating countries.
- NC was requested to support for the installation of wet sampler at new monitoring site, St. Tomas.

x. Republic of Korea

- It was clarified that regular measurements were carried out at all atmospheric monitoring sites in accordance with national monitoring plan of 2005.

xi. Russia

- The peculiarities of interannual and seasonal variations of SO₂ in air of Baikal region were discussed based on summarized monitoring results with using meteorological analysis of data. The influence of cold 2005 winter climatic anomalies on increasing level of average SO₂ concentrations was supposed as well as the relation with long-range transportation of air pollutants on the hemispheric scale.

xii. Thailand

- It was clarified that the monitoring of wet and dry deposition at Khanchanaburi had been carried out by using a mobile unit. Because of limited availability of the mobile unit, there has been a few monitoring data in a year at this site.

xiii. Viet Nam

- The suggestion was expressed on possible effects on measurements by activities in site surround in Hanoi and Hoa Binh.
- The proposed national monitoring plan is still under expectation to be approved by government. The 6 monitoring sites were planned for national EANET monitoring including those in middle and southern parts of Viet Nam.

- It was clarified that studies on emission inventory and modeling were proposed for ADORC to be conducted jointly as one of activities of ADORC; and correspondent proposal has been submitted to research fund of a Japanese private company.

xiv. Others

- During the discussion, some participating countries expressed special interest on opportunity to evaluate transboundary pollution and long-range effects by volcano eruption and Atmospheric Brown Clouds in Asia (ABC-Asia).

VII. Consideration of a preliminary draft data report on the acid deposition monitoring in 2005 (Agenda Item 6)

17. NC presented a preliminary draft Data Report on the Acid Deposition in the East Asian Region 2005. It was informed that Cambodia and China did not submit the data on EANET monitoring in 2005. Major explanation and discussions on this topic included the following:

i. Wet deposition monitoring data

- The data of Cambodia and China will be included in the revised report, and the data from Republic of Korea will be added in summary tables later.
- NC clarified the equation for calculation of organic acid concentrations. The inclusion of two other organic acids for further revision of the formulas was proposed by participating country to use their on-going analysis data for improvement of R_1 and R_2 .
- It was suggested that brief descriptions of analytical procedures, such as type of instruments, and pH of eluent for ion chromatography, should be provided for organic ion analysis.
- It was clarified that IC equipment was used for analysis in Viet Nam instead of spectrophotometry since 2002.
- NC requested participants to confirm the data and the information of the preliminary draft data report.

ii. Dry deposition (air concentration) monitoring data

- Contents of dry deposition monitoring in the Data Report 2005 was introduced; and participating countries requested to re-confirm submitted data before SAC6 in October 2006.
- The data of China and Republic of Korea will be included in the revised report.
- NC presented preliminary analysis of air concentration monitoring with the purpose to clarify and verify the data of Data Report 2005. Being useful as the first step in analysis of general chemical composition of aerosols, the consideration of balance between anions and cations in aerosol-extract solution should be done carefully due to difference with precipitation chemistry. However, QA/QC methodology and procedures for the analysis of filter pack samples should be established with corresponding QA/QC criteria including possibilities to check extracted solutions taking aerosol chemistry into account.

iii. Soil and vegetation monitoring data

- The effect of air pollution on tree decline at Russian forest monitoring site was supposed by national experts. It was pointed out that causes of tree decline need to be investigated more carefully with corresponding data on air pollution and acid deposition.
- During the discussion on possible effect of forest characteristics on monitoring data it was pointed out that information on site conditions and land use, such as management of man-made forest, should be recorded for accurate evaluation of the data. However, reserved forest areas should be selected for long-term observation, such as national parks and experimental forests.

iv. Inland aquatic environment monitoring data

- The data of two new sites, namely Komarovka River (Russia) and Ambulalakao Lake (Philippines) were submitted in 2005.
- The values of EC and Alkalinity from a new site Ambulalakao Lake in Philippines were detected as very low, and questions on lake properties and possible impacts on aquatic environment were raised. It was clarified that it is a natural lake with very clean waters being free from local pollution impacts. It was pointed out that the lake with low alkalinity might be remarkably sensitive to acid depositions and continuous monitoring might allow to evaluate their impacts. The biological indicators were mentioned as one of the possible methodologies for this purpose taking into account the experiences of other monitoring networks.

