



EANET

ACID DEPOSITION MONITORING NETWORK
IN EAST ASIA



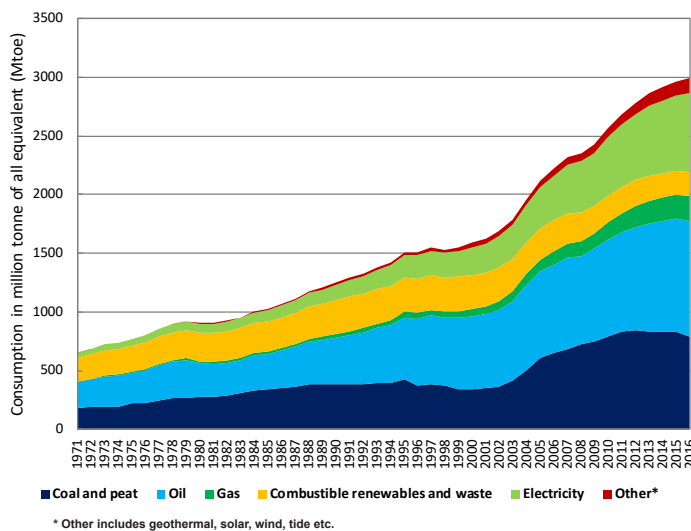
BACKGROUND

Air, water, land and biodiversity in ecosystems are essential for supporting human life on the planet Earth. But ironically though, the ability and capacity of these systems to support human existence have been imperiled by humans themselves through economic activities. There is evidence of unprecedented environmental changes at the global and regional levels, and these changes have major implications on human well-being locally.

Almost one-third of the world's population lives in the East Asian region. Due to rapid economic growth and industrialization, many countries in this region are facing a serious threat from acid deposition including particulate matter (PM) and ozone, particularly if their energy production depends on sulfur-rich coal. Regional cooperation for measures to prevent this issue is urgently needed.



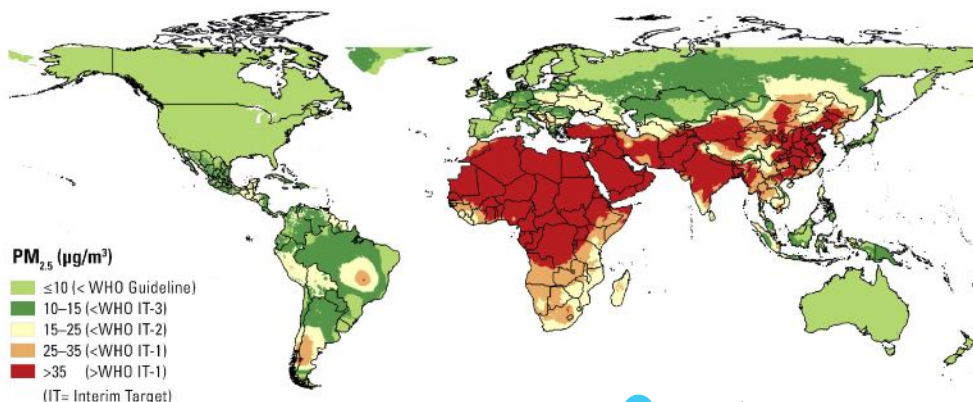
● Air Pollution in East Asia



The Figure of total energy consumption by fuel in East Asia shows increasing trends of energy consumption in East Asia based on the type of fuel. The increasing trend of energy consumption in East Asia is likely to cause more serious issues on acid deposition including particulate matter (PM) and ozone in the future. The situation is serious in that unless the fossil-based fuel consumptions and their environmental aftermath are curtailed, the damage they cause to human health and the environment will continue and become more serious in the decades to come.

● Total energy consumption by fuel in East Asia Source: International Energy Agency (IEA), World Energy Balances, 2018 edition

Comparison of 2017 annual average PM_{2.5} concentrations to the WHO Air Quality Guideline (2005) in the State of Global Air 2019 by Health Effects Institute (HEI) and Institute for Health Metrics and Evaluation's (IHME's) Global Burden of Disease Project is shown in Figure. In 2017, 92% of the world's population lived in areas that exceeded the WHO Guideline for PM_{2.5} (10 µg/m³), 54% lived in areas exceeding Interim Target (IT) 1 (IT-1, 35 µg/m³), 67% lived in areas exceeding IT-2 (25 µg/m³), and 82% lived in areas exceeding IT-3 (15 µg/m³). In this regard, in order to improve such poor air quality, it is required to implement various measures that can positively impact on human health and ecosystems, as well as contribute to achieving the Sustainable Development Goals (SDGs).



