



# INDONESIA

## Policies and Practices Concerning Acid Deposition

### 1. CURRENT SITUATION AND PROGRESS

#### General Evaluation

The air quality, in particular of the urban region, is deteriorating significantly during the past few years. The observed annual average concentration of PM<sub>2.5</sub> in Jakarta city was 39 µg/m<sup>3</sup>, which is about four times higher than the WHO guideline of 10 µg/m<sup>3</sup>. However, during the past few decades, the concentration levels of SO<sub>2</sub> have shown a decreasing trend, in particular in Jakarta, which could be attributed to pollution reduction policies implemented in the country. Still, the levels of SO<sub>2</sub>, NO<sub>x</sub>, and Trop-O<sub>3</sub> do not meet WHO guidelines. Monthly pH measurements show that precipitation in most cities in Indonesia has a pH of below 5.6. The highest concentrations of acidic pollutants were recorded in Jakarta.

#### Main Pollution Sources and Trends

The primary sources of air pollution in Indonesia are peatland fires, motor vehicles, coal-fired power plants, road dust, open burning, and biomass burning for cooking and heating. The country has seen a steady growth in private vehicles, which adds to the congestion of air pollution in urban areas. About 90 percent of urban air pollution is contributed to by the transport sector as almost all vehicles run on fossil fuels. Petroleum fuel and coal are the primary sources of energy production comprising 52 and 20 percent, respectively. These are significant sources of pollution in the country. In 2007, the total number of registered vehicles was 57 million, and it is expected to reach 90 million in 2030.

**National Ambient Air Quality Standards (NAAQS) vs. WHO Guidelines**

Air Pollutants	Average Time	NAAQS (µg/m <sup>3</sup> )	WHO Guidelines(µg/m <sup>3</sup> )
SPM	24-hr	230	-
	1-yr	90	-
PM <sub>10</sub>	24-hr	150	50
	1-yr	50	20
PM <sub>2.5</sub>	24-hr	65	25
	1-yr	15	10
SO <sub>2</sub>	1-hr	900	-
	24-hr	365	20
	1-yr	60	-
NO <sub>2</sub>	1-hr	400	200
	24-hr	150	-
	1-yr	100	40
O <sub>3</sub>	1-hr	235	-
	8-hr	-	100
	1-yr	50	-

## Participation in EANET

Indonesia has been participating in EANET since 1998, and the following is the institutional arrangement for the implementation of EANET:

- National Focal Point: Air Pollution Control, Ministry of Environment and Forestry
- Scientific Advisory Committee Members: Center for Climate Change Information Agency for Meteorology Climatology and Geophysics, and Ministry of Environment and Forestry
- National QA/QC Manager: Environmental Management Center, Ministry of Environment and Forestry
- National Center: Center of Environmental Impact Control Facility, Ministry of Environment and Forestry

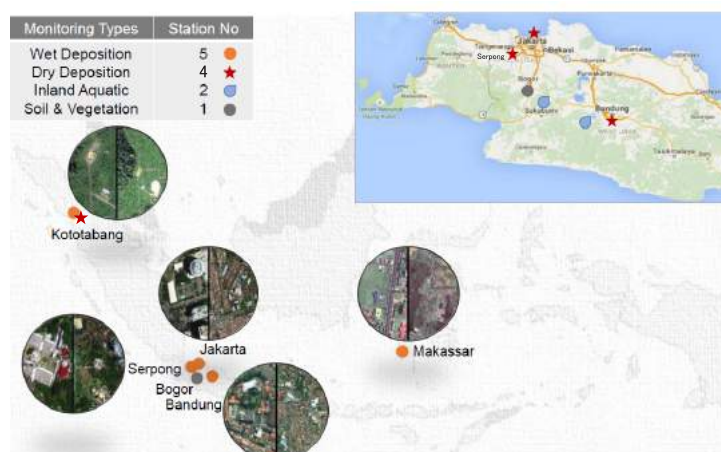
## 2. SITE INFORMATION

- EANET Monitoring Sites: Wet deposition – 5; Dry deposition – 4; Inland aquatic environment – 2; Soil and vegetation – 1
- Established new monitoring rural sites in Bali and Lombok for wet deposition in 2019.

