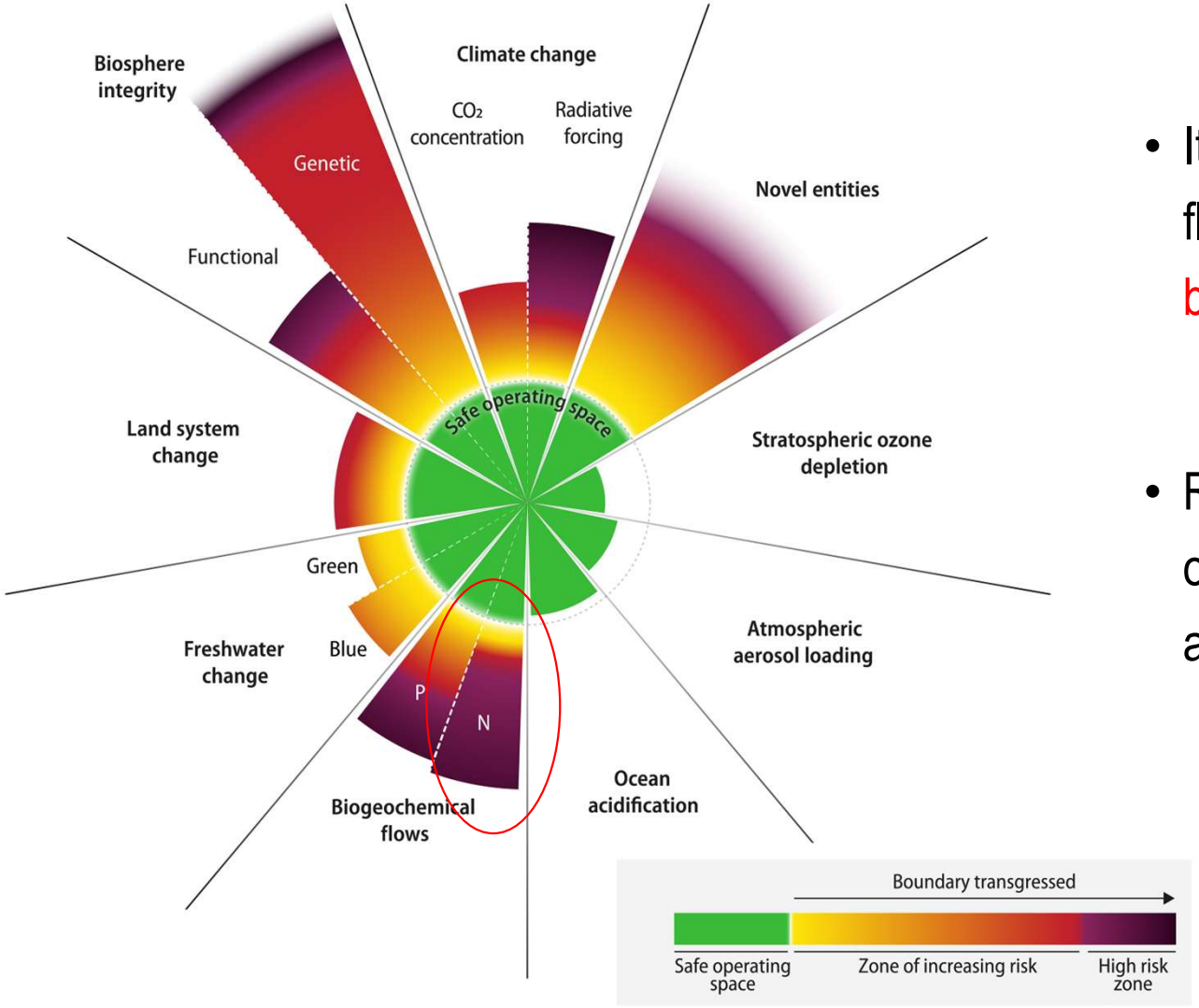
EANET Seminar for
Sustainable Nitrogen Management Seminar 2025
– Accumulation of Nitrogen Data in EANET –
EANET Project Activity 2025-04

Introductory remarks: EANET's potential for contributing to sustainable nitrogen management

Hiroyuki SASE
Network Center for EANET

Planetary boundary concept (updated)

(Richardson et al. 2023, *Science Advances*)