● Annual average PM_{2.5} concentration in 2017 relative to the WHO Air Quality Guideline.

Source: HEI/IHME State of Global Air / 2019 <https://www.stateofglobalair.org/report>

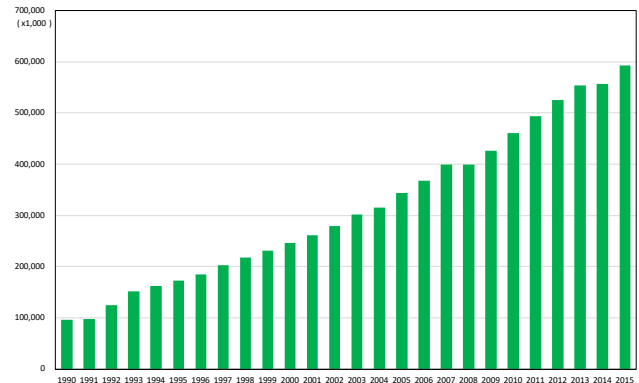
AIR POLLUTION AND ACID DEPOSITION



Decline of forests

the photochemical reaction of NO_x and VOCs under sunlight in the troposphere causes harmful effects on humans and the ecosystem as a strong oxidizing substance. Since the emission of NO_x in East Asia is rapidly increasing due to the rapid rise in the use of automobiles, concentrations of tropospheric ozone are predicted to increase in the future. The figure on the right shows an increasing trend in the number of vehicles in East Asia.

Major air pollutants, those gases or particles emitted from sources directly, which are prevalent in East Asia are sulfur dioxide (SO_2), nitrogen oxides (NO_x), particulate matter (PM), volatile organic compounds (VOCs), carbon monoxide (CO), and toxic elements (e.g., lead (Pb), fluorine (F), mercury (Hg)). These pollutants are emitted from automobiles and industries. Secondary pollutants, those gases or particles formed by atmospheric reactions of precursor or primary emissions are ozone (O_3), photochemical oxidants, and secondary aerosols which are also prevalent in East Asia. Ozone produced from

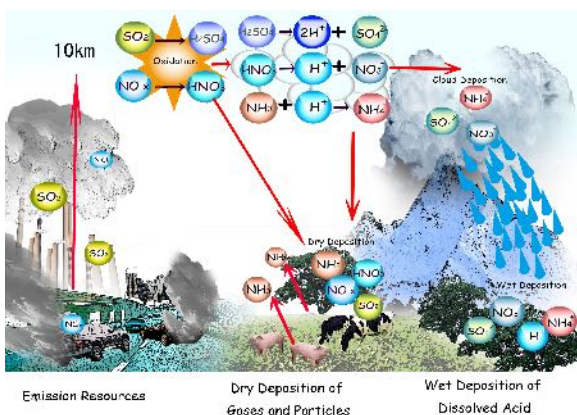


Trend of the number of vehicles in East Asia

Reference: World Development Indicators (WB),
World Road Statistics (IRF), UN Statistical Division

Mechanism of Acid Deposition

SO_2 and NO_x are emitted into atmosphere with other pollutants during the combustion of fossil fuels (oil, coal, etc.) by industries and power plants as well as in engines of motor vehicles. These gases are transformed by chemical reactions with air constituents into sulfuric and nitric acids which are transported and come down to the surface of the earth far from the emission sources. The acid deposition phenomena are realized in two types of processes as shown in the Figure below. One process is "wet deposition" when acids are taken by cloud water and brought down to land and water bodies with rain, snow or fog, which is called rainout, and acids are scavenged by descending raindrops and snowflakes which is called washout. A large amount of dissolved acids cause the strong acidity of precipitation commonly known as "acid rain".



Mechanism of acid deposition

By another process called "dry deposition", airborne acids are removed from the air during fine and cloudy days. They pass through the air to the ground and deposit on water bodies, grasses, trees, buildings, and even inhaled into the human respiratory system causing health problems.

Although ammonia (NH_3), emitted from fertilizers and livestock, does not fall under the criteria as an air pollutant affecting human health, it reacts with nitric and sulfuric acids in the atmosphere to form fine particulate matter through the process of neutralization. After deposition on the ground, ammonium compounds are oxidized into nitrate in soil and produce acid. Moreover, excess nitrogen loads by nitrate and ammonium disturb the nutrient cycles of ecosystems.

