

# **Overview of Nitrogen in South Asia**

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**The eight South Asian countries namely Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka are home to:**

- 1. About 22% of the global population,**
- 2. With only 4.8% of the world's land mass,**
- 3. 14% of the global arable land,**
- 4. 2.73% of the world forest area and**
- 5. 4% of the world's coastline.**



**South Asian Region**

**In the selected countries (India, Nepal, Pakistan, Bangladesh, Maldives and Sri Lanka) the main factors influencing the N flows are:**

- a) the strong agricultural activities, using manures and synthetic N fertilizers;**
- b) the huge amount of cattle excreta generated by the enormous cattle population;**
- c) the high amount of municipal solid waste produced at the densely populated regions; and**
- d) the strong N exchange over the thickly vegetated cropping regions.**

**In terms of N flows and cycling in the environment, these factors make these countries a coherent region.**

# **Agricultural practices leading to nutrient enrichment**

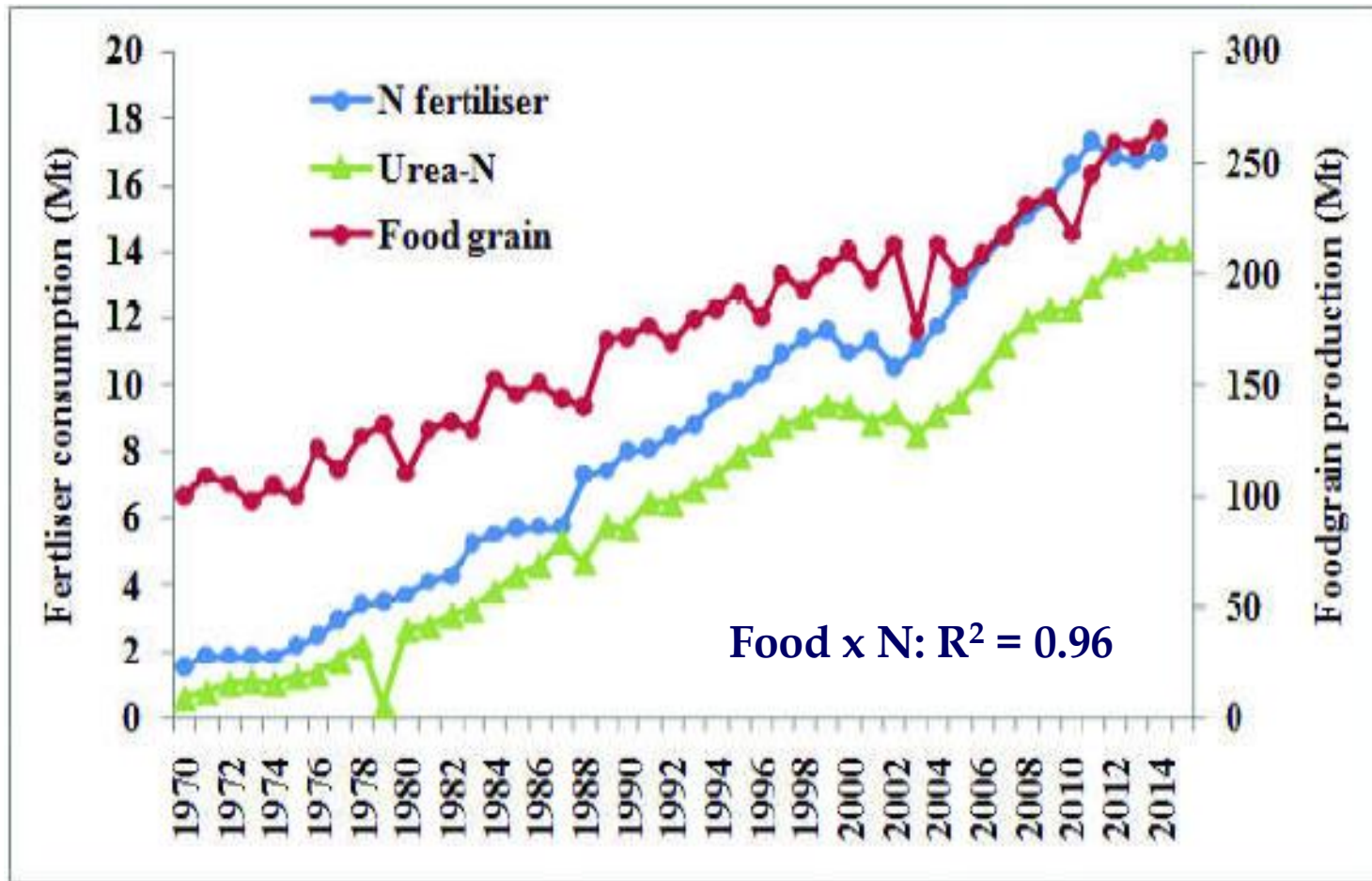
**South Asia has the largest share (91%) of arable and permanent cropland in total agricultural land. It has 22 per cent of the world's population, which exists on about 14 per cent of the world's arable land.**

