



CAMBODIA

Policies and Practices Concerning Acid Deposition

1. CURRENT SITUATION AND PROGRESS

General Evaluation

Rapid industrialization, urbanization, and increasing socio-economic activities, including using solid fuels for cooking and power plant have led to a growing concern on the increasing level of air pollution in the country. The observed annual concentrations of PM_{2.5} at Phnom Penh site were 13.47 µg/m³ and 19.26 µg/m³ in 2017 and 2018, respectively, which are about two times higher than the WHO guideline of 10 µg/m³, however, it complies to Cambodia proposed Ambient Air Quality Standard of 25 µg/m³. The observed level of SO₂ has shown a decreasing trend from 1.8 ppb in 2010 to 0.5 ppb in 2015 and then shown an increasing trend to 1.3 ppb in 2017, which is under Cambodia Ambient Air Quality Standard 38.17ppb (100 µg/m³). Monitoring of acid deposition parameters for more than 15 years shows no negative impacts on the environment from acid deposition in Cambodia, although its effect on the ancient historical sites such as Angkor Wat Temple is doubtful.

Main Pollution Sources and Trends

The transport sector is a dominant source of air pollution in urban regions. In 2016, 37,500 new passenger cars were registered, which makes the total number of registered vehicles in Cambodia to more than 3.6 million, including 537,459 cars and 3,132,361 motorbikes. About 95 percent rural region and about 50 percent urban region, with the national average of about 88 percent, use solid fuels such as wood and charcoal for cooking, which are a dominant indoor air pollution sources. Emissions from industries, such as coal power plants, cement factories, food and beverages, textiles, including seasonal open burning of agricultural residues and forest fires are also significant sources of air pollution in the country.

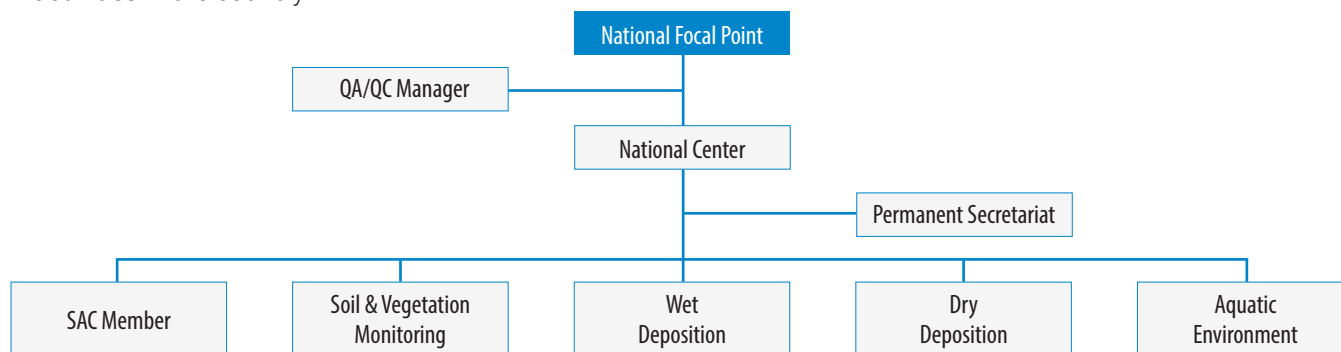
National Ambient Air Quality Standards (NAAQS) vs. WHO Guidelines

Air Pollutants	Average Time		NAAQS	WHO Guidelines
CO	8-hr	(mg/m ³)	20	10
NO ₂	1-hr	(µg/m ³)	300	200
	24-hr	(µg/m ³)	100	-
	1-yr	(µg/m ³)	-	40
SO ₂	1-hr	(µg/m ³)	500	-
	24-hr	(µg/m ³)	300	20
	1-yr	(µg/m ³)	100	-
TSP	1-yr	(µg/m ³)	100	-
PM _{2.5}	1-yr	(µg/m ³)	25 (proposed)	10
PM ₁₀	1-yr	(µg/m ³)	50 (proposed)	20

Cambodia has no national standards for annual concentrations of NO₂, PM₁₀, and PM_{2.5}. However, Cambodia has proposed to revise the sub-degree on Air Pollution Control and Noise Disturbance with the new Ambient Air Quality Standard that will be include PM₁₀, and PM_{2.5}, and other standards such as Emission Standard for Vehicle and Fuel Quality Standard.