ACID DEPOSITION MONITORING NETWORK IN EAST ASIA (EANET)

The Acid Deposition Monitoring Network in East Asia (EANET) is an intergovernmental regional network established for promoting cooperation among countries in East Asia to address acid deposition problems.

Objectives of EANET

- To create a common understanding of the state of acid deposition problems in East Asia;
- To provide useful inputs for decision-making at the local, national, and regional levels aimed at preventing, or reducing adverse impacts on the environment caused by acid deposition; and
- To contribute to cooperation on the issues related to acid deposition among the participating countries.

Thirteen Participating Countries of EANET



Major Activities of EANET

EANET addresses the deposition of major acidifying species and related chemical substances such as SO_4^{2-} , NO_3^- , H^+ , SO_2 , NO_2 , ozone and particulate matter (PM) issues in an integrated approach for implementing the following major activities:

1. Acid deposition monitoring

- Review and revision/establishment where appropriate of the national monitoring plans*
- Implementation of monitoring using common methodologies*
Wet deposition, dry deposition, soil/vegetation, inland aquatic environment and catchment

2. Compilation, evaluation, storage, analysis and provision of data

- Submission of monitoring data to the Network Center*
- Issuing of Data Report
- Periodic report on the state of acid deposition
- Dissemination of the data and relevant information through EANET website

3. Promotion of quality assurance and quality control (QA/QC) activities

- Implementation of QA/QC programs
- Development of Standard Operating Procedures (SOPs)*
- Inter-laboratory comparison projects

4. Implementation of technical support and capacity building activities

- Dispatch of technical missions
- Individual training at the NC
- National training*
- Utilization of existing training programs and others

5. Promotion of research and studies related to acid deposition and air pollution problems

- Joint studies on wet/dry deposition, catchment analysis, etc.
- EANET fellowship research

6. Promotion of public awareness activities

- Development of public awareness materials and implementation of environmental studies
- Workshop on public awareness

7. Other relevant activities

- Cooperation and exchange of information and experiences with other regional and global networks/initiatives

