

This is not an ADB material. The views expressed in this document are the views of the author/s and/or their organizations and do not necessarily reflect the views or policies of the Asian Development Bank, or its Board of Governors, or the governments they represent. ADB does not guarantee the accuracy and/or completeness of the material's contents, and accepts no responsibility for any direct or indirect consequence of their use or reliance, whether wholly or partially. Please feel free to contact the authors directly should you have queries.

Monitoring of Air Pollutants in East Asia can contribute to preventing health effect and climate change

Shiro HATAKEYAMA

Asia Center for Air Pollution Research
(Network Center of the EANET)



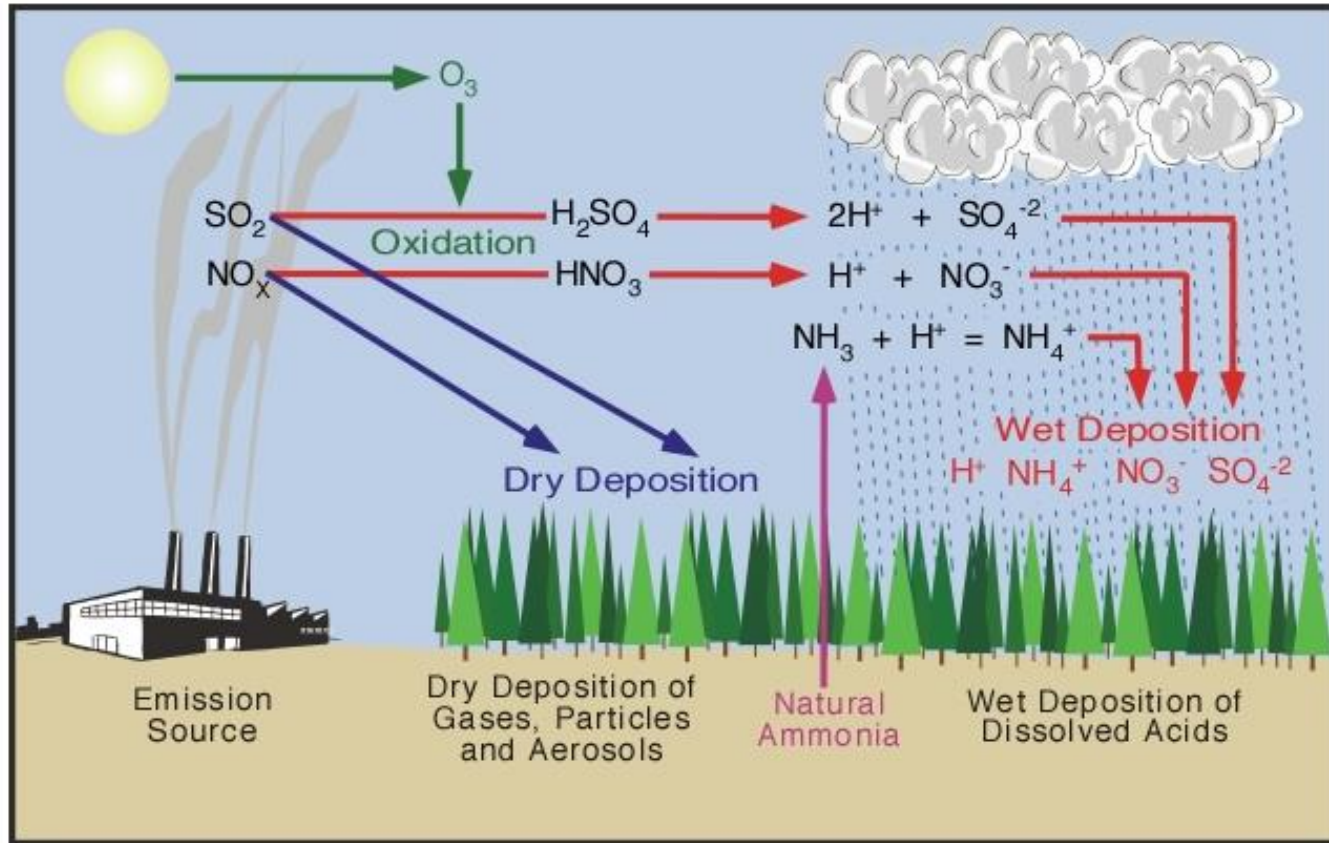
In the concept note of this workshop it is said:

“In Asia, air pollution is the single greatest threat to human health and a sustainable future, and effective solutions to tackle air pollution must be implemented in coordination with actions for climate change and biodiversity loss.”