Participation in EANET

Cambodia has been participating in EANET since 2001 with the following institutional arrangement for the implementation of EANET activities in the country:



- National Focal Point: General Directorate of Environmental Protection, Ministry of Environment
- Scientific Advisory Committee Members: Department of Air Quality and Noise Management, General Directorate of Environmental Protection, Ministry of Environment
- National QA/QC Managers: Laboratory, General Directorate of Environmental Protection, Ministry of Environment
- National Center: Department of Air Quality and Noise Management, General Directorate of Environmental Protection, Ministry of Environment

2. SITE INFORMATION

Cambodia has started monitoring of acid deposition at Phnom Penh City in 2004 and expanded its activities to monitoring of inland aquatic environment at Kirirom National Park in 2011.

Monitoring Site	Site Classification	Location			Parameters Measured		
		Latitude	Longitude	Altitude (m)	Wet Dep.	Dry Dep.	Inland Water
Phnom Penh	Urban	11°33'18"N	104°56'20"E	15	✓	✓	
Siem Reap	Urban	13°37'55"N	103°89'31"E	17	✓		
Sras Srang Lake	Remote	11°19'42"N	104°2'13"E	800			✓

Monitoring Parameters

Monitoring Type	Parameters	Frequency
Wet Deposition	pH, EC, SO_4^{2-} , NO_3^- , Cl^- , NH_4^+ , Na^+ , K^+ , Ca^{2+} , Mg^{2+}	Weekly
Dry Deposition	Filtration: Aerosols, SO_4^{2-} , NO_3^- , Cl^- , Na^+ , NH_4^+ , K^+ , Ca^{2+} , Mg^{2+} Adsorption: HNO_3 , partial SO_2 , partial HCl , SO_4^{2-} , NO_3^- , Cl^- , NH_4^+ Neutralization by alkali impregnated cellulose filter: SO_2 , HCl , SO_4^{2-} , Cl^- Neutralization by acid-impregnated cellulose filter: NH_3 , NH_4^+	Biweekly
Inland Aquatic Environment	pH, EC, Temperature, Transparency, DO, Alkalinity, SO_4^{2-} , NO_3^- , Cl^- , Na^+ , K^+ , NH_4^+ , Ca^{2+} , Mg^{2+}	Biannually