* by participating countries



● EANET Data Report



● Public awareness activities at the Network Center



● EANET Training at the Network Center



● Network Center technical mission

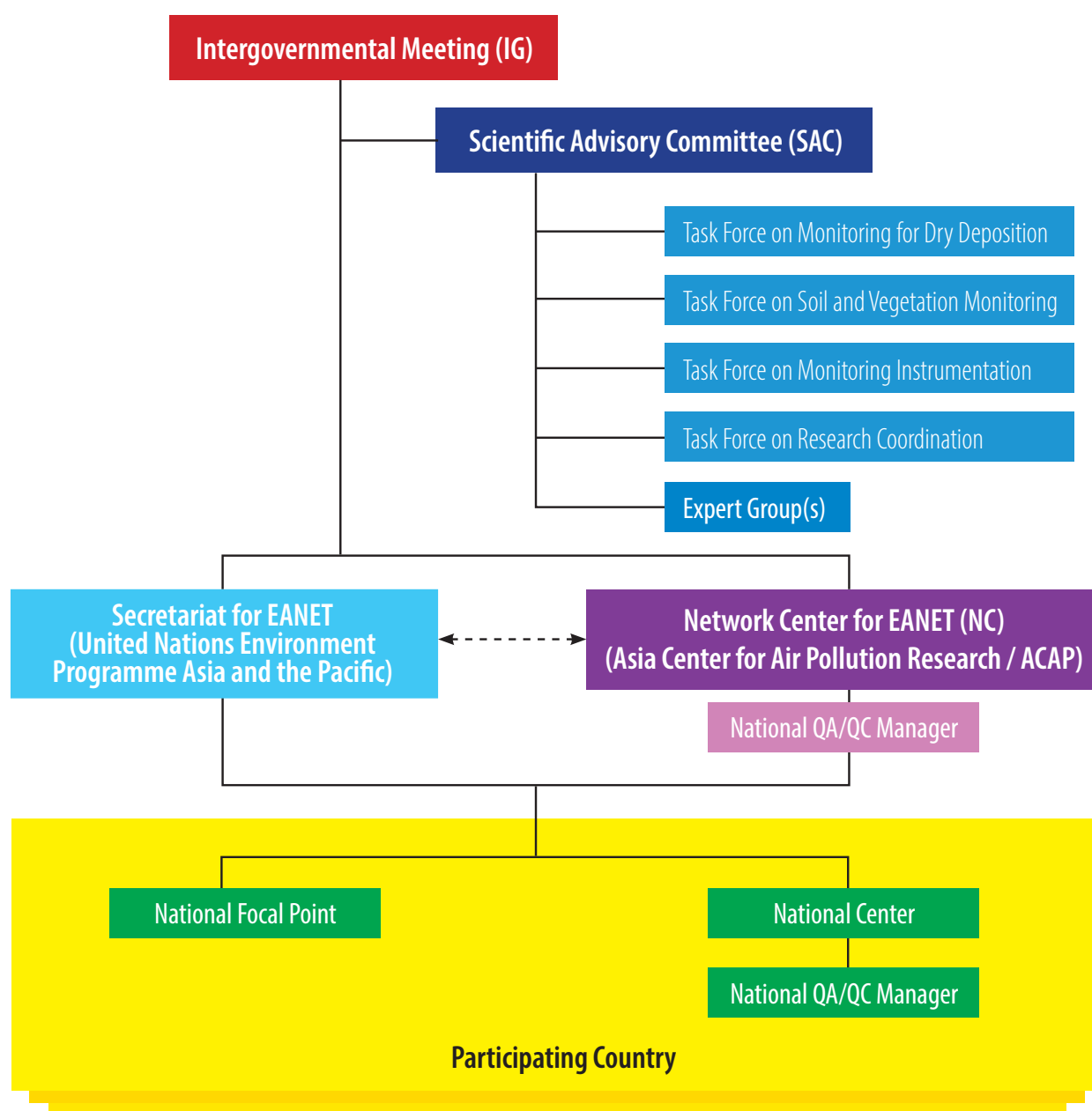
Institutional Framework of EANET

As the institutional framework for EANET, the Intergovernmental Meeting (IG) is the decision-making body of EANET. The Scientific Advisory Committee (SAC) was established under the IG, and the Secretariat and the Network Center were designated to support the network. Several Task Forces and Expert Groups were established under the SAC. These organizations promote the network activities in close communication, coordination and collaboration with the National Focal Points (NFPs), National Centers and National Quality Assurance and Quality Control (QA/QC) Managers in the participating countries.



21st Session of the Intergovernmental Meeting (IG21) in 2019, Beijing, China

Organizational Structure



Roles of Respective Organizations of EANET

Intergovernmental Meeting

- Composed of the representatives of all participating countries and make decisions on the implementation of the network activities.

Scientific Advisory Committee

- Composed of scientific and technical experts nominated by the participating countries and advise and assist the IG on scientific and technical issues of the network; and
- Prepare periodic assessment reports on the state of acid deposition in East Asia.

Secretariat

- Communicate and cooperate with the participating countries;
- Prepare for EANET meetings such as Intergovernmental Meeting (IG), Scientific Advisory Committee (SAC);
- Conduct necessary administrative and financial management for the network; and
- Promote capacity building and public awareness activities in cooperation with the Network Center.

Network Center

- Compile, evaluate, analyze and store EANET monitoring data and related information;
- Disseminate monitoring data and related information;
- Prepare data reports on acid deposition in East Asia;
- Provide technical assistance to the participating countries;
- Implement and coordinate QA/QC activities in the participating countries;
- Promote research activities of EANET; and
- Promote capacity building and public awareness activities in cooperation with the Secretariat.

Participating Countries

National Focal Points

- Communicate and coordinate with the Secretariat and the Network Center for implementation of the network activities.

National Centers

- Collect the national monitoring data and submit to the Network Center;
- Promote national QA/QC activities; and
- Deal with technical matters on the network activities in the countries.

National QA/QC Managers

- Promote national QA/QC activities in cooperation and coordination with the National Centers.



● Scientific Advisory Committee



● Support to participating countries (Senior Technical Managers' Meeting)



● QA/QC activities at a participating country

Monitoring Activities of EANET

EANET monitoring covers five environmental media, wet deposition, dry deposition, soil/vegetation, inland aquatic environment and catchment. The monitoring activities have been conducted following a set of monitoring guidelines and technical manuals. Monitoring for wet and dry deposition is implemented in order to measure concentrations and fluxes of acidic and other substances deposited to the ground, while monitoring soil/vegetation, inland aquatic environment and catchment are being implemented to assess adverse impacts on terrestrial and aquatic ecosystems.



Monitoring interval and parameters

1. Wet deposition/rainwater (every 24 hours or every precipitation event)

with electric conductivity (EC), concentrations of sulfate (SO_4^{2-}), nitrate (NO_3^-), ammonium (NH_4^+), etc.

预览已结束，完整报告链接和二维码如下：

https://www.yunbaogao.cn/report/index/report?reportId=5_13944

