The Twenty-eighth Session of the Intergovernmental Meeting (IG28)
on the Acid Deposition Monitoring Network in East Asia (EANET)
24-26 November 2026, Niigata, Japan

Consideration of the final draft Fifth Periodic Report on the State of Atmospheric Environment in East Asia (PRSAE5)

I. INTRODUCTION

1. The Twenty-sixth Session of the Intergovernmental Meeting (IG26) agreed to initiate the preparation of the Fifth Periodic Report on the State of Acid Deposition in East Asia (PRSAD5) in 2025, with the process to be approved by Participating Countries (PCs) by email in the first quarter of 2025. After the process of the preparation of the PRSAD5 proposed by the Network Center for the EANET (NC) was reviewed and approved by PCs on 7 February 2025 by email, the Drafting Committee (DC) for the PRSAD5 has been established. The DC members are listed in Annex 1.

2. The First Meeting of the DC (DC1) was held on 24 June 2025 as a virtual meeting and discussed the format, title, contents, and lead authors and candidates of contributing authors for each chapter of PRSAD5. After the DC1, the DC members continued to discuss the title and contents of the PRSAD5 through email.

3. The Twenty-fifth Session of the Scientific Advisory Committee (SAC25) discussed the title, contents, use of monitoring data other than EANET data, use of peer reviewed scientific papers, lead authors and contributing authors, and implementation plan of the PRSAD5. The conclusions of discussions endorsed by SAC25 were endorsed by IG27. The title has been updated to the Fifth Periodic Report on the State of Atmospheric Environment in East Asia (PRSAE5). The contents of the PRSAE5 and implementation plan after IG27 are provided in Annex 2 and 3, respectively.

4. The first Lead Authors' Meeting (LAM1) second Drafting Committee/Lead Authors' Meeting (DC2/LAM2), and third Drafting Committee/Lead Authors' Meeting (DC3/LAM3) for the PRSAD5 were held in virtual form on 7 January, 9 April, and 29 July, respectively for preparation of the draft of the PRSAE5.

5. The final draft of the PRSAE5 was circulated among DC and SAC as well as NFP members from 20 September 2026. The Twenty-sixth Session of the Scientific Advisory Committee (SAC26) reviewed and adopts the PRSAE5, with modifications on a condition that the drafts are appropriately revised to address the comments from SAC members. The revised final draft of the PRSAE5 has been circulated since 3 November 2026 among SAC members for

adoption of the PRSAE5 by SAC26 and among NFP members for approval for publication of the PRSAE5 by the Twenty-eighth Session of the Intergovernmental Meeting (IG28). The revised final draft, including the additional revisions described in Annex 4, was adopted by SAC26 on November 17, 2026.

II. OUTLINE AND CONTENTS OF THE PRSAD5

6. The document will be prepared as a scientific assessment of the state of air pollution and acid deposition in East Asia based on the data accumulated from the network. Because the scope of EANET has been extended, the title was changed from "the Periodic Report on the State of Acid Deposition in East Asia (PRSAD)" to "The Periodic Report on the State of Atmospheric Environment in East Asia (PRSAE).

7. Based on the recommendation from IG27, the DC decided the format of the PRSAE5 as follows:
   - Executive Summary
   - Part I: Regional Assessment
   - Part II: National Assessment

8. It was suggested that the PRSAD5 should be prepared to focus on trend analysis and, possibly, impact assessment of acid deposition and air pollution in the region. The suggested period of monitoring data to be analyzed in the PRSAD5 is from 2020 to 2024, however the data 2000-2019 are also used for the long-term trend analysis. It was also suggested that the regional assessment report would be basically created using EANET data, and other national/international monitoring results might be used as references (not for direct analysis but for interpretation of EANET data). These suggestions were adopted at SAC25.

9. The contents of the Regional Assessment Report of the PRSAE5 were discussed at the third Drafting Committee/Lead Authors' Meeting. The contents for the final draft were updated from those reported at the Working Group Meeting in 2026 held on 4-5 August as the detailed contents were developed. The contents of the PRSAE5 were provided in Annex 2.

10. National assessment reports are prepared by each country according to a format for national assessments which was prepared by the DC with support of the NC. The EANET data and other domestic data of each country could be used for the national assessment.