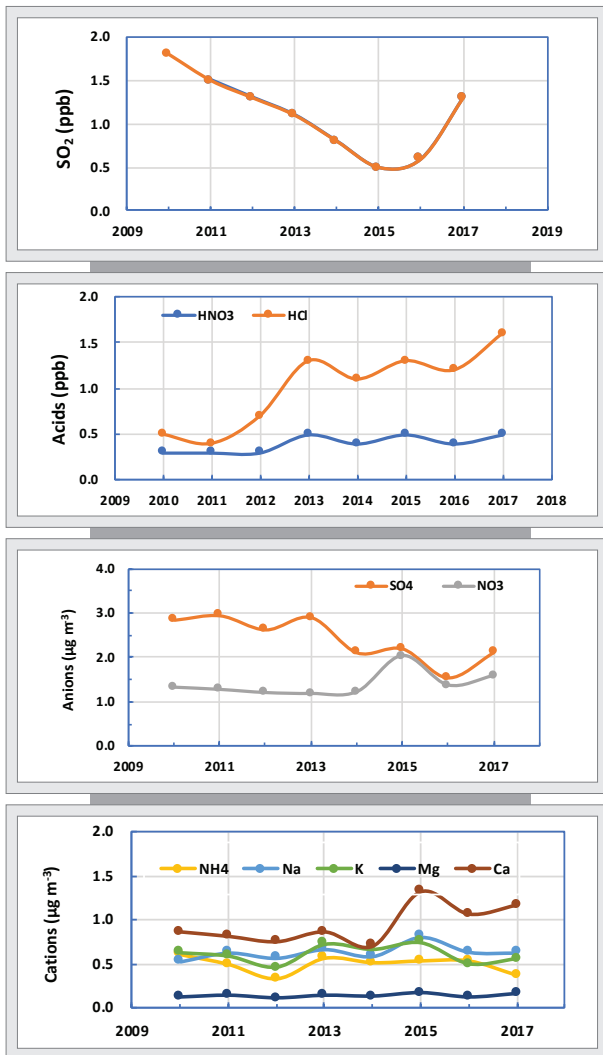




3. HIGHLIGHTS OF MONITORING RESULTS

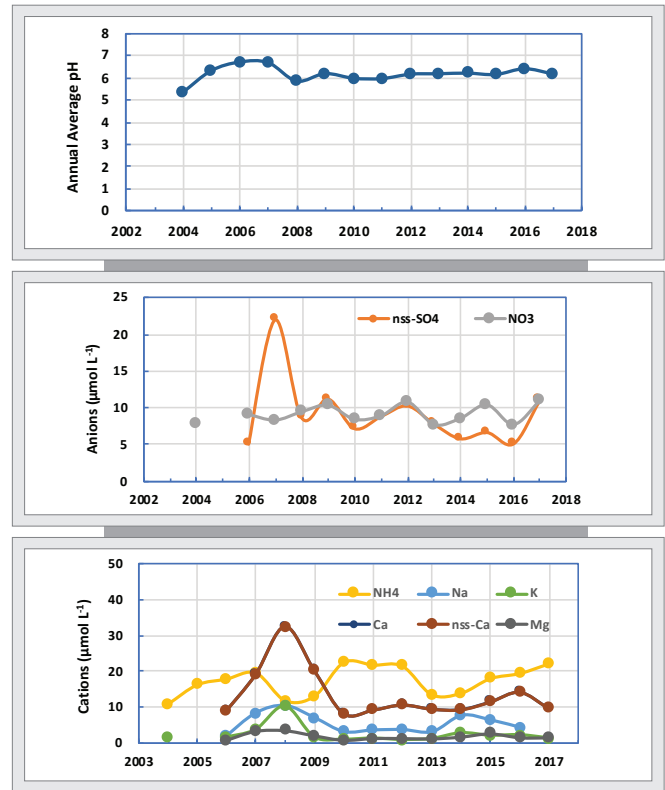
The following figures show the time-series trend of the annual average of important acid deposition parameters in the dry deposition, wet deposition, and inland water quality.

Dry Deposition



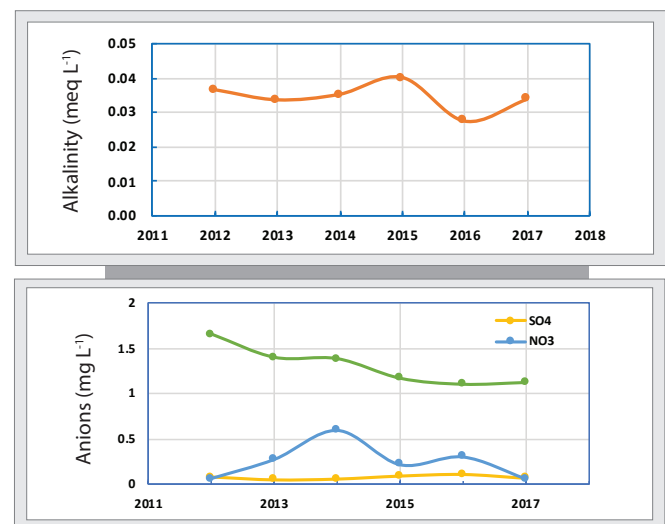
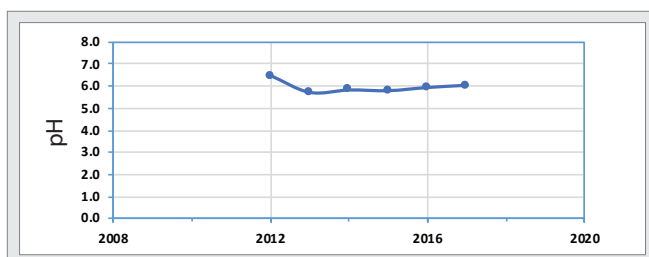
- SO₂ and nss-SO₄²⁻ were showing decreasing trend while acids increasing.