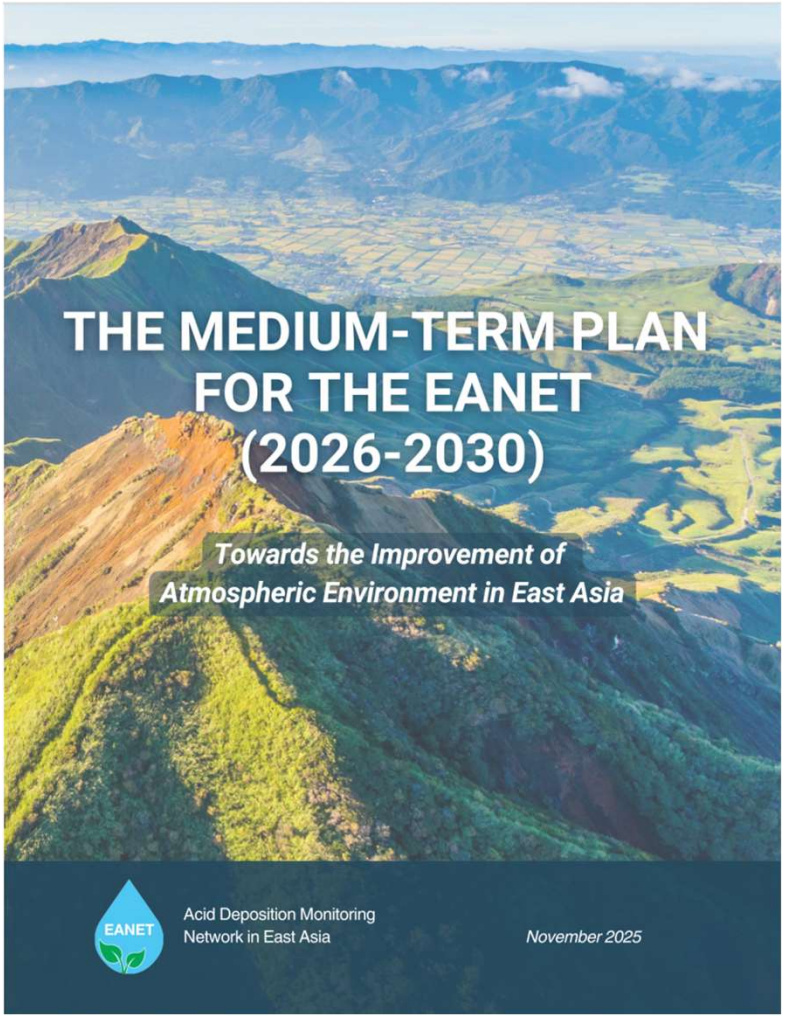
- It is suggested “nitrogen biogeochemical flows/cycles” have already transgressed the boundary of the Earth system.

- Reactive nitrogen is also closely related to other boundary issues, such as atmospheric aerosol loading, climate change, etc.

Sustainable Nitrogen Management as a global issue

- Reactive nitrogen (NO_x, NH_3, etc.) produced by anthropogenic activities is believed to have reached levels that could cause irreversible changes to natural resources.
- To tackle the above issue, at the United Nations Environment Assembly (UNEA 5.2) the resolution 5/2 "Sustainable Nitrogen Management" was adopted in March 2022, and member states are encouraged:
  - to accelerate actions to significantly reduce nitrogen waste globally by 2030 and beyond through the improvement of sustainable nitrogen management
  - to share information on national action plans, as available, according to national circumstances
- In December 2025, at UNEA-7, the UNEP Executive Director's report identified "tackling nutrient pollution," including nitrogen pollution, as one of the priority issues.
- Therefore, nitrogen management remains a critical global challenge that requires sustained and coordinated action.