III. IMPLEMENTATION PLAN

11. The implementation plan of the PRSAE5 is provided in Annex 3.

IV. ACTIONS REQUIRED

12. The IG28 is invited to review the revised final draft of the PRSAE5 and provide comments and suggestions for necessary revisions to be approved with modification for publication of the PRSAE5.

Annex 1

Drafting Committee Members of the Fifth Periodic Report

Country	Name	Affiliation
Cambodia	Mr. Chhay Por Ing	Department of Air quality noise and vibration Management, Ministry of Environment.
China	Dr. Xiaoyang Yang	Institute of Atmospheric Environment, Chinese Research Academy of Environmental Sciences
Indonesia	Ms. Nevy Rinda Nugraini	Director of Air Quality Prediction and Management, Ministry of Environment
Japan	Prof. Kazuhide Matsuda	Tokyo University of Agriculture and Technology
Lao PDR	Mr. Sitthideth Nonthaxay	Natural Resource and Environment Research Institute, Ministry of Natural Resources and Environment
Malaysia	Mr. Mohan Kumar Sammathuria	Atmospheric Sciences and Cloud Seeding Division, Malaysian Meteorological Department
Mongolia	Mr. Barkhasragchaa Baldorj	Central Laboratory of Environment and Metrology, National Agency for Meteorology and Environmental Monitoring
Myanmar	Dr. Kyu Kyu Sein	Hydrological Division, Department of Meteorology and Hydrology, Ministry of Transport and Communications
Philippines	Prof. Wilfredo M. Carandang	Institute of Renewable Natural Resources, College of Forestry and Natural Resources, University of the Philippines Los Baños
Republic of Korea	Prof. Taehyoung Lee*	Department of Environmental Science, Hankuk University of Foreign Studies
Russia	Dr. Sergey A. Gromov	Yu. A. Izrael Institute of Global Climate and Ecology, Roshydromet
Thailand	Dr. Sarawut Thepanondh	Dean of the Faculty of Public Health, Department of Sanitary Engineering, Faculty of Public Health, Mahidol University
Viet Nam	Dr. Le Ngoc Cau	Viet Nam Institute of Meteorology, Hydrology and Climate Change, Ministry of Natural Resources and Environment

*Chair

Annex 2

Contents of the Fifth Periodic Report on the State of Atmospheric Environment in East Asia (PRSAE5)

PART I: Regional Assessment

Table of Contents

List of Lead Authors and Contributing Authors to the PRSAE5 Part I

Drafting Committee Members in Scientific Advisory Committee

Foreword

Chapter 1. Introduction

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1.2 Brief introduction of the EANET

1.3 Objectives

1.4 Institutional arrangement

1.5 EANET activities in 2000-2024

1.6 References

Chapter 2. Monitoring Data Quality

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2.2 General procedures of QA/QC

2.3 Evaluation of the Inter-laboratory Comparison Projects

2.4 Evaluation of the regular measurements

2.5 Conclusion and recommendations

2.6 References

Box 1. Observational studies for sustainable monitoring in the EANET region

Chapter 3. Gas and Aerosol Concentration in East Asia

3.1 Introduction

3.2 Monitoring methodology

3.3 Particulate matter

3.4 Ozone (Surface ozone)

3.5 Other gas species

3.6 Summary and Recommendations

3.7 References

Box 2. Impacts of meteorological conditions on air pollution

Chapter 4. Wet and Dry Deposition in East Asia

4.1 Introduction

4.2 Monitoring methodology

4.3 Sulfur deposition in East Asia

4.4 Nitrogen deposition in East Asia

4.5 Precipitation chemistry in East Asia

4.6 Comprehensive discussion

4.7 Summary and recommendations

4.8 References

Box 3. Nitrogen flow and management

Chapter 5. Impacts on Ecosystems in East Asia

5.1 Introduction

5.2 Monitoring methodology

5.3 Soil chemical properties

5.4 Forest vegetation

5.5 Inland water chemistry

5.6 Catchment-scale analysis

5.7 Conclusions

5.8 References

Chapter 6. Summary and Recommendations for Future Activities

6.1 Summary

6.2 Recommendations for future activities

6.3 References

Annex. Introduction of EANET Project and related information

List of the Secretariat of the Drafting Committee for the Fifth Periodic Report

PART II: National Assessment*

Participating countries:

Cambodia,
China,
Indonesia,
Japan,
Lao PDR,
Malaysia,
Mongolia,
Myanmar,
Philippines,
Republic of Korea,
Russia,
Thailand,
Vietnam.

