

The Seventeenth Session of the Scientific Advisory Committee
on the Acid Deposition Monitoring Network in East Asia
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Overview of the Updated National Monitoring Plans of the Participating Countries Network Center for EANET

I. Background

1. National Monitoring Plan (NMP) includes the information on monitoring sites, monitoring methods, monitoring frequency etc. in participating countries. This information is crucial for QA/QC activities in the EANET. First summarization of the NMP was prepared in November 2001. The NMP is required to be submitted when the participating countries submit its annual monitoring data to the Network Center (NC). Additionally, when the participating countries make some revision, the revised NMP shall be submitted to the NC as soon as possible. The NMP has been prepared using the template which was provided in the preparatory phase of the EANET monitoring.
2. The NMP shall be reviewed every year and shall be revised by each participating country, if necessary, because
 - i) The EANET activities shall be carried out according to the NMP; and
 - ii) Suitability of the completed activities to the NMP should be checked in every year. Even if there is no point of revision, the existing state of the EANET activities can be re-confirmed periodically and this state should be reported to the NC.
3. However, the former NMP template had the following issues.
 - i) Description of the relationship between monitoring site, analytical laboratory and meteorological observatory was obscure.
 - ii) There were many improper options in many tables, such as the sampling intervals, analytical methodology etc.
 - iii) The specifying of the site location might be impossible only by referring to the site location map, latitude and longitude described in the NMP.
 - iv) Former format of the NMP was difficult to be utilized for the site and laboratory audit.

II. Preparation of NMP based on the revised template

4. Considering the above mentioned background, the electronic template of the NMP were newly prepared and distributed to the National QA/QC managers in March 2013. The NMP needs to be reviewed and/or revised for the implementation of monitoring by the National QA/QC manager in each participating countries. The NC has prepared the final draft template of the NMP as the part of the QA/QC Guidebook which was adopted at SAC16.

5. The outcome of the STM18 meeting should be reflected to the secondary revision process for the draft with communication between the NC and the National QA/QC managers in the participating countries. After report and discussion at the SAC17, the NC prepares the compiled NMPs submitted by the participating countries, and site information will be updated on the EANET website as appropriate. The participating countries implement their EANET monitoring activities in accordance with their own NMP for each year.

III. Development of NMP in 2017

6. Overview of the NMP in 2017 is shown in Attachment 1, and list of sites and monitoring items are shown in Attachment 2. The major points of the updated NMPs in participating countries are shown below.

- i Cambodia

- It was informed that the newly installed PM_{2.5} monitor has been working well.
- It was clarified that the PM_{2.5} monitor was installed at the 7th floor, the rooftop of the building.

- ii China

- In Zhuhai City, the site name of Xiang Zhou of dry deposition site should be changed to Haibin park.

- iii Indonesia

- The monitoring of PM_{2.5} started in 2017 in Jakarta.

- iv Japan

- The new continuous monitoring of PM_{2.5} components started in 2017 in 10 monitoring sites as the domestic monitoring activities.

- v Lao PDR

- The monitoring of PM_{2.5} will start in Vientiane in 2017 by PMTT project of CAA.
- Wet and dry deposition monitoring site will move to the new lab.

- vi Malaysia

- Re-organization of the inland aquatic monitoring in Semenyih Dam is under consideration, although UiTM has been conducting the sampling. It was clarified that MMD staff would be trained to take over the sampling there.
- It was informed that relocation of the Petaling Jaya site is still in progress.

- vii Mongolia

- PM_{2.5} installed at Ulaanbaatar site in 2015 should be included in the monitoring plan.

- viii Myanmar

- It is planned that the EANET activities will be expanded to include monitoring on inland

aquatic environment and soil and vegetation.

ix Philippines

- Sampling of the stream water has already been started since January 2006 for the regular catchment-scale monitoring in La Mesa Watershed, although the data were still under verification by the national center.
- SO₂, NO₂ and O₃ at industrial and road side sites are measured by DOAS to identify local sources and to determine ozone formation processes by primary emission from NO₂ and VOCs.

x Republic of Korea

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xi Russia

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xii Thailand

- A new station was established for automatic monitoring of air concentration in the city area of Kanchanaburi in June 2017.

xiii Viet Nam

- The soil and vegetation monitoring in Cuc Phuong would be started in 2018 and the previous sites around Hoa Binh would be officially closed.