I would like to comment from the perspective of EANET activities.

“Acid Deposition Monitoring Network in East Asia (EANET)” has been conducting monitoring of air pollution, including acid rain, **with an eye to its impact on health and its contribution to climate change** under collaboration of 13 countries in East Asia for more than 20 years.”

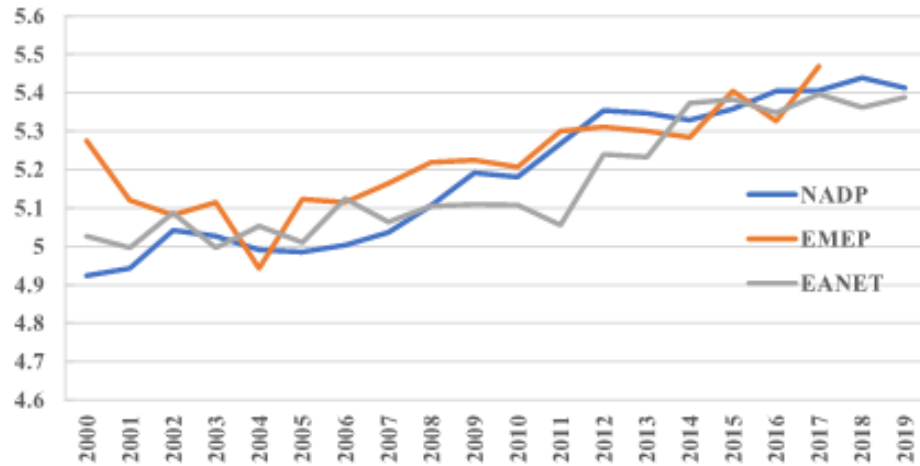


Initial targets:

- Acidic substances such as H_2SO_4 and HNO_3 in rainwater
- Precursors of acids such as SO_2 and NO_x
- Dry and wet deposition of acids and their impacts on the ecosystem

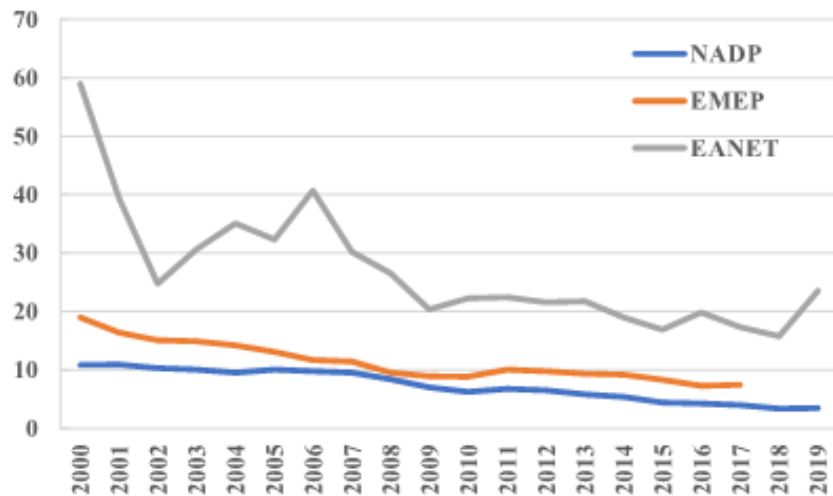
Wet Deposition of Acidic Substances in East Asia (PRSad4,2021)