Chapter 1. Basic Information on National Monitoring Activities

1.1.Outline of the activities on acid deposition and air pollution in National Monitoring Plan
1.2.Monitoring program
1.3.Monitoring stations
1.4.Sampling and measurements

Chapter 2. Acid Deposition and Air Pollution in Each Participating Country and Their Environmental Impacts

2.1 State of acid deposition and air pollution
2.2 State of inland aquatic environment
2.3 State of soil and vegetation
2.4 State of catchment monitoring
2.5 Overall analysis

Chapter 3. Review of National Air Quality Management including Acid Deposition

Chapter 4. Conclusion or Summary

*Modification of structure can be made by each country

Executive Summary

Preface

Summary for Policy Makers

Summary of Key Points

- About the Fifth Periodic Report on the State of Atmospheric Environment in East Asia (PRSAE5)
- Current status of EANET monitoring activities
- Overview of the analysis of monitoring results

Summary of State of Atmospheric Environment in East Asia

- Gas and Aerosol Concentration in East Asia
- Wet and Dry Deposition of atmospheric substances
- Impacts on Ecosystems in East Asia

Key Messages to Policy Maker

- Protecting and Strengthening EANET's Scientific Foundation
- Supporting Alternative Monitoring Technologies and Closing Data Gaps
- Bridging Scientific Data with Policy Making
- Moving from Regional Data to Regional Strategies and Measures
- Building a Stronger Regional Platform for the Future
- Conclusion

Summary of Each Chapter of Regional Assessment

1. Introduction

2. Monitoring Data Quality

3. Gas and Aerosol Concentration in East Asia

4. Wet and Dry Deposition in East Asia

5. Impacts on Ecosystems in East Asia

6. Summary and Recommendations for Future Activities

7. References

Annex 3

**Implementation Plan of
the Fifth Periodic Report on the State of Atmospheric Environment in East Asia
(PRSAE5)
After the IG27**

Year	Month	Activities/Events	Deliverables
2025	November	**IG27** The Chairperson of SAC reports progress of PRSAE5 to IG27	SAC Chairperson's Report to IG27 Endorsement of the progress of PRSAE5
2026	January	**1st LAs Meeting**	Comments from the LAs meeting
	January	Reports of 1st LAs meeting sent to the LAs members	Report of 1st LAs meeting
	January	Provision of monitoring dataset (2024) to the DC member	Monitoring dataset (2024/2001-2023)
	January -April	Compilation, editing and communications with the LAs and Contributors	Preliminary draft of some sections of PRSAE5
	April	**2nd DC Meeting** **2nd LAs Meeting**	Comments from the DC and the LAs meetings
	Aprily	Reports of 2nd meetings sent to the DC members	Reports of 2nd meetings of the DC
	April -May	Preparation of First Draft of PRSAE5	First Draft of PRSAE5
	May	Circulation of First Draft among the DC and the LAs members, Contributors for comments	Comments from the DC and the LAs members, and Contributors
	May-June	Revision of First Draft to include comments from the DC and the LAs members, and Contributors	Second Draft of PRSAE5
	June	Circulation and revision of Second Draft to include comments from the DC and the LAs members, and Contributors Drafting of the Executive Summary	Third Draft of PRSAE5 and Draft Executive Summary
	July	**3rd DC Meeting** **3rd LAs Meeting**	Comments from the DC and the LAs meetings
	July	Reports of 3rd meetings sent to the DC members	Reports of 3rd meetings of the DC
	August	Revision of the Third Draft of PRSAE5 and Executive Summary to include comments from the DC and the LAs meetings	Final Draft of PRSAE5
	September	Circulation of the Final Draft of PRSAE5 and Executive Summary to the DC members and SAC members for approval	Final Draft of PRSAE5 and Executive Summary
	September	Circulation of the Final Draft of PRSAE5 and Executive Summary to NFPs for endorsement	Final Draft of PRSAE5 and Executive Summary
	October	**SAC26** Preparation of the report of the Chairperson of the DC to SAC26 Presentation of the Final Draft of PRSAE5 and Executive Summary to	Final Draft of PRSAE5 and Executive Summary (adopted with modification on a condition that the drafts are appropriately revised to