Wet Deposition



- pH value in wet deposition is slightly acidic.
- nss-SO₄²⁻ was showing decreasing.
- No change in NO₃⁻.

Inland Water

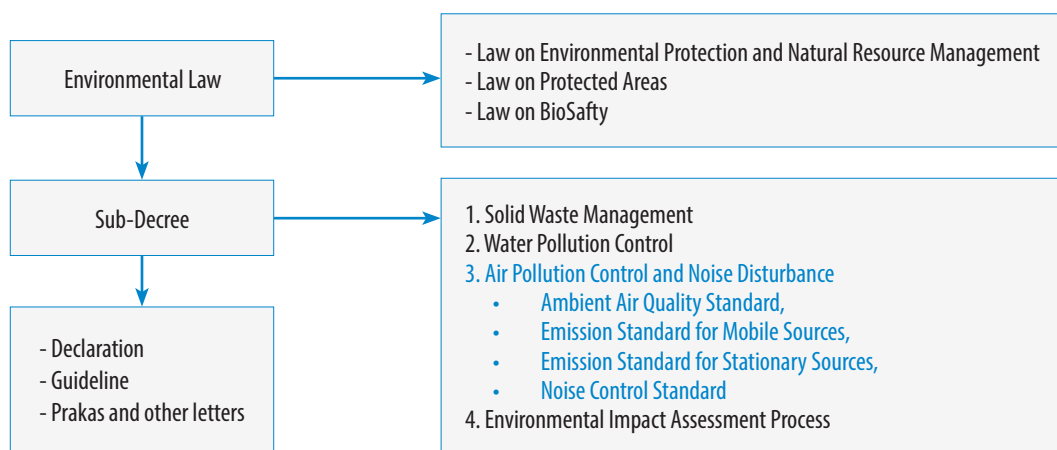


4. AWARENESS ACTIVITIES, RELEVANT POLICIES AND FUTURE PLAN

- Ministry of Environment (MoE) conducts training courses for new staff on the management of environmental and natural resources every year as well as training for new staff of laboratory and university students every year.
- Periodic monitoring of stationary sources (industrial sector) with an interval of 45 days for specific factories and 60 days for normal factories.
- Conduct technical tests and monitoring of emissions of toxic gases of mobile sources (all kinds of vehicles) in 2 years (light-duty vehicles) and one year (heavy-duty vehicles).

Policies and Practices Concerning Air Pollution

Cambodia has the following laws, regulations, and frameworks to address air pollution in the country:



- Inspections of pollution sources, such as factories, are conducted regularly to prevent and mitigate environmental impact.
- Conduct regular periodic testing of motor vehicle emissions during the registration process.
- Ministry of Environment of Cambodia is in the process of revising sub degree on Air Pollution Control and Noise Disturbance, which include ambient air quality standards, emission standard and fuel standard. Recently, Cambodia is in the process of preparing the Environmental Code, which will combine all Environmental regulations as one and specify all kinds of environmental issues in this Code.
- The country has a National Policy, Strategy, and Action Plan on Energy Efficiency that sets out the following strategic objectives: improve energy efficiency in the industrial sector by 28 percent; strengthen capacity-building in industrial energy efficiency and raise awareness among factory owners and managers regarding energy efficiency issues.

EANET Activities and Future Plan

- Strengthen understanding and analytical capabilities.
- Compile methods of analysis on wet, dry, and inland aquatic.
- Enhance on local monitoring network.
- Promote public awareness to internship students from the local university.
- Continue the work of participating laboratories for monitoring activity.
- Continue with close collaboration with EANET.

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