Attachment 1

Overview of the National Monitoring Plan in 2017

Country	Items	Monitoring sites	Classification	Monitoring interval	Measurement Parameters	Remarks (Start time)	Available Data(2016)	
<Cambodia>	Wet deposition	Phnom Penh	Urban	weekly	All required items	January 2005		
		Siem Reap	Urban	weekly	All required items	October 2011		
	Dry deposition	Phnom Penh	Urban	AP+ FP(biweekly)	PM _{2.5} PSO ₂ ,HNO ₃ ,HCl,NH ₃ ,PMC	Februray 2010		
		Inland aquatic environment	Sras Srang Lake	Remote	2times/years	Water quality of Sras Srang Lake	2012	
<China>	Wet deposition	Chongqing -Haifu	Urban	daily	All required items + F ⁻	January 2008	✓	
		Chongqing -Jinyunshan	Rural	daily	All required items + F ⁻	April 1999	✓	
		Xi'an -Shizhan	Urban	daily	All required items	April 1999	✓	
		Xi'an-Jiwozi	Remote	daily	All required items	April 1999	✓	
		Xiamen-Hongwen	Urban	daily	All required items + F ⁻	April 1999	✓	
		Xiamen-Xiaoping	Remote	daily	All required items + F ⁻	April 1999	✓	
		Zhuhai-Xiang Zhou	Urban	daily	All required items + F ⁻	April 1999	✓	
		Zhuhai-Zhuxiandong	Urban	daily	All required items + F ⁻	December 1999	✓	
	Dry deposition	Chongqing -Jinyunshan	Rural	AT(Daily)	SO ₂ , NO, NO _x , PM ₁₀	January 2001	✓	
		Xiamen-Hongwen	Urban	AT(Daily)+ FP	SO ₂ ,NO ₂ ,PM ₁₀ ,HNO ₃ ,HCl,NH ₃ ,PMC	January 2000	✓	
		Zhuhai-Haibin-Park	Urban	AT	SO ₂ ,NO ₂ , PM ₁₀	2014	✓	
		Soil and vegetation	Chongqing -Jinyunshan	Rural	Every 3 years	Tree decline, Abnormalities of leaves and branches(Ions etc.in soil)		
	Xi'an-Jiwozi		Remote	Every 3 years	Tree decline, Abnormalities of leaves and branches(Ions etc.in soil)			
	Xiamen-Xiaoping		Remote	Every 3 years	Tree decline, Abnormalities of leaves and branches(Ions etc.in soil)			
	Zhuhai-Zhuxiandong		Urban	Every 3 years	Tree decline, Abnormalities of leaves and branches(Ions etc.in soil)			
	Inland aquatic environment	Chongqing-Jinyunshan Lake	Rural	4times/years	Water quality of Jinyunshan Lake	2001	✓	
		Xi'an-Jiwozi River	Remote	4times/years	Water quality of Jiwozi River	2001	✓	
		Xiamen-Xiaoping Dam	Remote	4times/years	Water quality of Xiaoping Dam	2001	✓	
		Zhuhai-Zhuxiandong Stream	Urban	4times/years.	Water quality of Zhuxiandong Stream	2004	✓	
	<Indonesia>	Wet deposition	Jakarta (BMG)	Urban	weekly	All required items	April 1998	✓
Serpong (EMC)			Rural	daily	All required items	April 1998	✓	
Kototabang (BMG)			Remote	weekly	All required items	April 1998	✓	
Bandung (LAPAN)			Urban	daily	All required items	January 1999	✓	
Maros(BMG)			Rural	weekly	All required items	January 2008	✓	
Dry deposition		Serpong (EMC)	Rural	FP (Bi-weekly)	SO ₂ ,HNO ₃ ,HCl,NH ₃ ,PMC	July 2001	✓	
		Kototabang (BMG)	Remote	PS	SO ₂ ,NO ₂	January 2007	✓	
		Jakarta (BMG)	Urban	FP (Bi-weekly)	SO ₂ ,HNO ₃ ,HCl,NH ₃ ,PMC	2014	✓	
		Jakarta (BMG)	Urban	PS	SO ₂ ,NO ₂	2007	✓	
		Jakarta (BMKG)	Urban	AT	PM _{2.5}	2017		
		Bandung (LAPAN)	Urban	FP (Bi-weekly)	SO ₂ ,HNO ₃ ,HCl,NH ₃ ,PMC	2014	✓	
		Bandung (LAPAN)	Urban	PS	NO ₂	2008	✓	
		Soil and vegetation	Bogor Research Forest (Darmaga Experimental Forest)	Rural	once/3-5 years	Decline, K etc. in leaves & ions in soil	2002	✓
			Inland aquatic environment	Patenggang Lake	Rural	4times/yr.	Water quality of Patenggang Lake	2001
Gunung Lake	---	4times/yr.		Water quality of Situgunung	2007	✓		