The MTP (2026-2030) adopted at IG27 in November 2025



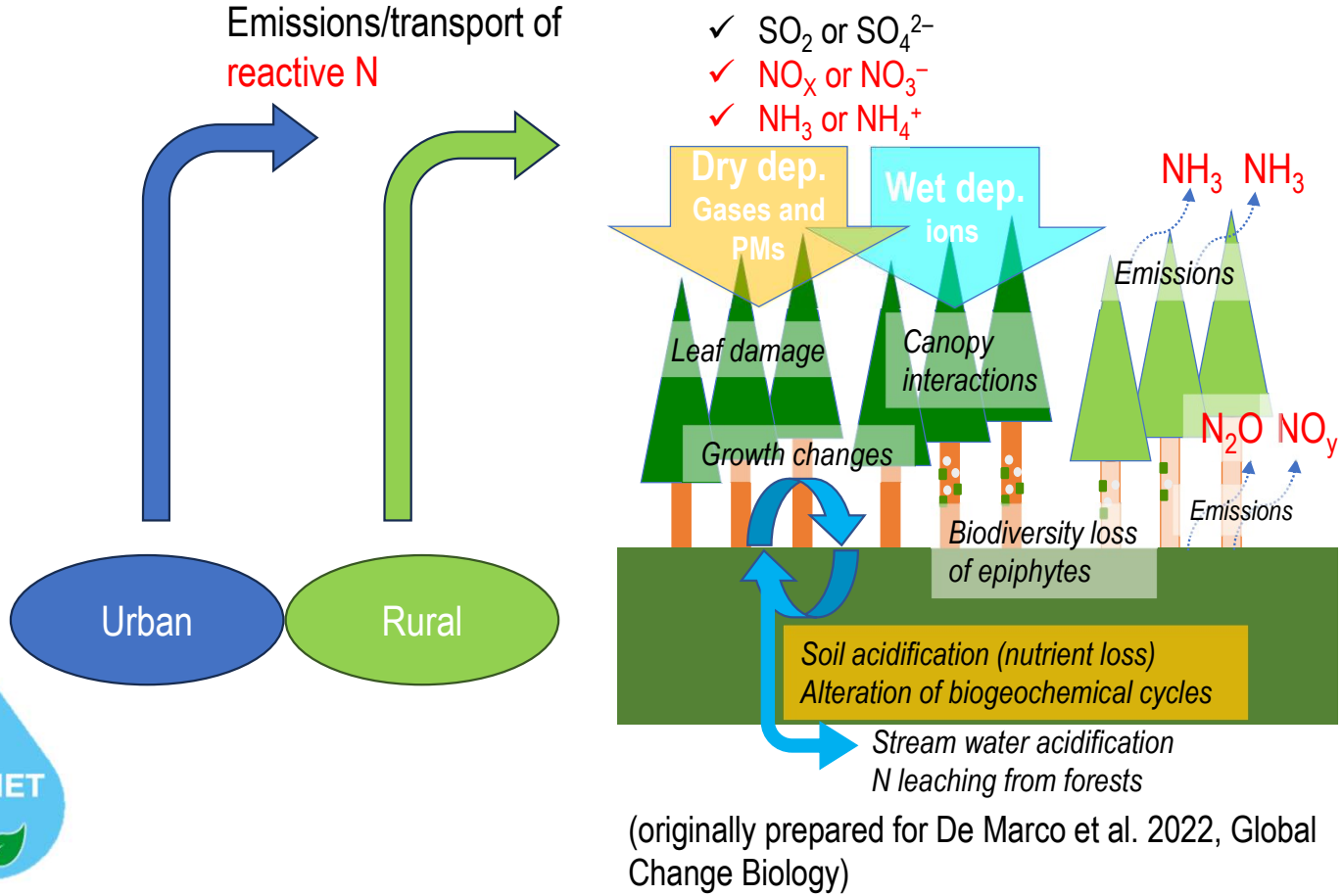
- As one of the key and emerging challenges and needs to be addressed in the MTP 2026-2030, contribution to sustainable nitrogen management is clearly mentioned:

Para 12. One opportunity to maximize EANET's potential contribution to the global environmental agenda on sustainable nitrogen management. ..... Strengthening efforts to obtain and assess data on atmospheric deposition of NOx, NH_3, and their ionic species, as well as their ecological effects, within the EANET scope, could contribute to the global discussion on "sustainable nitrogen management" as part of a regional air quality monitoring network.

A potential of the EANET

- Reactive nitrogen (Nr) species, including NO_x and NH_3 (and their derivatives), have been monitored as major components of acid deposition since 2001.
- EANET data are obtained from a variety of media from the atmosphere to the ecosystem, including precipitation, gases, particulate matter (PM), soil, and inland waters.
- There is a potential of the EANET to contribute to understanding the regional nitrogen cycles in terms of atmospheric deposition.