Monitoring Site	Site Classification	Location		Parameters Measured			
		Latitude	Longitude	Wet Dep.	Dry Dep.	Soil & Veg.	Inland Water
Serpong (EMC)	Rural	6°21'02"S	106°40'04"E	✓	✓		
Bandung (LAPAN)	Urban	6°53'42"S	107°35'11"E	✓	✓		
Jakarta (BMKG)	Urban	6°09'22"S	106°50'33"E	✓	✓		
Maros (BMKG)	Rural	4°59'50"S	119°34'18"E	✓			
Kototabang (BMKG)	Remote	0°12'9"S	100°19'5"E	✓	✓		
Situ Patengang (EMC)	Rural	7°9'59"S	107°21'22"E				✓
Situ Gunung (EMC)	Rural	6°49'55"S	106°54'51"E				✓
Bogor Forest Research (Bogor Forest Park)	Rural	6°33'10"S	106°44'52"E			✓	

### Monitoring Parameters

Monitoring Type	Parameters	Frequency
Wet Deposition	pH, EC, Precipitation Amount, $SO_4^{2-}$ , $NO_3^-$ , $Cl^-$ , $NH_4^+$ , $Na^+$ , $K^+$ , $Ca^{2+}$ , $Mg^{2+}$	Weekly
Dry Deposition	$SO_2$ , $HNO_3$ , $NH_3$ , $NO_2$ , $PM_{2.5}$ , $SO_4^{2-}$ , $NO_3^-$ , $Cl^-$ , $NH_4^+$ , $Ca^{2+}$ , $Mg^{2+}$	Biweekly (FP, PS)
Inland Aquatic Environment	pH, EC, Alkalinity, $SO_4^{2-}$ , $NO_3^-$ , $Cl^-$ , $NH_4^+$ , $Na^+$ , $K^+$ , $Ca^{2+}$ , $Mg^{2+}$ , Transparency, $PO_4^{3-}$ , $NO_2^-$ , DOC	3 times/year
Soil	Ions in soil	Every 5 years
Vegetation	$K^+$ in leaves, tree decline	Every 5 years