pH of precipitation

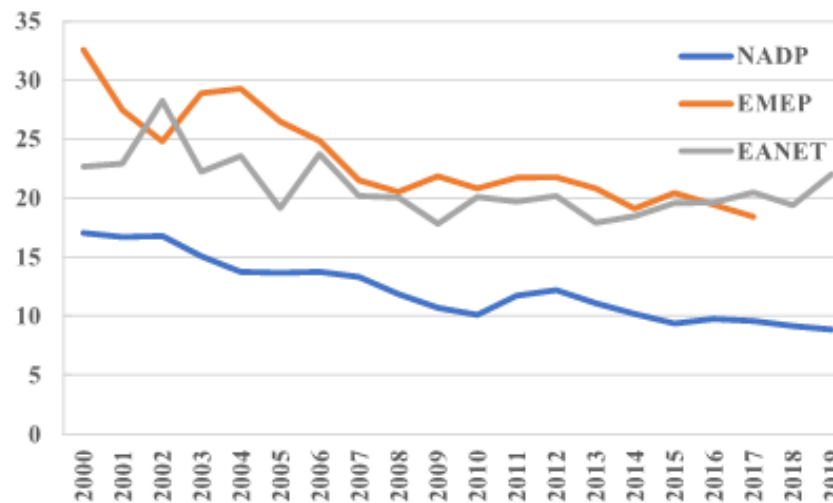


- Statistical trend analysis (Mann-Kendall) from EANET, EMEP and NADP
- SO_4^{2-} deposition decreased. **Nitrogen depositions are still high, declining trend**

$\mu\text{mol/l}$ nss- SO_4^{2-} in precipitation



$\mu\text{mol/l}$ NO_3^- in precipitation



Annual average of pH , nss- SO_4^{2-} and NO_3^- concentrations in precipitation from EANET, EMEP and NADP since 2000 to 2019



EANET expanded its scope in consideration of the health effects of air pollution and its impact on climate change:

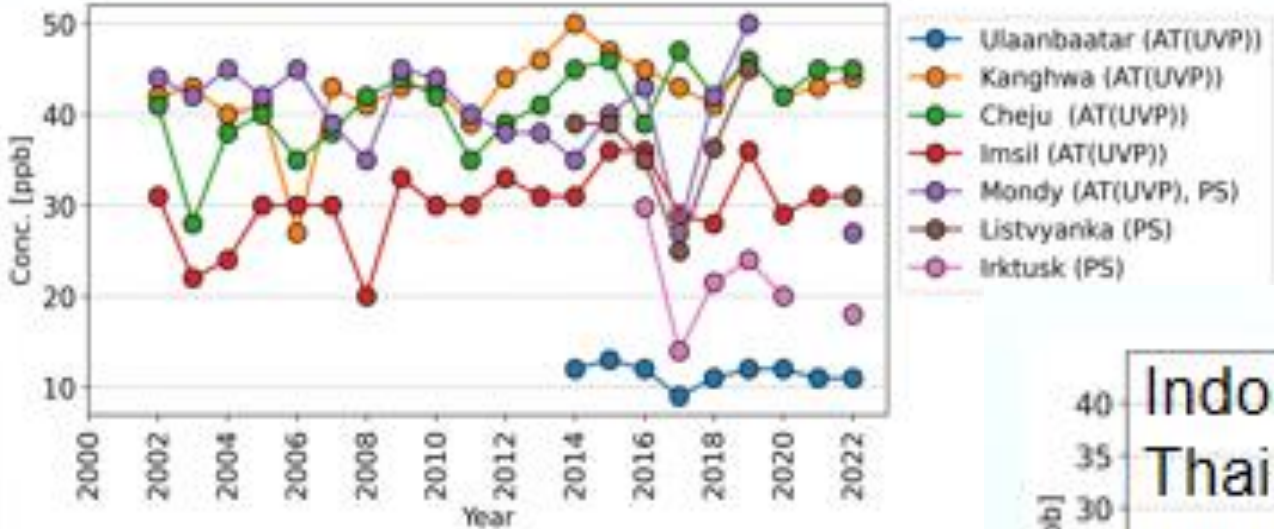
New Directions

- **Scope expansion:** acid deposition + **air pollution**, which can bring co-benefit to **preventing health effects and climate change**
- Introduction of newer science and technology
- Looking for **cooperation** with organizations outside the Participating Countries of EANET