Potential for EANET to understand nitrogen flows in the context of atmospheric deposition



(originally prepared for De Marco et al. 2022, Global Change Biology)

EANET activities

Atmospheric deposition

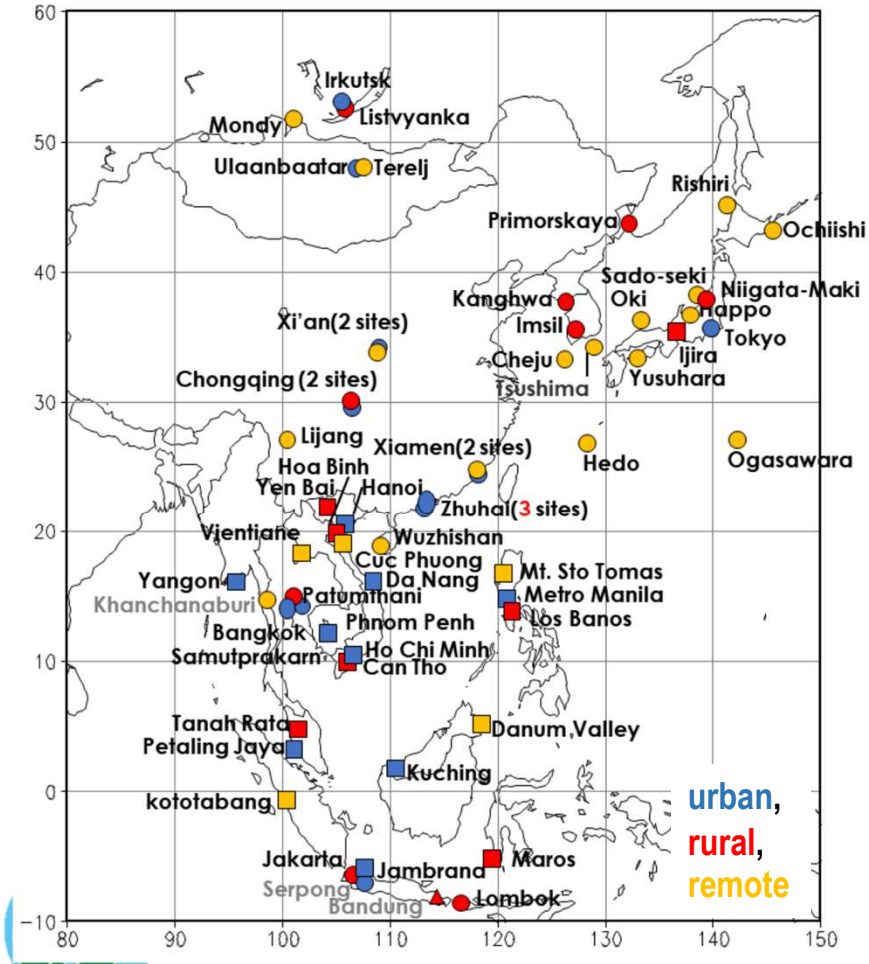
(wet deposition/dry deposition)

Forest ecosystems

(soil, vegetation)

Inland water (lakes/rivers)