		SAC26 for adoption	address the comments from SAC members by the SAC26)
	November	Circulation of the Revised Final Draft of PRSAE5 to the SAC and NFP members	The Revised Final Draft of PRSAE5 adopted by SAC26 on 17 November
	November	**IG28** The NC, on behalf of the DC and SAC. reports the Revised Final Draft of PRSAE5 to IG28 for approval for publication of PRSAE5.	Finalized Draft of PRSAE5 and Executive Summary (approval for publication of PRSAE5 by IG28)
	December	Editorial Check	Final Draft of PRSAE5 checked by language expert
	December	Printing and distribution of PRSAE5	Publication of PRSAE5

DC: Drafting Committee, LAs: Lead Authors, NC: Network Center

Annex 4

Revisions from the revised final draft of the Fifth Periodic Report on the State of Atmospheric Environment in East Asia (PRSAE5) to the SAC26-Adopted Version

This document summarizes the changes between the revised final draft of the Periodic Report on the State of Atmospheric Environment in East Asia (PRSAE5), distributed on 3 November, and the version adopted by SAC26 on 17 November.

I. Chapter 3 of the Regional Assessment

P/L of FCV	Original Text in the Second Circulation Version	Revised Text
Comments: Whilst reviewing the draft, we noticed a minor discrepancy in Figure 3.9*. The caption refers to $PM_{2.5}$ concentration, but the bottom-left graph shows hourly O_3. Could you please check whether this graph was included by mistake, or whether it should be replaced with the corresponding $PM_{2.5}$ graph? *This comment is for Figure 3.9 in Executive Summary. However, the corresponding figure (Figure 3.3.6) and related descriptions in Regional Assessment Chapter 3 need to be revised.		
P73 L1-4	Figure 3.3.6 presents the mean diurnal cycles of $PM_{2.5}$ and O_3 concentrations by season at eight representative EANET sites over 2020–2024, revealing distinct site-specific patterns governed by local meteorology, emission source characteristics, and photochemical activity.	Figure 3.3.6 presents the mean diurnal cycles of $PM_{2.5}$ concentrations by season at eight representative EANET sites over 2020–2024, revealing distinct site-specific patterns governed by local meteorology, emission source characteristics, and photochemical activity.
P74 L7-13	Ulaanbaatar (Bayanzurkh) displays an O_3 diurnal cycle with a pronounced afternoon maximum peaking around 14:00–16:00 during the warm season, driven by photochemical production, and suppressed concentrations during the cold season due to reduced solar radiation and rapid NO titration. Imsil (Republic of Korea) similarly shows a strong photochemically driven O_3 afternoon peak, most pronounced during MAM and JJA, consistent with the seasonal enhancement	Ulaanbaatar (Bayanzurkh) displays an PM2.5 diurnal cycle with a pronounced morning peak between approximately 10:00–12:00 local time, associated with morning traffic emissions, and a secondary evening rise after 22:00–02:00. Imsil (Republic of Korea) shows a morning peak between approximately 08:00-10:00 in MAM and SON, DJF related with the morning traffic emissions and shallow nocturnal boundary layer conditions.