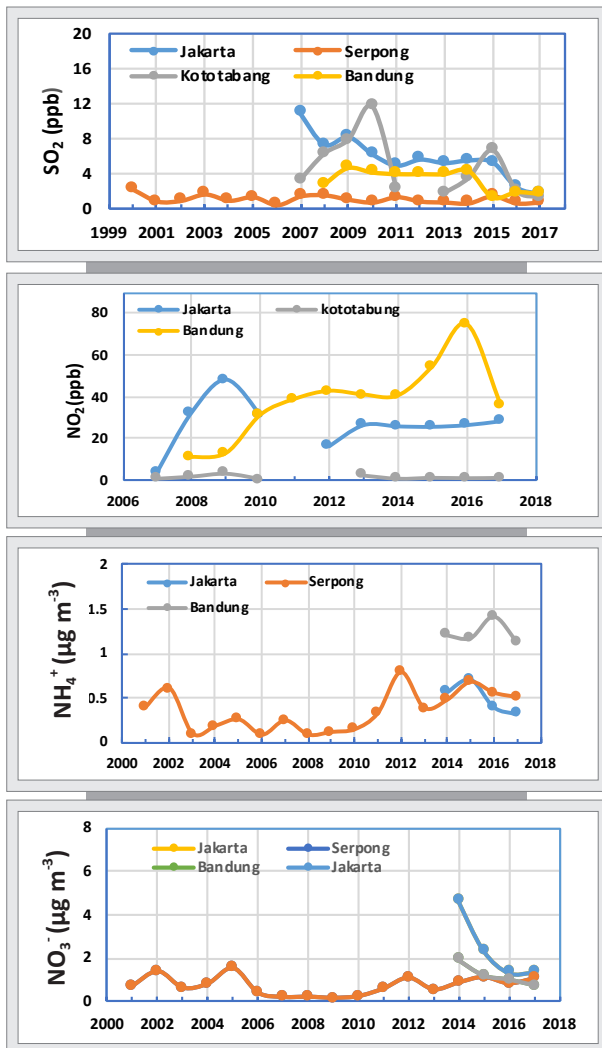




### 3. HIGHLIGHTS OF MONITORING RESULTS

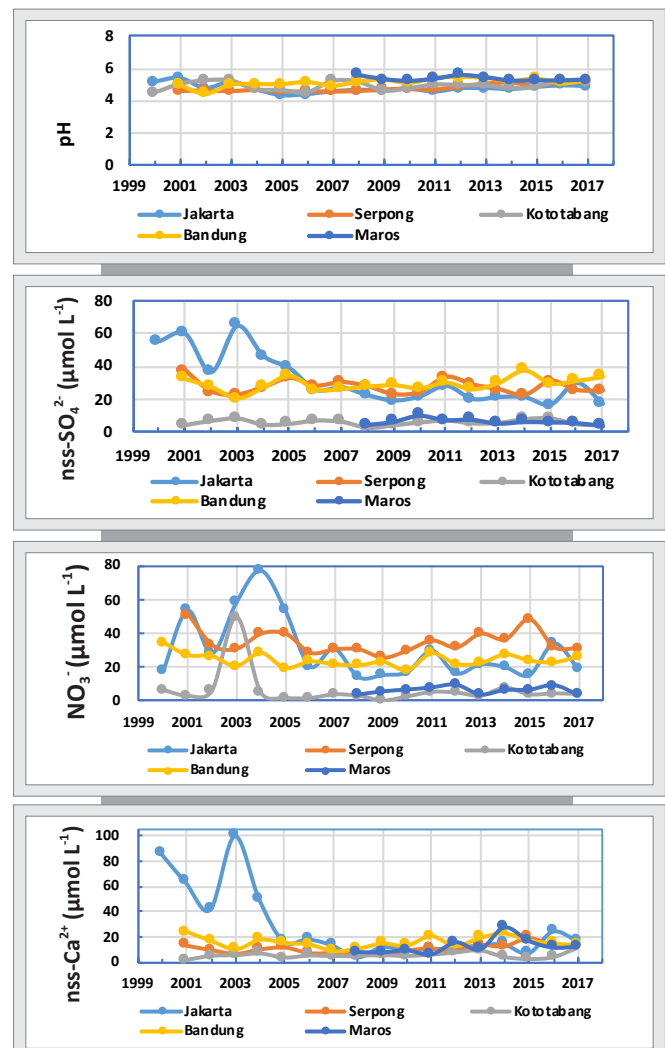
The following figures show the time-series trend of the annual average of important acid deposition parameters in the dry deposition, wet deposition, and inland water quality.

#### Dry Deposition



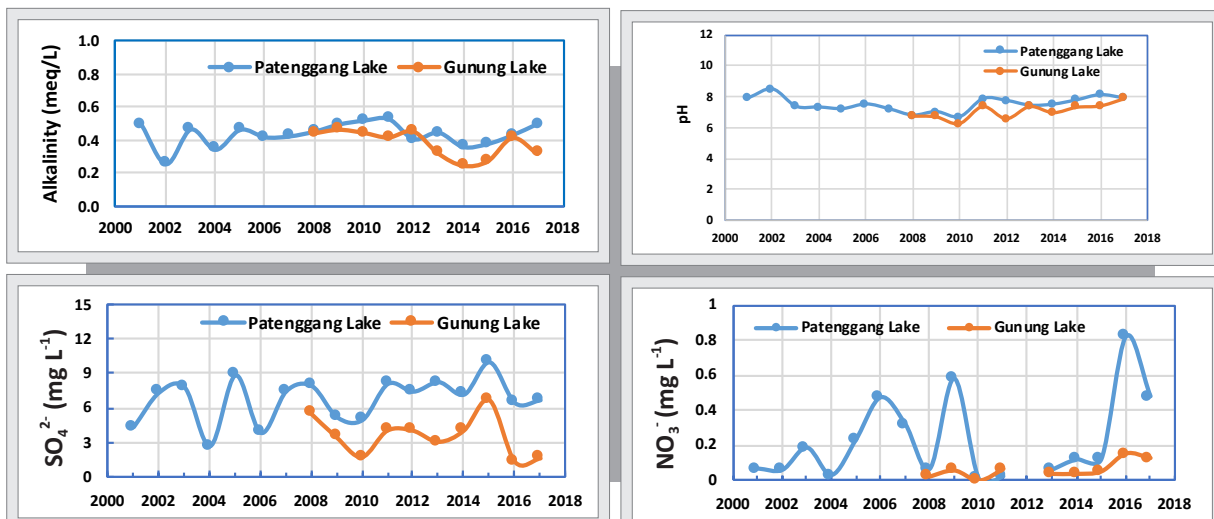
- SO<sub>2</sub> level is below to the NAQSS and is showing decreasing trend.
- NO<sub>2</sub> level is increasing but remain within NAQSS.