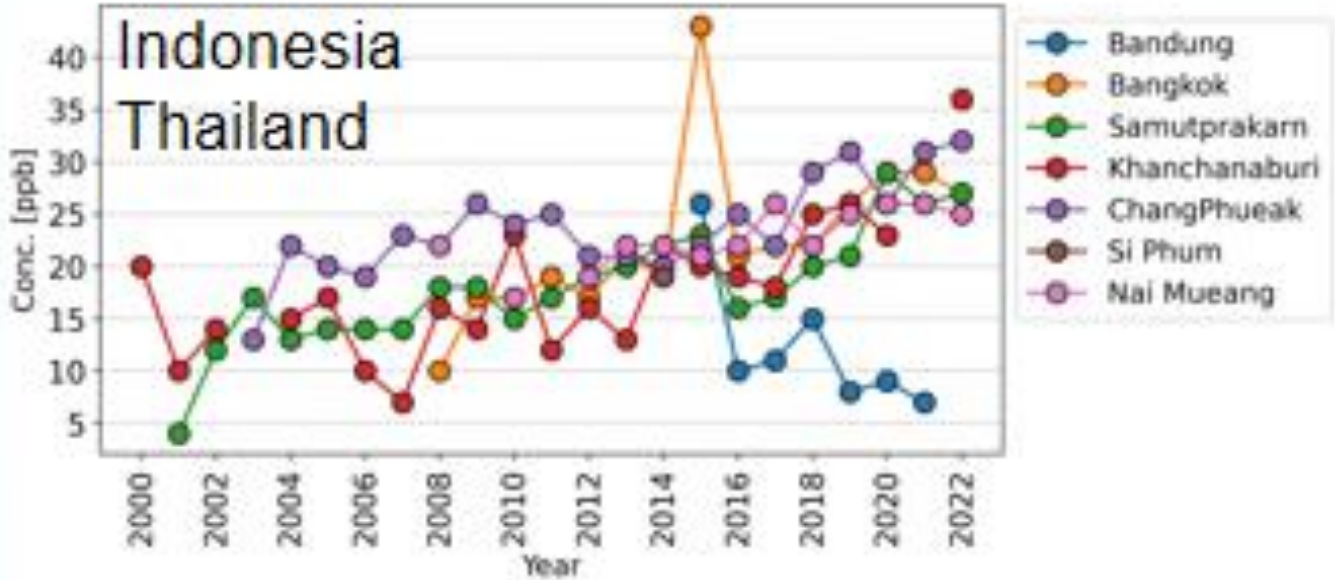
Here, we will take ozone as an example.

Ozone concentration change in East Asian Countries

Mongolia, R.Korea, Russia



Nearly constant for a few years



Increasing in these years

Tropospheric Ozone shows many kinds of environmental effects:

Health effect

- Photochemical smog became popular in 1970 in Japan. High school students collapsed on the ground in the afternoon while they were running.
- Strict regulations for auto-mobile exhaust were imposed then but the achievement rate of environmental standards for ozone is still very low.

Global Warming

- Ozone has a strong potential for global warming as one of SLCFs.