<Japan>	Wet deposition	Rishiri	Remote	daily	All required items	April'98	✓	
		Ochiishi	Remote	daily	All required items	April'03	✓	
		Tappi	Remote	daily	All required items	April'98	✓	
		Ogasawara	Remote	daily	All required items	May'99	✓	
		Sado-seki	Remote	daily	All required items + HCO ₃ ⁻	April'99	✓	
		Happo	Remote	daily	All required items	April'98	✓	
		Oki	Remote	daily	All required items	April'98	✓	
		Yusuhara	Remote	daily	All required items + F ⁻ , NO ₂ ⁻ , PO ₄ ³⁻	December'99	✓	
		Hedo	Remote	daily	All required items	December'99	✓	
		Ijira	Rural	weekly	All required items	June'99	✓	
	Banryu	Urban	weekly	All required items +F ⁻ , NO ₂ ⁻	May'99	✓		
	Tokyo	Urban	daily	All required items F ⁻ , NO ₂ ⁻	April'07	✓		
<Japan>	Dry deposition	Rishiri	Remote	AT+ FP(biweekly)	SO ₂ ,NO,NO _x ,O ₃ ,PM _{10/2.5} HNO ₃ ,HCl,NH ₃ ,PMC	AT FP January 2002	✓	
		Ochiishi	Remote	AT+ FP(biweekly)	SO ₂ ,NO,NO _x ,O ₃ ,PM _{10/2.5} HNO ₃ ,HCl,NH ₃ ,PMC	FP from 2008	✓	
		Tappi	Remote	AT+ FP(biweekly)	SO ₂ ,NO,NO _x ,O ₃ ,PM _{10/2.5} HNO ₃ ,HCl,NH ₃ ,PMC	FP from 2003	✓	
		Ogasawara	Remote	AT+ FP(biweekly)	SO ₂ ,NO,NO _x ,O ₃ ,PM _{10/2.5} HNO ₃ ,HCl,NH ₃ ,PMC	FP from 2003	✓	
		Sado-seki	Remote	AT+ FP(biweekly)	SO ₂ ,NO,NO _x ,O ₃ ,PM _{10/2.5} HNO ₃ , HCl,NH ₃ ,PMC	FP from 2003	✓	
		Happo	Remote	AT+ FP(biweekly)	SO ₂ ,NO,NO _x ,O ₃ ,PM _{10/2.5} HNO ₃ ,HCl,NH ₃ ,PMC	FP from 2003	✓	
		Oki	Remote	AT+ FP(biweekly)	SO ₂ ,NO,NO _x ,O ₃ ,PM _{10/2.5} HNO ₃ , HCl,NH ₃ ,PMC	FP from 2002	✓	
		Yusuhara	Remote	AT+ FP(biweekly)	SO ₂ ,NO,NO _x ,O ₃ ,PM _{10/2.5} HNO ₃ ,HCl,NH ₃ ,PMC	FP from 2003	✓	
		Hedo	Remote	AT+ FP(biweekly)	SO ₂ ,NO,NO _x ,O ₃ ,PM _{10/2.5} HNO ₃ ,HCl,NH ₃ ,PMC	FP from 2003	✓	
		Ijira	Rural	AT+ FP(biweekly)	SO ₂ ,NO,NO _x ,O ₃ ,PM _{10/2.5} HNO ₃ ,HCl,NH ₃ ,PMC	FP from 2003	✓	
		Banryu	Urban	AT+ FP(biweekly)	SO ₂ ,NO,NO _x ,O ₃ ,PM _{10/2.5} HNO ₃ ,HCl,NH ₃ ,PMC	FP from 2003	✓	
		Tokyo	Urban	FP(biweekly)	SO ₂ ,NO ₂ ,HNO ₃ ,NH ₃ , PMC	FP from 2007	✓	
		Soil and vegetation	Ijira	Rural	Once in 5 years	All required items		✓
			Banryu	Urban	Once in 5 years	All required items		✓
		Inland aquatic environment	Ijira Lake	Rural	4times/yr.	Water quality of Ijira Lake	From 2001	✓
			Banryu Lake	Urban	4times/yr.	Water quality of Banryu Lake	From 2001	✓
		Catchment-scale	Ijira	Rural	1times/yr.	Input, output, biochemical process		✓
<Lao PDR>	Wet deposition	Vientiane	Urban	daily	All required items	October 2003		
	Dry deposition	Vientiane	Urban	FP(weekly)	SO ₂ ,HNO ₃ ,HCl,NH ₃ , PMC			
	Inland aquatic environment	Nam Houm Lake	Urban	4times/yr.	Water quality of Nam Houm Lake	September 2009		
<Malaysia>	Wet deposition	Petaling Jaya	Urban	weekly	All required items+Organic acid	April 1998	✓	
		Tanah Rata	Remote	weekly	All required items+Organic acid	January 1999	✓	
		Danum Valley	Remote	weekly	All required items+Organic acid	January 2006	✓	
		Kuching	Urban	weekly	All required items+Organic acid		✓	
	Dry deposition	Petaling Jaya	Urban	FP (weekly)	SO ₂ ,HNO ₃ ,HCl,NH ₃ , PMC		✓	
		Tanah Rata	Remote	FP (weekly)	SO ₂ ,HNO ₃ ,HCl,NH ₃ , PMC	FP from 2001	✓	
		Danum Valley	Remote	FP (biweekly)	SO ₂ ,HNO ₃ ,HCl,NH ₃ , PMC	FP from 2006	✓	
	Soil and vegetation	Pasoh Reserve Forest	Urban	Every 3-5 years	Tree decline, description tree & ions in soil etc.	2014		
		Universiti Putra Malaysia Rehabilitated Forest	Urban	Every 3-5 years	Tree decline, description tree & ions in soil etc.	2009		
	Inland aquatic environment	Semenyih Dam	Urban	4 times/yr.	Water quality of Semenyih Dam	February 2005	✓	
Tembaling River		Remote	4 times/yr.	Water quality of Tembaling River	March 2007	✓		
<Mongolia>	Wet deposition	Ulaanbaatar	Urban	daily	All required items	August 1998	✓	
		Terej	Remote	daily	All required items	September 1998	✓	
	Dry deposition	Ulaanbaatar	Urban	AT+ FP (biweekly)	SO ₂ ,NO,NO ₂ ,O ₃ ,PM _{10/2.5} SO ₂ ,HNO ₃ ,HCl,NH ₃ ,PMC	2014	✓	
		Terej	Remote	FP (biweekly)	SO ₂ ,HNO ₃ ,HCl,NH ₃ ,PMC		✓	
	Soil and vegetation	Ulaanbaatar (Bogdkhan mountain)	Urban/Ecolog	Every 3-5 years	PH(H ₂ O),pH(KCl),Exchangeable acidity, Tree decline, description tree	From 2002		
	Inland aquatic environment	Terej River	Remote	4-5 times/yr.	Water quality of Terej River	From 2002	✓	
<Myanmar>	Wet deposition	Yangon	Urban	weekly	All required items	June 2007	✓	
	Dry deposition	Yangon	Urban	FP (biweekly)	SO ₂ ,HNO ₃ ,HCl,NH ₃ , PMC	November 2011	✓	
		Mandalay	Rural	AT	PM _{2.5}	May 2015	✓	