#### Wet Deposition



- pH is slightly acidic.
- nss-SO<sub>4</sub><sup>2-</sup> is showing decreasing trend similar to that of SO<sub>2</sub>.
- No change in NO<sub>3</sub><sup>-</sup>.

#### Inland Water



- pH in inland water is almost neutral with low alkalinity.

## 4. AWARENESS ACTIVITIES, RELEVANT POLICIES AND FUTURE PLAN

- Organize national seminars and workshops on atmospheric science pertaining to acid deposition.
- Conduct environmental education of acid deposition (laboratory practice) for students.
- Laboratory of Chemistry, PSTA-LAPAN, was accredited by National Accreditation Body for wet & dry deposition parameters.
- Conduct Annual Technical Meeting of EANET activities.
- Organize Workshop of Monitoring and Information of Ambient Air Quality.
- Organize Workshop on Eco-Driving Practice in Urban Area.

### Policies and Practices Concerning Air Pollution

Indonesia passed following regulations and laws for control and abatement of air pollution in the country:

- The State Minister of Environment Decree (No. 13/1995) on emission standard for stationary industrial sources.
- The Government Regulation (No.32/2006) Environment Act.
- The Government Regulation (No.41/1999) Air Pollution Control Act.
- The State Minister of Environment Decree (No. 17/2019) for fertilizer and Ammonium Nitrate Industry.
- The State Minister of Environment Decree (No.05/2006) on emission standard for in-use vehicles.
- The State Minister of Environment Decree (No. 17/2008) on emission standards for ceramics.
- The State Minister of Environment Decree (No.15/2019) for thermal power plant.
- The State Minister of Environment Decree (No.4/3/2009) on emission standards for vehicular emissions.
- The State Minister of Environment Decree (No.13/2009) on emission standards for Oil and Gas.
- The National Law (No.22/2009) on Road Traffic and Transportation.
- The National Law (No.32/2009) on Environmental Protection and Management.
- The State Minister of Environment Decree (No.10/2012) on emission standards for motorcycle (L3 category).
- The State Minister of Environment Decree (No. 19/2017) on emission standards for Cement Industries.
- The State Minister of Environment Decree (No. 20/2017) on emission standards for new type vehicles (M, N, and O categories).

Indonesia established an Agency for Peatland Restoration to mitigate peatland fires in 2015. Efforts to reduce air pollution include the development of Intelligent Transport System (ITS) and Area Traffic Control System; adoption of Green Transportation concept in cities; reforms in Transit System (BRT, MRT, LRT, TOD, etc.); replacement of Armada of public transportation; adoption a zero fatality policy; production of low cost and green vehicles; implementation of Eco-Driving Programme; implementation of Blue-Sky Programme; and encouraging car-free day.

### EANET Activities and Future Plan

- Conducting monitoring of acid deposition parameters regularly.
- Participation in annual EANET Inter-Laboratory Comparison of Wet Deposition, Dry Deposition, Inland Aquatic, and Soil.
- Ministry of Environment and Forestry monitor ambient air quality and provide air quality index for air quality management.
- Enhancement of local monitoring network cooperation.
- Review on National Monitoring Plan.

#### National Focal Point

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