VIII. Consideration of preliminary draft reports on inter-laboratory comparison 2005 projects (Agenda Item 7)

18. NC presented preliminary draft reports on inter-laboratory comparison projects on wet deposition, dry deposition, soil, and inland aquatic environment in 2005. Major discussions on this topic are as follows:

- The data of Republic of Korea will be added in the revised draft reports.
- NC will send new samples of inter-laboratory comparison projects in November 2006.
- Participating laboratories were requested to conduct analysis as soon as possible after receiving samples and submit the results before February 28, 2007.

i. Project on wet deposition

- The percentage of flagged data did not demonstrated clear improvement in analysis of both high concentration and low concentration samples.
- The numbers of outlier results was proposed to be included into overall evaluation, and laboratories with many outlier data should be focused on to improve the quality of analysis. NC and the laboratories have already made efforts to identify the reason of the outliers and to improve accuracy including detail consideration of results during technical missions. However, corresponding improvement might be checked by investigation of outlier percentage through the whole set of project attempts.

- During the discussion on possibility to invite laboratories of other monitoring initiatives into EANET inter-laboratory comparison projects NC pointed out the difficulties to use EANET budget for this purpose. It was also clarified that the data of laboratories outside EANET could not be included in statistical analysis and would be used as reference. However, an experience of participating country on charging a fee for participating in intercomparisons was mentioned as opportunity to open EANET projects for laboratories outside EANET.
- ii. Project on dry deposition
- The first attempt for dry deposition (air concentration by filter pack method) monitoring was conducted in 2005 with participation of 19 laboratories from 9 countries. Around 75% of analytical results was within the allowable range for data quality criteria of EANET.
 - The QA/QC manager of China expressed their willingness for participation in the next 2006 project after receiving Filter Pack equipment to start dry deposition measurement in Xiamen.
- iii. Project on soil
- The inter-laboratories precisions were improved for most parameters, however, some systematic errors were supposed to be still in a few laboratories.
 - It was informed that the whole statistical analysis would be carried out again after including the data of Republic of Korea.
- iv. Project on inland aquatic environment
- Accuracy of NH_4^+ analysis was the worst among all ion constituents, and possible reasons were discussed.
 - The number of flagged data in the project 2005 was less than that of the project 2004, probably because concentrations of most ions were higher than those in the previous attempt. It was pointed out that elaboration of evaluation approaches other than trace of overall number of flagged data should be done taking into account both critical substances and concentrations in samples.
19. NC prepared updated information on principal international inter-laboratory comparison projects: WMO/GAW (QS/SAC Americas), EMEP (NILU/CCC) and ICP-Waters (NIVA). Several EANET laboratories of participating countries were involved in international projects last years. NC will continue assistance to the participating countries when they apply to the international inter-laboratory comparison projects.

IX. Consideration on improvement of the monitoring methodologies (Agenda Item 8)

20. NC presented a review of existing methods and activities on measurements of the dry deposition in order to establish the estimation method for dry deposition. The inferential method was introduced as the most suitable for a routine monitoring in EANET. Major clarifications and

discussions are as follows:

- The estimation of the dry deposition was pointed out as essential in order to evaluate the ecological impact caused by the acid deposition.
- The set of meteorological parameters necessary for flux calculations was clarified, and relevant measurements were mentioned to be used for local site area calculation; from other side to use results of meteorological model was proposed if correspondent meteorological measurements are not available.
- The effectiveness of GIS data or existing research on dry deposition estimation was clarified.
- It was recommended that the details of the estimation method in EANET should be discussed by the Task Force on Dry Deposition Monitoring.

21. Dr. Kjetil Torseth, expert from EMEP-CCC made a general overview of deposition processes and presented more specifically various approaches and techniques for assessing dry deposition fluxes. Particular focus was made on micrometeorological techniques and the recent development of the Conditional Time Average Gradient (COTAG) method as a useful low cost alternative for sites where dry deposition monitoring is wished to be conducted. The method is relatively simple and at low cost compared to traditional micrometeorological techniques. He also gave an overview of current and planned activities within Europe related to dry deposition measurements.

22. NC made a presentation on activities in line with the Strategy Paper for Future Direction of Soil and Vegetation Monitoring of EANET. Major points on this topic included the following:

- NC introduced progress on preparation of the sub-manual on forest vegetation monitoring. It was clarified that most parts of the sub-manual were developed using current methodologies and information from the Technical Manual on Soil and Vegetation Monitoring, and some new techniques for EANET, such as monitoring of lichens, would be included as informative references.