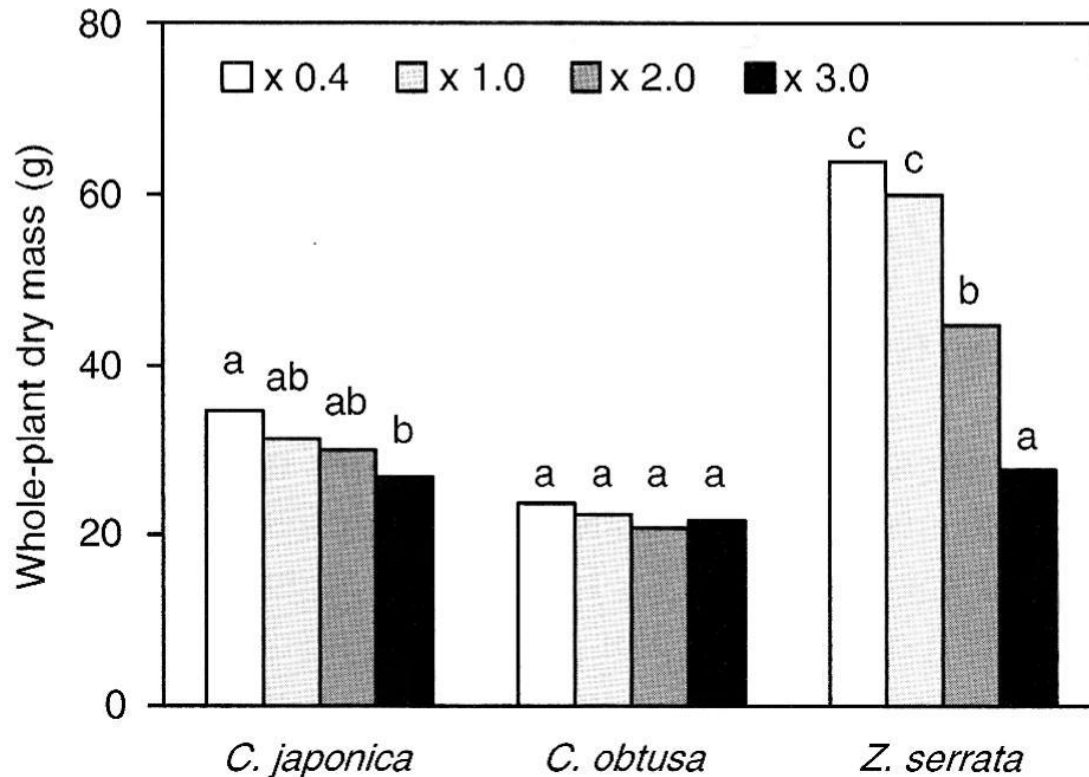


Neurological Symptoms
dyspnea, convulsions



Impacts on Plants: as a simplistic example of decline of biodiversity

Impacts of ozone on dry-matter growth of trees

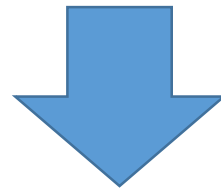


- Whole-plant dry mass of seedlings of 3 types of trees exposed to four levels of ozone for 24 weeks. The seedlings were exposed to four simulated profiles of ozone: 0.4, 1.0, 2.0, and 3.0 times the ambient ozone conc.

Watanabe et al., in "Air Pollution Impacts on Plants in East Asia", ed. by T. Izuta, 73-100, Springer (2017)

As a perspective to discuss *interactions between urban and rural air pollution in Asia, and the multiple development benefits of coordinated action*

- Toward controlling the effects of **Ozone** and PM2.5 (for example) on human health and on regional warming-climate change, extensive measurements in wider area will become more-and-more important, particularly, in developing countries to *see rural-urban and cross boundary transport of air pollutants*.