	of photochemical oxidant production under high-insolation conditions and regional NO_x and VOC precursor availability (Seinfeld & Pandis, 2016).	
P74	Figure 3.3.6 The panels for Ulaanbaatar and Imsil showed ozone data.	Figure 3.3.6 The panels for Ulaanbaatar and Imsil were replaced with those showing $PM_{2.5}$ data
Comments: Section 3.4.1, Figures 3.4.1 and 3.4.2 of Chapter 3. The O_3 data provided by China are MDA8, namely daily maximum 8-hour moving averages, whereas the data from other countries are annual means of hourly concentration. Because these values are not directly comparable. Please delete the following original text: "as well as at Jinyunshan (China)" "China ranked second at approximately 42 ppbv, with notable within-country variability, individual site values ranging from approximately 20 to 47 ppbv, reflecting the contrasting conditions between rural photochemically active sites and more polluted urban locations subject to NO_x titration."		
P79 L39-41	The highest O_3 concentration, exceeding 45 ppb (red), was recorded at Rosa (Philippines), while concentrations in the 35–45 ppb range (orange) were observed at several Japanese sites including Sado-seki, Niigata-maki, Happo, and Ochiishi, as well as at Jinyunshan (China) and Rishiri (Japan).	The highest O_3 concentration, exceeding 45 ppb (red), was recorded at Rosa (Philippines), while concentrations in the 35–45 ppb range (orange) were observed at several Japanese sites including Sado-seki, Niigata-maki, Happo, and Ochiishi, and Rishiri (Japan).
P79 L42-45	These elevated values at Japanese and Chinese rural and remote sites are consistent with the well-documented phenomenon of high background O_3 in the western Pacific region, driven by photochemical production, compounded by stratospheric intrusion events at higher-latitude sites (Verstraeten et al., 2015; Monks et al., 2015).	These elevated values at Japanese rural and remote sites are consistent with the well-documented phenomenon of high background O_3 in the western Pacific region, driven by photochemical production, compounded by stratospheric intrusion events at higher-latitude sites (Verstraeten et al., 2015; Monks et al., 2015).
P80 L16-19	China ranked second at approximately 42 ppbv, with notable within-country variability, individual site values ranging from approximately 20 to 47 ppbv, reflecting the contrasting conditions between rural photochemically active sites	(Deleted)

	and more polluted urban locations subject to NO_x titration.	
P80	Figure 3.4.1 Figure 3.4.1 Spatial distribution map of O_3 concentration (2020-2024)	Figure 3.4.1 Spatial distribution map of O_3 concentration (2020-2024) Note: The averaged concentrations of O_3 were calculated by the hourly data. (Data of Hongwen, Haibin-Park, and Jinyunshan were removed from Figure 3.4.1)
P81	Figure 3.4.2 Country based characteristics of O3 concentrations (2020-2024)	Figure 3.4.2 Country based characteristics of O_3 concentrations (2020-2024) Note: The averaged concentrations of O_3 were calculated by the hourly data. (Data of China was removed from Figure 3.4.2)

II. Chapter 5 of the Regional Assessment

P/L of FCV	Original Text in the Second Circulation Version	Revised Text
Comments: Section 5.4.3 of Chapter 5. The present text attributes changes in wet deposition and forest dynamics to air pollution control measures in China and to transboundary air pollution. However, the source region and transport process are not clearly identified, and the evidence presented in this section is insufficient to support such specific attribution. We therefore suggest to made the following deletions. In the first paragraph, delete: “As a result of air pollution control measures in China,” So the revised paragraph now reads: Tree growth is influenced by various environmental factors. These include meteorological conditions (temperature, precipitation, strong winds, and snowfall), CO2 concentration, atmospheric depositions, intra- and inter-specific competition, diseases and pests, and anthropogenic physical disturbance, etc. (Forzieri et al. 2021; Hisano et al. 2020). The load of acid deposition (air pollution) is one such factor. Assessing the effects of air pollution through field monitoring requires appropriate monitoring plans to distinguish the effects of air pollution from other factors. The amount of wet deposition of nss-SO42-, an indicator of the intensity of regional air pollution, has decreased at each survey site since 2007 (Fig. 5.3.5).		