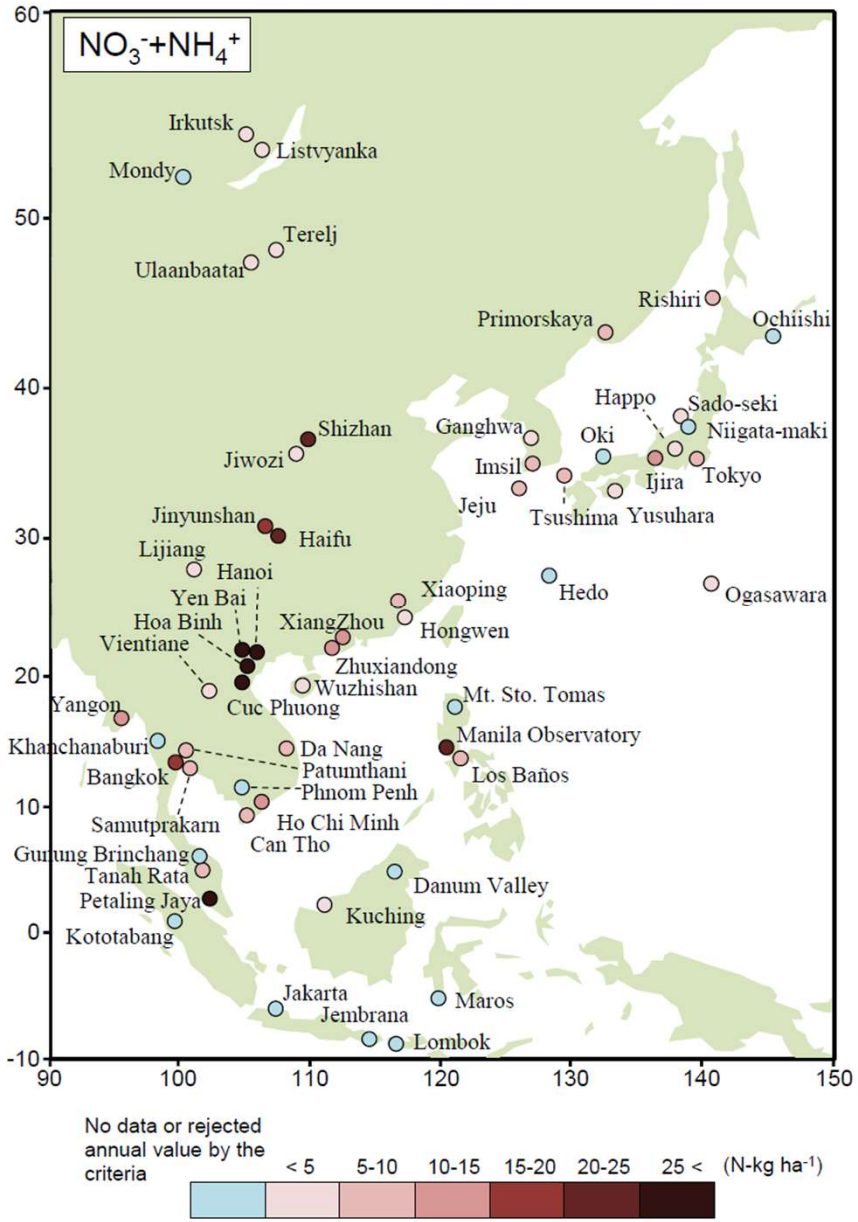
Available EANET data on reactive nitrogen (as of 2023)



Wet deposition monitoring sites: 57 sites

Monitoring media and monitored reactive nitrogen	Number of site	Note
Wet deposition (rainwater): NO_3^-, NH_4^+	57	Concentration and deposition
Dry deposition (air concentration): Gases (HNO_3, NH_3), Particles (NO_3^-, NH_4^+)	36 (FP method)	Concentration Deposition flux (only at 11 sites in Japan) AT (NO, NO_2, NO_x): 17 sites PS (NO_2): 2 sites
Inland water (lakes and rivers): NO_3^-, NH_4^+	17	Concentration
Forest catchment (Atmospheric deposition and river water): NO_3^-, NH_4^+	2 (+1 as the project activity)	Concentration, Deposition/discharge (utilizing the nearest deposition data)

FP, filter pack; AT, automatic monitor; PS, passive sampling



Annual wet deposition levels of dissolved inorganic nitrogen (DIN, as NO_3^- + NH_4) in 2023

(EANET 2024, Data Report 2023)

- The wet deposition levels at many sites remain high, over 10-15 N-kg ha^{-1}, which exceeds the N leaching thresholds suggested for Europe or North America.
- In addition, dry deposition flux has not been sufficiently assessed at most monitoring sites other than Japanese sites.
- Therefore, accumulating dry deposition data and assessing total nitrogen deposition (both wet and dry) are key issues that should be strengthened during the next MTP period through 2030.
- Ammonia (NH_3) monitoring should be given greater emphasis, as its emissions in the region have not shown clear reduction trends.

Data for 2024 will be released soon.

ACAP

Today's guest speakers

- **Prof. Kazuhide Matsuda, Tokyo University of Agriculture and Technology, Japan**

  Regional assessment of atmospheric nitrogen deposition using EANET monitoring data

- **Dr. Yongjoo Choi, Hankuk University of Foreign Studies, Republic of Korea**

  Spatio-temporal distribution of ammonia over Korea using CrIS satellite: Validation with in-situ measurements and bias correction