FACTSHEET

EANET

ACID DEPOSITION MONITORING NETWORK IN EAST ASIA

VIET NAM

Policies and Practices Concerning Acid Deposition

1. CURRENT SITUATION AND PROGRESS

General Evaluation

Air pollution has become one of the most concerning health and environmental hazards not only in Hanoi but throughout Viet Nam. During winter-time, the level of air pollution becomes worse because of stagnation of meteorological conditions. An estimate suggests that about 98 percent of the population is exposed to high level of $PM_{2.5}$ exceeding the WHO guidelines. The yearly averaged concentrations of $PM_{2.5}$ during 2015, 2016, and 2017 were 40, 49, and 37 (in $\mu g/m^3$), which was about twice higher than the prescribed NAAQS and 4 to 5 times higher than the WHO guideline of 10 $\mu g/m^3$. Concentrations of SO_2 have been decreasing over the years, except few years. Hanoi was a hotspot for wet and dry deposition of nitrate compounds, implying acidic precipitation and air particles.

Main Pollution Sources and Trends

In Viet Nam, road traffic is responsible for up to 70 percent of air pollution, accounts for 85% of CO and 95% of VOCs. There are more than 18 million motorbikes and more than 700,000 automobiles, many of which are outdated and prone to producing air pollutants. Motor vehicles are rising every year with an average increase of car 17 percent in Hanoi and 15 percent in Ho Chi Minh, whereas, the average increase of motorcycle in Hanoi is 11 percent and 10 percent in Ho Chi Minh per year. Coal-fired power, industries, construction activities, waste incineration, household cooking also contribute significantly to the increasing level of air pollution in the country.

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

Air Pollutants	Average Time	NAAQS ($\mu g/m^3$)	WHO Guidelines ($\mu g/m^3$)
TSP	1-hr	300	-
	24-hr	200	-
	1-yr	100	-
PM_{10}	24-hr	150	50
	1-yr	50	20
$PM_{2.5}$	24-hr	50	25
	1-yr	25	10
SO_2	1-hr	350	-
	24-hr	125	20
	1-yr	50	-
NO_2	1-hr	200	200
	24-hr	100	-
	1-yr	40	40
O_3	1-hr	200	-
	8-hr	120	100

EANET

UN environment programme

ACAP

Participation in the EANET

Viet Nam joined EANET since its establishment and has been following institutional arrangement for the implementation of EANET activities at regional and country level:

- National Focal Point: Assoc. Institute of Meteorology, Hydrology and Climate Change, Ministry of Natural Resources and Environment
- Scientific Advisory Committee Members: Institute of Meteorology, Hydrology and Climate Change, Ministry of Natural Resources and Environment
- National QA/QC Manager: Institute of Meteorology, Hydrology and Climate Change, Ministry of Natural Resources and Environment
- National Center: Institute of Meteorology, Hydrology and Climate Change, Ministry of Natural Resources and Environment

2. SITE INFORMATION

Viet Nam has well-equipped air monitoring facilities, including acid deposition. There are three systems of acid deposition monitoring in Viet Nam, namely, EANET monitoring sites, and monitoring sites operated by the Viet Nam Environment Protection Agency (VEPA) and Hydro-Meteorology National Center (HMNC). From 2000 to 2010, Viet Nam had 20 automatic air monitoring stations, of which ten stations were in Ho Chi Minh City, and another ten were installed in different provinces in the country, including four in Hanoi. Since 2010, the Ministry of Natural Resources and Environment has installed seven automatic air monitoring stations in 6 provinces/cities. Air quality parameters such as PM_{10}, $PM_{2.5}$, $PM_{1.0}$, CO, NO_x, tropospheric (ground-level) ozone, and SO_2 are being monitored at these stations.

Monitoring Sites	Site Classification	Location			Parameters Measured			
		Latitude	Longitude	Altitude(m)	Wet Dep.	Dry Dep.	Soil & Veg.	Inland Water
Yen Bai	Rural	21°42′28″N	104°52′29″E	56	✓	✓		
Ha Noi	Urban	21°03′24″N	105°43′36″E	6	✓	✓		
Hoa Binh	Rural	20°50′12″N	105°20′32″E	23	✓	✓		✓
Cuc Phuong	Remote	20°18′01″N	105°41′38″E	155	✓		✓	
Da Nang	Urban	16°02′35″N	108°12′24″E	5	✓			
Ho Chi Minh	Urban	10°47′04″N	106°42′00″E	5	✓	✓		
Can Tho	Rural	10°05′18″N	105°41′45″E	2	✓	✓		