<Philippines>	Wet deposition	Metro Manila	Urban	weekly	All required items	April 1999	
		Los Banos	Rural	weekly	All required items	April 1999	
		Mt. St. Tomas	Rural	weekly	All required items	October 2006	✓
	Dry deposition	Metro Manila	Urban	AT+ FP (Weekly)	SO ₂ ,NO ₂ ,O ₃ ,PM _{10/2.5} SO ₂ ,HNO ₃ ,HCl,NH ₃ ,PMC	2015	
		Los Banos	Rural	FP (Weekly)	SO ₂ ,HNO ₃ ,HCl,NH ₃ ,PMC		
		Mt. St. Tomas	Rural	FP (Weekly)	SO ₂ ,HNO ₃ ,HCl,NH ₃ ,PMC	October 2006	✓
	Soil and vegetation	Los Banos	Rural	Once in 3 years	(Tree decline, description tree & ions in soil etc.)	2001	
		UP Quezon- Laguna Land Grant	Rural	Once in 3 years	(Tree decline, description tree & ions in soil etc.)		
		Metro Manila(La Mesa Dam Watershed)	Urban	Once in 3 years	(Tree decline, description tree & ions in soil etc.)	November 2007	
		Boneco Long Term Ecological Research Site	Remote	Once in 3 years	(Tree decline, description tree & ions in soil etc.)	April 2008	
Inland aquatic environment	Pandin Lake	Rural	4 times a year	Water quality of Pandin Lake	From 2004		
	Ambulalakao Lake	Remote	4 times/yr	Water quality of Ambulalakao River	From 2005		
<Republic of Korea>	Wet deposition	Kanghwa	Rural	daily	All required items	March 1999	
		Cheju(Kosan)	Remote	daily	All required items	April 1999	
		Imsil	Rural	daily	All required items	January 2001	
	Dry deposition	Kanghwa	Rural	AT + FP(5 days a month)	SO ₂ , NO ₂ , O ₃ , PM _{10/2.5} , Ions in PM _{2.5}	2001	
		Cheju(Kosan)	Remote	AT + FP(5 days a month)	SO ₂ , NO ₂ , O ₃ , PM _{10/2.5} , Ions in PM _{2.5}	2001	
		Imsil	Rural	AT + FP(5 days a month)	SO ₂ , O ₃ , PM ₁₀ , Ions in PM _{2.5}	2001	
Soil and vegetation	Imsil (Mt.Naejang)	Rural	Every 3 years	(Tree decline, description tree & ions in soil)	2001		
<Russia>	Wet deposition	Mondy	Remote	daily	All required items (+F., NO ₂ ⁻ , Br ⁻ , HCO ₃ ⁻)	May 1999	✓
		Listvyanka	Rural	daily	All required items (+F., NO ₂ ⁻ , Br ⁻ , HCO ₃ ⁻)	January 2000	✓
		Primorskaya	Rural	daily	All required items	February 2002	✓
		Irkutsk	Urban	daily	All required items (+F., NO ₂ ⁻ , Br ⁻ , HCO ₃ ⁻)	January 2001	✓
	Dry deposition	Mondy	Remote	AT + FP(biweekly) +PS	SO ₂ ,HNO ₃ ,HCl,NH ₃ ,PMC O ₃	2001 2016	✓
		Listvyanka	Rural	FP(biweekly) +PS	SO ₂ ,HNO ₃ ,HCl,NH ₃ ,PMC O ₃	2001	✓
		Primorskaya	Rural	FP(weekly)	SO ₂ ,HNO ₃ ,HCl,NH ₃ ,PMC	2001	✓
		Irkutsk	Urban	FP(biweekly) + PS	SO ₂ ,HNO ₃ ,HCl,NH ₃ ,PMC O ₃	2001 2016	✓
		Soil and vegetation	Mondy	Remote	Once/5 years	Tree decline, description tree & ions in soil	2001
	Listvyanka (Bolshie Koty)		Rural	Once/5 years	Tree decline, description tree & ions in soil	2001	
	Irkutsk		Urban	Once/5 years	Tree decline, description tree & ions in soil	2001	
	Primorskaya		Rural	Once/5 years	Tree decline, description tree & ions in soil	2002	
	Inland aquatic environment	Pereemnaya River	Rural	3times/yr	Water quality of Pereemnaya River	2004	✓
Komarovka River		Rural	5times/yr	Water quality of Komarovka River	2005	✓	