23. Dr. Tomoyuki Hakamata, expert of soil monitoring, made a presentation on application of the hierarchical soil sampling strategy to the soil monitoring described in the Technical Documents on Soil and Vegetation Monitoring in East Asia. The usefulness of the hierarchical model for evaluation of data quality on the network was demonstrated based on the assessment of soil features in the Periodic Report on the State of Acid Deposition in East Asia. It was stressed that the sampling strategy should be referred during the whole process of the soil monitoring.

X. Consideration of the research activities on acid deposition (Agenda Item 9)

24. NC introduced the on-going research activities on acid deposition being conducted as joint research projects with Mongolia on plant sensitivity to acid deposition, with Republic of Korea on aerosol monitoring, with Russia on evaluation of atmospheric environment in East Siberia and Primorsky Region, with Thailand on dry deposition flux, on gas monitoring and on catchment

analysis as well as independent research activity on catchment analysis in Niigata, Japan and the Model Inter-comparison Study (MICS-Asia). In particular the joint researches with Russia, Thailand (catchment), and Republic of Korea were presented with more details. Major discussions included the following:

- i. Joint project with Russia on evaluation of atmospheric environment in East Siberia and Primorsky Region
 - Results on wet deposition and gas/aerosol concentration determined in the first year of Phase III project were summarized. Wet deposition data were compared with information on concentration, precipitation and deposition rates from other regions.
 - The possible reasons of higher sulfur dioxide concentrations in 2005 were discussed. It was pointed out that the increase of concentration should be analyzed in relation to forest fire, climatological anomalies, meteorological conditions, and so on.
- ii. Joint project with Thailand on catchment analysis
 - The studied catchment was established in a forest area of the Sakaerat Silvicultural Research Station, and atmospheric deposition and stream water chemistry were monitored with two-week interval from October 2005.
 - Three-dimensional variation of chemical properties in the catchment soils was clarified by the intensive survey.
- iii. Joint Research Project on Aerosol Monitoring with Republic of Korea
 - It was informed that intensive measurements would be performed in the same period with LTP intensive monitoring on 12-27 October 2006.
 - Workshop on this research will be held during next NC technical mission in order to discuss the results of the intensive monitoring.

XI. Other issues (Agenda Item 10)

25. NC presented the announcement on the Research Fellowship in 2006 based on the guideline adopted by IG7 together with updated list of possible research fields proposed by NC for fellowship studies in 2006. Major explanations and clarifications were:
 - An announcement was sent to NFPs and SAC members on 4 July 2006.
 - NC asked participating country to send applications for the fellowship by the deadline, 14 August 2006.
 - Based on the request from Myanmar, NC informed of the individual training plan in 2006.
26. Dr. Kjetil Torseth, expert of EMEP-CCC, presented a general overview of the CLRTAP with focus on current EMEP activities to be relevant for EANET. They include the activities of the EMEP Task Force on Measurements and Modelling (TFMM) and of the Task Force on Intercontinental

Transport (TFHTAP). The updated information about coming events of TF HTAP presented process of the preparation an assessment report on the importance of intercontinental fluxes to be as a basis for the review of the Gothenburg protocol. He also pointed to correspondent planned workshops on projections of emissions (Beijing, October 2006) and on integrated observations (Geneva, January-February 2007). The different topics were explained during the discussion with reference to EMEP experience on development and application of Integrated Assessment models, their necessity for decision makers to identify cost-effective measures as well as needs of monitoring data for model improvement and validations. The relations of acid deposition issues with ecosystem eutrophication and climate changes were also explained with remarks on mutual benefits of relevant mitigation efforts. The importance of monitoring data from regional networks was highlighted for the support of hemispheric transport investigation, calculation of source-receptor relationships, modeling and so on.

27. Prof. Hiroshi Hara, expert of atmospheric chemistry, presented some important topics and approaches to an interpretation of wet deposition measurements including explanation of acid-base chemistry and its application to data analysis. A case study on mechanism and seasonal variation of precipitation chemistry in Irkutsk and Chongqing was introduced. It was demonstrated also that there are specific characteristics of precipitation chemistry based on the data of some sites in East Asia.
28. An EANET brochure with updates on current institutional status was distributed by NC among the participants.
29. NC informed that JICA had already sent the invitation letter for the JICA-HIC Training Course in October-December 2006. NC suggested facilitating the process of application as soon as possible.

XII. Wrap-up of the Meeting (Agenda Item 11)

30. The Report of the Meeting was considered and adopted.

XIII. Closing of the Meeting (Agenda Item 12)

31. All the participants expressed their gratitude and appreciation for the efforts made by the organizers and host country, particularly Department of Meteorology and Hydrology, the Ministry of Transport, Myanmar, for having arranged this important meeting.
32. The Meeting was officially closed.

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