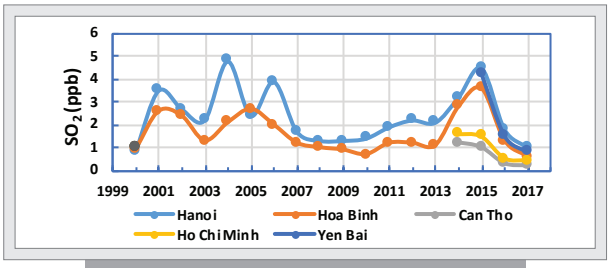
Monitoring Parameters

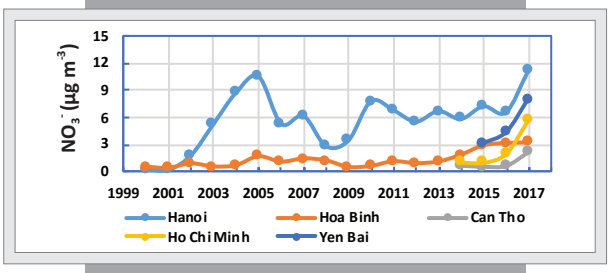
Monitoring Type	Parameters	Frequency
Wet Deposition	pH, EC, Cl^-, F^-, NO_3^-, SO_4^{2-}, Ca^{2+}, Mg^{2+}, K^+, Na^+, NH_4^+ and meteorological parameters	Daily
Dry Deposition	SO_2, HCl , HNO_3, NH_3, Cl^-, NO_3^-, SO_4^{2-}, Ca^{2+}, Mg^{2+}, K^+, Na^+, NH_4^+	Weekly
Inland Aquatic Environment	Temperature, pH, EC, Cl^-, F^- ,NO_3^-, SO_4^{2-}, Ca^{2+}, Mg^{2+}, K^+, Na^+, NH_4^+, PO_4^{3-}, alkalinity, COD, color, NO_2^-, transparency	4 times in a year

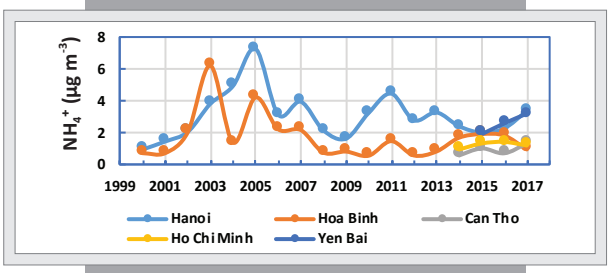
3. HIGHLIGHTS OF MONITORING RESULTS

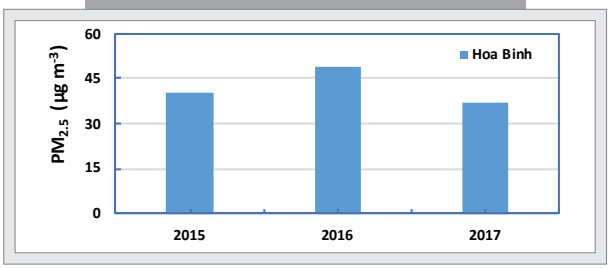
Following figures shows the time-series trend of the annual average of important acid deposition parameters in the dry deposition, wet deposition, and inland water quality of Viet Nam.

Dry Deposition



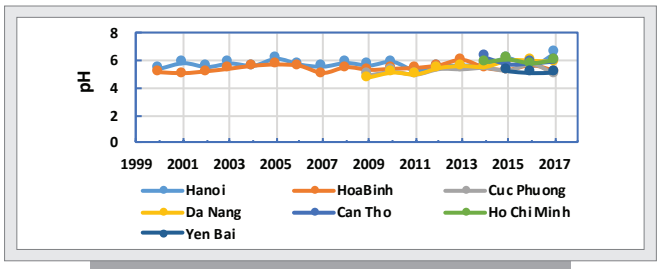


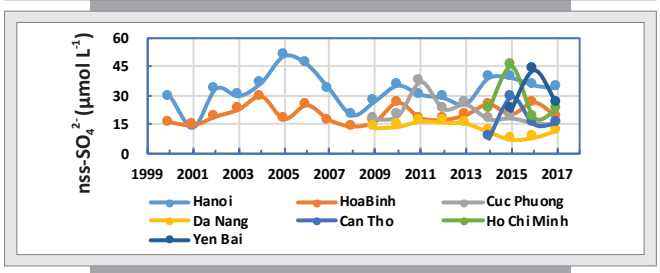


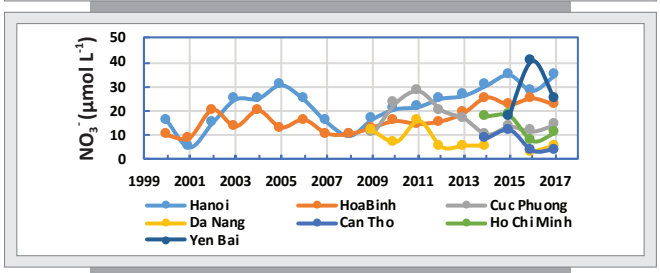


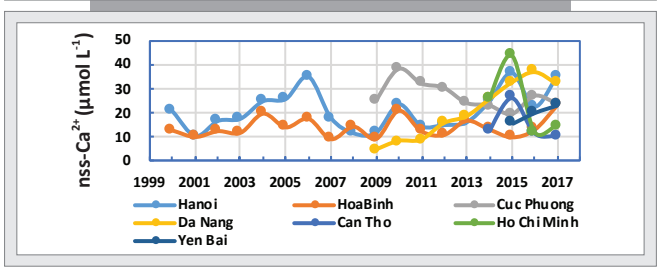
- Except few years, SO_2 is showing decreasing trend
- NO_3^- is showing increasing trend.
- $PM_{2.5}$ is higher than NAAQS.