<Thailand>	Wet deposition	Bangkok	Urban	daily	All required items+Organic acid, Phosphate	April 1999	✓
		Samutprakarn	Urban	daily	All required items+Organic acid, Phosphate	January 2000	✓
		Patumthani	Rural	daily	All required items+Organic acid, Phosphate	March 1999	✓
		Khanchaburi (Vachiralongkorn Dam)	Remote	daily	All required items+Organic acid, Phosphate	April 1999	✓
		Chiang Mai(Mae Hia)	Rural	daily	All required items+Organic acid, Phosphate	January 2001	✓
		Sakaerat	Rural	daily	All required items+Organic acid, Phosphate	January 2006	✓
	Dry deposition	Bangkok	Urban	AT+ FP(10 days)	NO ₂ ,NO ₂ ,O ₃ ,PM ₁₀ ,PM _{2.5} ,HNO ₃ ,HCl, NH ₃ ,PMC		✓
		Samutprakarn	Urban	AT	SO ₂ ,NO ₂ ,NO ₂ ,O ₃ ,PM ₁₀ ,PM _{2.5}		✓
		Pathumthani	Rural	FP	SO ₂ ,HNO ₃ ,HCl,NH ₃ ,PMC		
		Khanchaburi (Vachiralongkorn Dam)	Remote	AT+ FP(10 days)	SO ₂ ,NO ₂ ,NO ₂ ,O ₃ ,PM ₁₀ ,PM _{2.5} , HNO ₃ ,HCl,NH ₃ ,PMC		✓
Chiang Mai (Mae Hia)	Rural	FP(10 days)	SO ₂ ,HNO ₃ ,HCl, NH ₃ ,PMC		✓		
Chiang Mai (Chang Phueak)	Urban	AT	SO ₂ ,NO ₂ ,NO ₂ ,PM ₁₀ ,PM _{2.5} ,O ₃		✓		
Chiang Mai (Si Phum)	Urban	AT	SO ₂ ,NO ₂ ,NO ₂ ,PM ₁₀ ,PM _{2.5}		✓		
Sakaerat	Rural	FP(10 days)	SO ₂ ,HNO ₃ ,HCl,NH ₃ ,PMC	January 2006	✓		
Nai Mueang	Rural	AT	SO ₂ ,NO ₂ ,NO ₂ ,O ₃ ,PM ₁₀	January 2006	✓		
Soil and vegetation	Vachiralongkorn Dam	Remote	Once/3-5 years	Tree Decline, Ions in soil			
Inland aquatic environment	Vachiralongkorn Dam	Remote	4 times/year	Water quality of Vachiralongkorn Dam		✓	
<Viet nam>	Wet deposition	Hanoi	urban	weekly	All required items + F ⁻	August 1999	✓
		Hoa Binh	rural	weekly	All required items + F ⁻	August 1999	✓
		Cuc Phuong	remote	weekly	All required items + F ⁻ , HCO ₃ ⁻	January 2010	✓
		Da Nang	urban	weekly	All required items+HCO ₃ ⁻	January 2010	✓
		Can Tho	Rural	weekly	All required items + F ⁻	April 2014	✓
		Ho Chi Minh	Urban	weekly	All required items + F ⁻	January 2014	✓
		Yen Bai	Rural	weekly	All required items + F ⁻	May 2015	✓
	Dry deposition	Hanoi	urban	FP(weekly)	SO ₂ ,HNO ₃ ,HCl,NH ₃ ,PMC		✓
		Hoa Binh	rural	AT+ FP(weekly)	PM2.5 SO ₂ ,HNO ₃ ,HCl,NH ₃ ,PMC	February 2015	✓
		Can Tho	Rural	FP	SO ₂ ,HNO ₃ ,HCl,NH ₃ ,PMC		✓
		Ho Chi Minh	Urban	FP	SO ₂ ,HNO ₃ ,HCl,NH ₃ ,PMC		✓
		Yen Bai	Rural	FP	SO ₂ ,HNO ₃ ,HCl,NH ₃ ,PMC	May 2015	✓
	Soil and vegetation	Cuc Phuong	rural	Once/3-5 years	Tree decline, description tree & ions in soil		✓
Inland aquatic environment	Hoa Binh Reservoir	rural	4 times/year	Water quality of Hoa Bin Reservoir	1999	✓	
PMC; Particulate matter components							