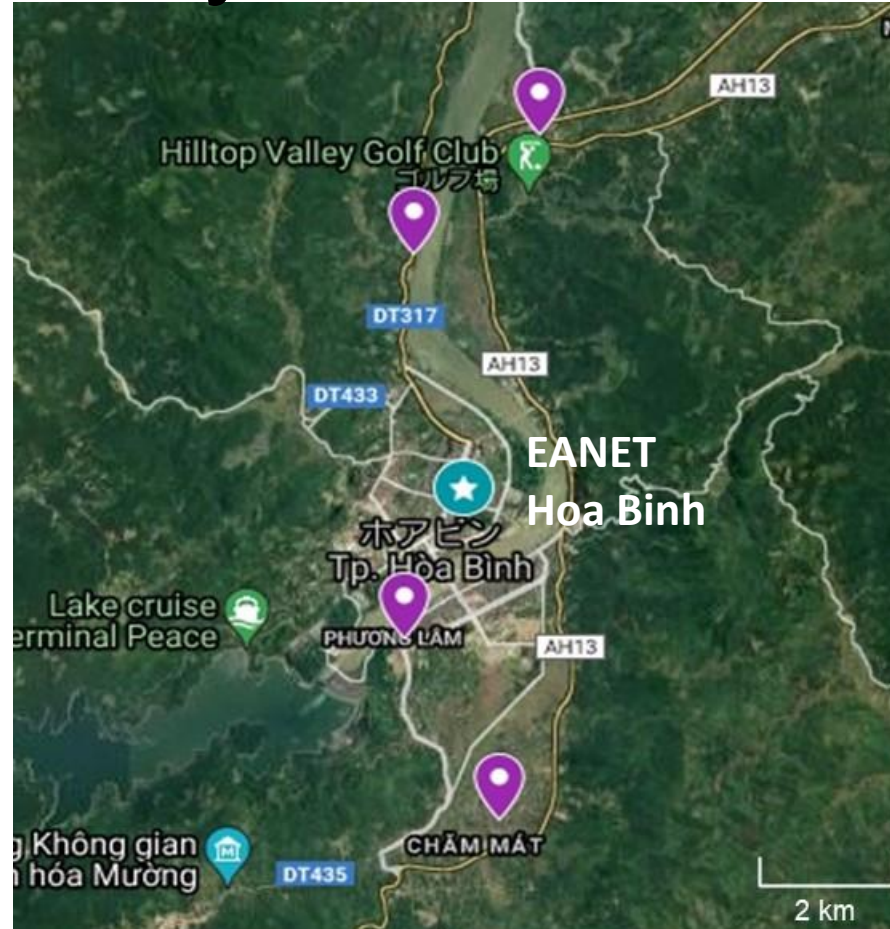


- Utilization of low-cost sensors (LCS) is one promising candidate if the reliability of such monitoring instruments is satisfactory.

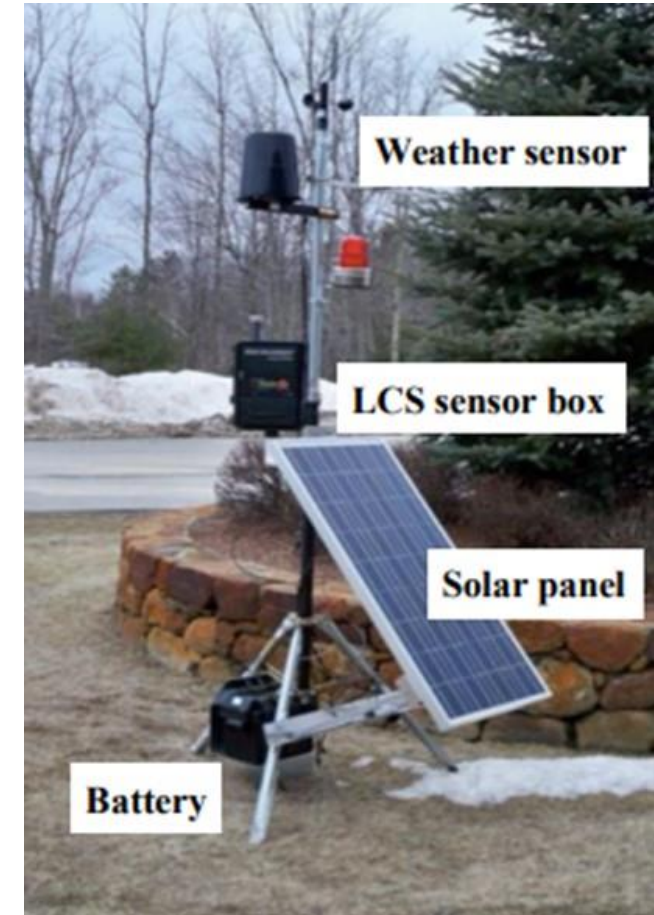
Implementation and analysis of parallel measurement in Myanmar and Vietnam



Yangon in Myanmar (from Sep. 2022)



Hoa Binh in Vietnam (from Feb. 2023)



LCSs were settled around the official-monitoring station