<table>
<tr><td colspan="3">In the following paragraph, delete “from the continent”, “transboundary” and “also”. Then the revised paragraph now reads:
Sekido-san and Horyu-zan are vulnerable to air pollution, and Fagus crenata is a sensitive tree species to ozone stress (Kume et al. 2020). Therefore, a decrease in air pollution might have caused a systematic change in forest dynamics. At Sekido-san, the rate of DBH increase was large around 2010 to 2015, and at Horyu-zan, the rate increased around 2005 to 2010. Furthermore, stand BA increased at both sites from 2010 to 2015 (Figures 5.4.2a, b, c, d, e, f). Changes in meteorological conditions have been confirmed to have an impact on forest dynamics in this region (Ishida et al. 2026). Although no trend was observed in soil pH (Fig. 5.3.5a), the results support the idea that the forest at these sites are changing.</td></tr>
<tr><td>P150
L7-9</td><td>As a result of air pollution control measures in China, the amount of wet deposition of nss-SO_4^{2-}, an indicator of the intensity of regional air pollution, has decreased at each survey site since 2007 (Fig. 5.3.5).</td><td>The amount of wet deposition of nss-SO_4^{2-}, an indicator of the intensity of regional air pollution, has decreased at each survey site since 2007 (Fig. 5.3.5).</td></tr>
<tr><td>P150
L10-17</td><td>Sekido-san and Horyu-zan are vulnerable to air pollution from the continent, and Fagus crenata is a sensitive tree species to ozone stress (Kume et al. 2020). Therefore, a decrease in transboundary air pollution might have caused a systematic change in forest dynamics. At Sekido-san, the rate of DBH increase was large around 2010 to 2015, and at Horyu-zan, the rate increased around 2005 to 2010. Furthermore, stand BA increased at both sites from 2010 to 2015 (Figures 5.4.2a, b, c, d, e, f). Changes in meteorological conditions have also been confirmed to have an impact on forest dynamics in this region (Ishida et al. 2026). Although no trend was observed in soil pH (Fig. 5.3.5a), the results support the idea that the forest at these sites are changing.</td><td>Sekido-san and Horyu-zan are vulnerable to air pollution, and Fagus crenata is a sensitive tree species to ozone stress (Kume et al. 2020). Therefore, a decrease in air pollution might have caused a systematic change in forest dynamics. At Sekido-san, the rate of DBH increase was large around 2010 to 2015, and at Horyu-zan, the rate increased around 2005 to 2010. Furthermore, stand BA increased at both sites from 2010 to 2015 (Figures 5.4.2a, b, c, d, e, f). Changes in meteorological conditions have been confirmed to have an impact on forest dynamics in this region (Ishida et al. 2026). Although no trend was observed in soil pH (Fig. 5.3.5a), the results support the idea that the forest at these sites are changing.</td></tr>
<tr><td colspan="3">Additional Comments
In Section 5.4.3 of Chapter 5, the following sentence appears:
“the effects of transboundary air pollution on deciduous beech Fagus crenata and evergreen conifer Cryptomeria japonica differed”.
We would suggest replacing “transboundary air pollution” with “regional air pollution”.</td></tr>
</table>

P150 L25-28	In the case of forest monitoring on Mt. Tateyama in the central mountainous region of Japan, the effects of transboundary air pollution on deciduous beech *Fagus crenata* and evergreen conifer *Cryptomeria japonica* differed, with beech becoming dominant as air pollution decreased (Kume et al. 2020).	In the case of forest monitoring on Mt. Tateyama in the central mountainous region of Japan, the effects of regional air pollution on deciduous beech *Fagus crenata* and evergreen conifer *Cryptomeria japonica* differed, with beech becoming dominant as air pollution decreased (Kume et al. 2020).

III. Executive Summary

P/L of FCV	Original Text in the First Circulation Version	Revised Text in the Second Circulation Version
Revision corresponding to the revisions made to Chapter 3 of the Regional Assessment		
P14	Figure 3.3 Spatial distribution map of O_3 concentration (2020-2024)	Figure 3.3 Spatial distribution map of O_3 concentration (2020-2024) Note: The averaged concentrations of O_3 were calculated by the hourly data. (Data of Hongwen, Haibin-Park, and Jinyunshan were removed from Figure 3.3)
Comments: Figure 3.9 Diurnal variations of $PM_{2.5}$ concentration for each season (2020-2024) The caption refers to $PM_{2.5}$ concentration, but the bottom-left graph shows hourly O_3.		
P17 L8-10	Diurnal variations further highlight the contrasting behavior of $PM_{2.5}$ and O_3 (Figure 3.9). $PM_{2.5}$ commonly exhibited relatively modest diurnal variability compared with gaseous pollutants, suggesting that secondary aerosol formation contributes substantially to ambient concentrations.	Diurnal variations further highlight the contrasting behavior of $PM_{2.5}$ (Figure 3.9). $PM_{2.5}$ commonly exhibited relatively modest diurnal variability compared with gaseous pollutants, suggesting that secondary aerosol formation contributes substantially to ambient concentrations.
P17	Figure 3.9 The panel for Imsil showed ozone data.	Figure 3.9 The panel for Imsil was replaced with that showing $PM_{2.5}$ data