Attachment 2

List of sites and monitoring items

Table 1. Wet Deposition Monitoring

Country/items	City	Monitoring sites	Classification	Monitoring interval	Mandatory items:										Optional items:	Meteorology	
					pH	EC	SO ₄ ²⁻	NO ₃ ⁻	Cl ⁻	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺	NH ₄ ⁺			
<Cambodia>		Phnom Penh	Urban	Weekly	x	x	x	x	x	x	x	x	x	x			
		Siem Reap	Urban	Weekly	x	x	x	x	x	x	x	x	x	x			
<China>	Chongqing	Haifu	Urban	Daily	x	x	x	x	x	x	x	x	x	x	F		x
		Jinyunshan	Rural	Daily	x	x	x	x	x	x	x	x	x	x	F		x
	Xi'an	Shizhan	Urban	Daily	x	x	x	x	x	x	x	x	x	x			x
		Jiwozi	Remote	Daily	x	x	x	x	x	x	x	x	x	x			x
	Xiamen	Hongwen	Urban	Daily	x	x	x	x	x	x	x	x	x	x	F		x
		Xiaoping	Remote	Daily	x	x	x	x	x	x	x	x	x	x	F		x
	Zhuhai	Xiang Zhou	Urban	Daily	x	x	x	x	x	x	x	x	x	x	F		x
		Zhuxiandong	Urban	Daily	x	x	x	x	x	x	x	x	x	x	F		x
<Indonesia>		Jakarta(BMG)	Urban	Weekly	x	x	x	x	x	x	x	x	x	x			x
		Serpong(EMC)	Rural	Daily	x	x	x	x	x	x	x	x	x	x			x
		Kototabang(BMG)	Remote	Weekly	x	x	x	x	x	x	x	x	x	x			
		Bandung(LAPAN)	Urban	Daily	x	x	x	x	x	x	x	x	x	x			
		Maros(BMG)	Rural	Weekly	x	x	x	x	x	x	x	x	x	x			
<Japan>		Rishiri	Remote	Daily	x	x	x	x	x	x	x	x	x	x			x
		Ochiishi	Remote	Daily	x	x	x	x	x	x	x	x	x	x			x
		Tappi	Remote	Daily	x	x	x	x	x	x	x	x	x	x			x
		Ogasawara	Remote	Daily	x	x	x	x	x	x	x	x	x	x			x
		Sado-seki	Remote	Daily	x	x	x	x	x	x	x	x	x	x			x
		Happo	Remote	Daily	x	x	x	x	x	x	x	x	x	x			x
		Okii	Remote	Daily	x	x	x	x	x	x	x	x	x	x			x
		Yusuhara	Remote	Daily	x	x	x	x	x	x	x	x	x	x			x
		Hedo	Remote	Daily	x	x	x	x	x	x	x	x	x	x			x
		Ijira	Rural	Weekly	x	x	x	x	x	x	x	x	x	x			x
	Banryu	Urban	Weekly	x	x	x	x	x	x	x	x	x	x			x	
	Tokyo	Urban	Daily	x	x	x	x	x	x	x	x	x	x				
<Lao PDR>		Vientiane	Urban	Daily	x	x	x	x	x	x	x	x	x				
<Malaysia>		Petaling Jaya	Urban	Weekly	x	x	x	x	x	x	x	x	x	x	Formic,Acetic, Oxalic acid	x	
		Tanah Rata	Rural	Weekly	x	x	x	x	x	x	x	x	x	x	Formic,Acetic, Oxalic acid	x	
		Danum Valley	Remote	Weekly	x	x	x	x	x	x	x	x	x	x	Formic,Acetic, Oxalic acid		
		Kuching	Urban	Weekly	x	x	x	x	x	x	x	x	x	x	Formic,Acetic, Oxalic acid		
<Mongolia>		Ulaanbaatar	Urban	Daily	x	x	x	x	x	x	x	x	x	x	HCO ₃ ⁻	x	
		Terej	Remote	Daily	x	x	x	x	x	x	x	x	x	x	HCO ₃ ⁻	x	
<Myanmar>		Kaha-Aya, Yangon	Urban	Daily	x	x	x	x	x	x	x	x	x			x	
<Philippines>		Metro Manila	Urban	Weekly	x	x	x	x	x	x	x	x	x	x	PO ₄ ³⁻	x	
		Los Banos	Rural	Weekly	x	x	x	x	x	x	x	x	x	x	PO ₄ ³⁻	x	
		Mt. Sto. Tomas	Rural	Weekly	x	x	x	x	x	x	x	x	x	x		x	
<Republic of Korea>		Kanghwa	Rural	Daily	x	x	x	x	x	x	x	x	x	x		x	
		Cheju(Kosan)	Remote	Daily	x	x	x	x	x	x	x	x	x	x		x	
		Imsil	Rural	Daily	x	x	x	x	x	x	x	x	x	x		x	
<Russia>		Mondy	Remote	Daily	x	x	x	x	x	x	x	x	x	x	F ⁻ , NO ₂ ⁻ , Br ⁻ , HCO ₃ ⁻	x	
		Listvyanka	Rural	Daily	x	x	x	x	x	x	x	x	x	x	F ⁻ , NO ₂ ⁻ , Br ⁻ , HCO ₃ ⁻	x	
		Irkutsk	Urban	Daily	x	x	x	x	x	x	x	x	x	x	F ⁻ , NO ₂ ⁻ , Br ⁻ , HCO ₃ ⁻	x	
		Primorskaya	Rural	Daily	x	x	x	x	x	x	x	x	x	x	NO ₂ ⁻ , Br ⁻ , HCO ₃ ⁻	x	
<Thailand>		Bangkok	Urban	Daily	x	x	x	x	x	x	x	x	x	x	HCOOH,CH ₃ COOH,PO ₄ ³⁻	x	
		Sanuyprakan	Urban	Daily	x	x	x	x	x	x	x	x	x	x	HCOOH,CH ₃ COO,HPO ₄ ³⁻	x	
		Patumthani	Rural	Daily	x	x	x	x	x	x	x	x	x	x	HCOOH,CH ₃ COO,HPO ₄ ³⁻	x	
		Khanchanaburi (Vachralongkom Dam)	Remote	Daily	x	x	x	x	x	x	x	x	x	x	HCOOH,CH ₃ COO,HPO ₄ ³⁻	x	
		Chiang Mai(Mac-Hia)	Rural	Daily	x	x	x	x	x	x	x	x	x	x	HCOOH,CH ₃ COO,HPO ₄ ³⁻	x	
		Sakaerat	Rural	Daily	x	x	x	x	x	x	x	x	x	x	HCOOH,CH ₃ COO,HPO ₄ ³⁻	x	
<Viet nam>		Hanoi	Urban	Weekly	x	x	x	x	x	x	x	x	x	x	F ⁻	x	
		Hoa Binh	Rural	Weekly	x	x	x	x	x	x	x	x	x	x	F ⁻	x	
		Cue Phuong	Remote	Weekly	x	x	x	x	x	x	x	x	x	x	HCO ₃ ⁻	x	
		Da Nang	Urban	Weekly	x	x	x	x	x	x	x	x	x	x	HCO ₃ ⁻	x	
		Can Tho	Rural	Weekly	x	x	x	x	x	x	x	x	x	x	F ⁻	x	
		Ho Chi Minh	Urban	Weekly	x	x	x	x	x	x	x	x	x	x	F ⁻		
		Yen Bai	Rural	Weekly	x	x	x	x	x	x	x	x	x	x	F ⁻		