Wet Deposition



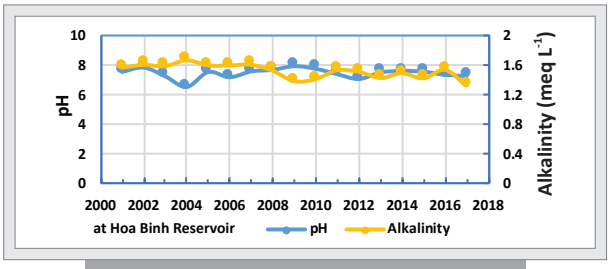




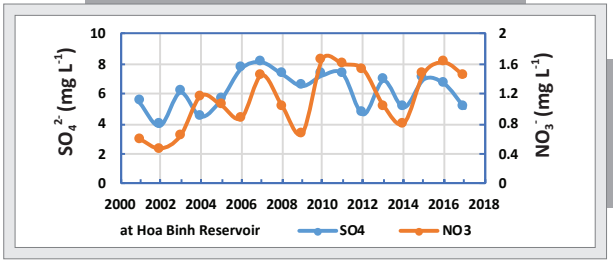


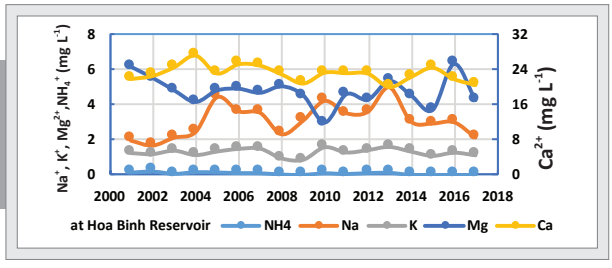
- pH values are slightly acidic.
- nss-SO_4^{2-}, NO_3^- have fluctuations in year by year.

Inland Water



- pH values are almost neutral.
- SO_4^{2-} is showing increasing trend.





4. AWARENESS ACTIVITIES, RELEVANT POLICIES AND FUTURE PLAN

- Organizing workshops for raising public awareness on air pollution, acid deposition and their impacts.
- Production and telecast of the television programme on air pollution including acid deposition problems.
- Development of brochure for school children and general public on origins, detection, and abatement of the damage of acid deposition.
- Incorporation of environmental education in high school syllabus and universities.
- Periodic assessment on the status of acid deposition in Viet Nam.

Policies and Practices Concerning Air Pollution

- Air pollution control is identified as one of the 19 priority areas in the Oriented Strategy for Sustainable Development.
- Viet Nam has implemented a number of air quality management and control measures, including tightening the emission standard for vehicles in road traffic; enhancing vehicle quality and piloting clean fuel for some vehicles in urban areas; enhancing technical and management measures to mitigate pollution from production activities, especially industrial activities; and checking, adjusting and issuing the Viet Nam Standard (QCVN) on air quality and emissions to meet WHO recommended standards or are within WHO interim targets.
- It passed an Environmental Protection Tax in 2010, Environmental Protection Law in 2014, and the National Action Plan on Air Quality Management in 2016.
- The government is drafting a national strategy for air pollution control, including the development of emission inventory and air quality management plan.
- In Ho Chi Minh City, 90 percent of industrial polluters have been requested to install air treatment systems by 2020.
- In Hanoi, up to eight metro lines will be built.
- Action is also being taken to promote non-motorized transport, including the building of sidewalks and bike lanes in new road projects, car-free areas.

EANET Activities and Future Plan

- Regular monitoring of EANET parameters on the dry deposition, wet deposition, and inland water at designated monitoring sites.
- Participation in the QA/QC activities including inter-laboratory comparison projects, namely, project on Wet Deposition, project on Soil, and project on Inland Aquatic Environment.
- Hands-on training on monitoring and analysis of acid deposition parameters; Increasing number of EANET monitoring sites (especially in middle Viet Nam).
- Strengthening understanding and capacity for monitoring of meteorological parameters.
- Using the acid deposition modeling for simulating atmospheric transport and deposition to evaluate the state of acid deposition problems in East Asia, based on the monitoring data.
- Monitoring the soil and vegetation/forests one time/year.
- Promotion of the monitoring of ozone and $PM_{2.5}$ including research cooperation.
- Capacity-building activities, especially for ozone and $PM_{2.5}$ monitoring.

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