Table 2. Dry Deposition Monitoring

Country/items	City	Monitoring sites	Classification	Monitoring method	Priority of the chemical species												
					SO ₂	O ₃	NO	NO ₂ , NO _x	PM ₁₀	PM _{2.5}	HNO ₃	HCl	NH ₃	SO ₄ ²⁻	NO ₃ ⁻	NH ₄ ⁺	Ca ²⁺
<Cambodia>		Phnom Penh	Urban	AT, FP	x					x	x	x	x	x	x	x	x
<China>	Chongqing	Jinyunshan	Rural	AT	x		x	x	x								
	Xiamen	Hongwen	Urban	AT, FP	x			x	x		x	x	x	x	x	x	x
	Zhuhai	Haibin Park	Urban	AT	x			x	x								
<Indonesia>		Jakarta	Urban	AT, FP, PS	x			x		x	x	x	x	x	x	x	x
		Serpong(EMC)	Rural	FP, PS	x			x			x	x	x	x	x	x	x
		Kototabang	Remote	PS	x			x									
		Bandung	Urban	AT, FP, PS	x	x		x			x	x	x	x	x	x	x
<Japan>		Rishiri	Remote	AT,FP	x	x	x	x	x	x	x	x	x	x	x	x	x
		Ochishi	Remote	AT,FP	x	x	x	x	x	x	x	x	x	x	x	x	x
		Tappi	Remote	AT,FP	x	x	x	x	x	x	x	x	x	x	x	x	x
		Ogasawara	Remote	AT,FP	x	x	x	x	x	x	x	x	x	x	x	x	x
		Sado-seki	Remote	AT,FP	x	x	x	x	x	x	x	x	x	x	x	x	x
		Happo	Remote	AT,FP	x	x	x	x	x	x	x	x	x	x	x	x	x
		Oki	Remote	AT,FP	x	x	x	x	x	x	x	x	x	x	x	x	x
		Yusuhara	Remote	AT,FP	x	x	x	x	x	x	x	x	x	x	x	x	x
		Hedo	Remote	AT,FP	x	x	x	x	x	x	x	x	x	x	x	x	x
		Ijira	Rural	AT,FP	x	x	x	x	x	x	x	x	x	x	x	x	x
		Banyu	Urban	AT,FP	x	x	x	x	x	x	x	x	x	x	x	x	x
		Tokyo	Urban	FP	x						x	x	x	x	x	x	x
<Lao PDR>		Vientiane	Urban	AT, FP	x		x	x	x		x	x	x	x	x	x	x
<Malaysia>		Petaling Jaya	Urban	FP	x						x	x	x	x	x	x	x
		Tanah Rata	Remote	FP	x						x	x	x	x	x	x	x
		Damun Valley	Remote	FP	x						x	x	x	x	x	x	x
<Mongolia>		Ulaanbaatar	Urban	AT, FP	x	x	x	x	x	x	x	x	x	x	x	x	x
		Terej	Remote	FP	x						x	x	x	x	x	x	x
<Myanmar>		Yangon	Urban	FP	x						x	x	x	x	x	x	x
		Mandalay	Rural	AT						x							
<Philippines>		Metro Manila	Urban	AT, FP	x	x	x	x	x	x	x	x	x	x	x	x	x
		Los Banos	Rural	FP	x						x	x	x	x	x	x	x
		Mt. Sto. Tomas	Remote	FP	x						x	x	x	x	x	x	x
<Republic of Korea>		Kanghwa	Rural	AT,FP	x	x		x	x	x	x	x	x	x	x	x	x
		Cheju(Kosan)	Remote	AT,FP	x	x		x	x	x	x	x	x	x	x	x	x
		Insil	Rural	AT,FP	x	x		x	x	x	x	x	x	x	x	x	x
<Russia>		Mondy	Remote	AT, FP, (PS)	x	x					x	x	x	x	x	x	x
		Listvyanka	Rural	FP, PS	x						x	x	x	x	x	x	x
		Ikutsk	Urban	FP, PS	x	x					x	x	x	x	x	x	x
		Primorskaya	Rural	FP	x						x	x	x	x	x	x	x
<Thailand>		Bangkok	Urban	AT, FP	x	x	x	x	x	x	x	x	x	x	x	x	x
		Samutprakam	Urban	AT	x	x	x	x	x	x							
		Khanchanaburi(Vachralongkom Dam)	Remote	AT,FP	x	x	x	x	x		x	x	x	x	x	x	x
		Chiang Mai (Mae-Hia)	Rural	FP	x						x	x	x	x	x	x	x
		Chiang Mai (Chang Phueak)	Rural	AT	x	x	x	x	x	x							
		Chiang Mai (Si Phum)	Rural	AT	x	x	x	x	x	x							
		Sakaerat	Rural	FP	x						x	x	x	x	x	x	x
		Nai Mueang	Urban	AT	x	x	x	x	x								
<Viet nam>		Hanoi	Urban	FP	x						x	x	x	x	x	x	x
		Hoa Binh	Rural	AT, FP	x					x	x	x	x	x	x	x	x
		Can Tho	Rural	FP	x						x	x	x	x	x	x	x
		Ho Chi Minh	Urban	FP	x						x	x	x	x	x	x	x
		Yen Bai	Rural	FP	x						x	x	x	x	x	x	x

AT:Automatic Monitor,FP:Filter pack.

Table 3. Soil & Vegetation monitoring

Country/items	City	Monitoring sites	Classification	Monitoring interval (Soil)	Monitoring interval (Forest)	Soil												Forest monitoring									
						Mandatory items:						Optional items						Voluntary item	Mandatory item(5-years)		Optional items						
						Moisture contents	pH (H ₂ O)	pH (KCl)	Exchangeable base cations (Ca, Mg, K, and Mn) (Mg)	Exchangeable & Acidity	Effective cation exchange capacity (ECEC)	Carbonate contents	Exchangeable acid cations (A, L, H)	Total carbon content	Total nitrogen content	Available phosphate/ Sulfate	Description of trees		Understory vegetation survey	Observation of tree decline		Photographic record of tree decline	Estimation of decline causes				
<China>	Chongqing	Jinyushan	Rural	Once/3years	Once/2years	X	X	X	X	X	X	X										X					
	Xi'an	Jiwazi	Remote	Once/3years	Once/3years	X	X	X	X	X	X	X											X				
	Xi'amen	Xiaoping	Remote	Once/3years	Once/3years	X	X	X	X	X	X	X											X				
	Zhuhai	Zhusiandong	Urban	Once/3years	Once/3years	X	X	X	X	X	X	X											X				
<Indonesia>		Bege Research Forest (Damage Experimental Forest)	Rural	Once/3years	Once/3years							X															
<Japan>		Ifjira	Rural	Once/5years	Once/5year	X	X	X	X	X	X	X											X				X
		Banyu	Urban	Once/5years	Once/5year	X	X	X	X	X	X	X											X				X
<Malaysia>		Pasoh Reserve Forest	Urban	Once/3years	Once/3years	X	X	X	X	X	X	X											X				X
		Universiti Putra Malaysia Rehabilitated Forest	Urban	Once/3years	Once/3years	X	X	X	X	X	X	X											X				X
<Mongolia>		Ulaanbaatar (Bagalkhan monimian)	Urban	Once/3-5years	Once/3-5years	X	X	X	X	X	X	X											X				X
<Philippines>		Los Baños Laguna (Makiling Forest Reserve)	Rural	Once/3years	Once/3years	X	X	X	X	X	X	X											X				X
		UP Quezon- Laguna Lane Grant	Rural	Once/3years	Once/3years	X	X	X	X	X	X	X											X				X
		Metro Manila (La Mesa Dam Watershed)	Urban	Once/3years	Once/3years	X	X	X	X	X	X	X											X				X
		Mt. Sto. Tomas(ERDS Research Station)	Remote	Once/3years	Once/3years	X	X	X	X	X	X	X											X				X
<Republic of Korea>		Inssi (Mt.Nagjang)	Rural	Once/3years	Once/3years	X	X	X	X	X	X	X											X				X
<Russia>		Mondy	Remote	Once/5years	Once/5years	X	X	X	X	X	X	X											X				X
		Listvyanka	Rural	Once/5years	Once/5years	X	X	X	X	X	X	X											X				X
		Primorskaya	Rural	Once/5years	Once/5years	X	X	X	X	X	X	X											X				X
		Irtutsk	Urban	Once/5years	Once/5years	X	X	X	X	X	X	X											X				X
<Thailand>		Vachiraongkorn Dam	Remote	Once/3-5years	Once/3-5years	X	X	X	X	X	X	X											X				X
<Viet nam>		Hoa Binh	Rural	Once/3-5years	Once/3-5years	X	X	X	X	X	X	X											X				X