**Total fertilizer nutrient consumption in Asia is 60% of the world total, and South Asia is the second largest fertilizer consuming region in the world (FAO, 2018).**

## Fertilizer consumption (kg N per hectare of arable land)

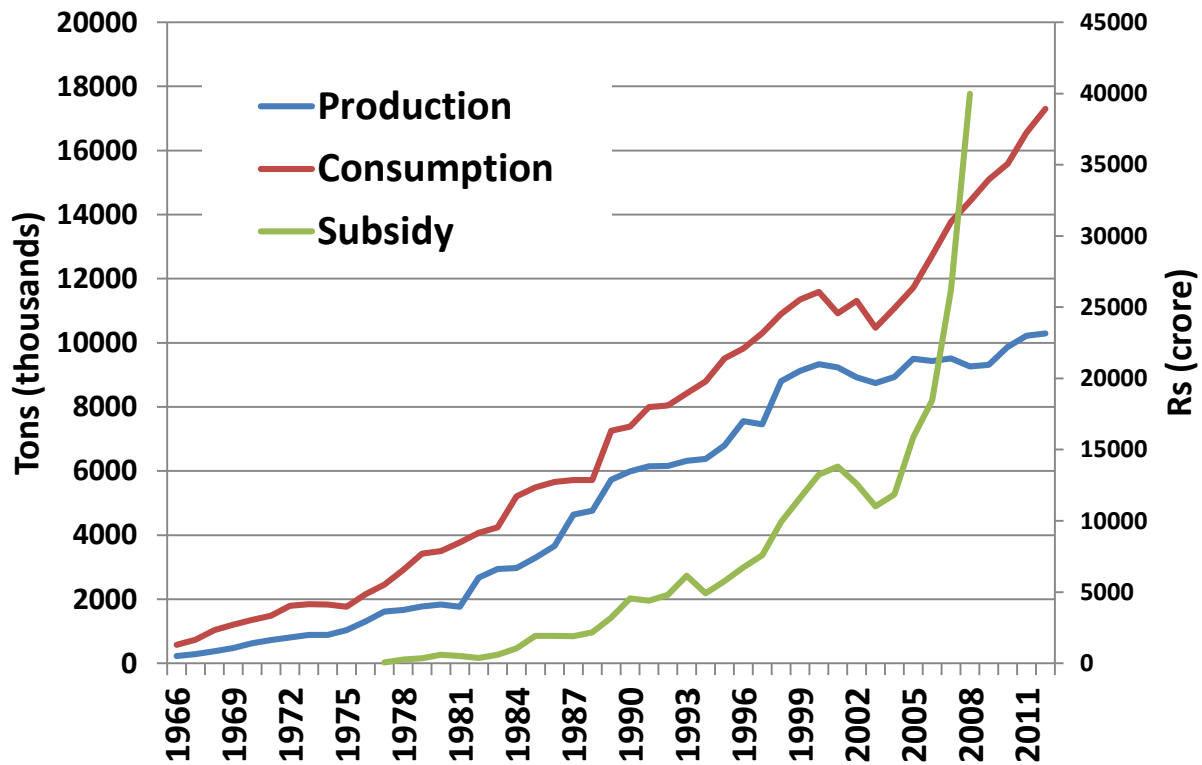
Countries	Year						
	2005	2010	2011	2012	2013	2014	2015
Afghanistan	3.17	4.19	6.31	27.58	14.45	11.71	11.71
Bangladesh	114.03	135.03	149.49	132.60	130.67	144.75	153.70
Bhutan	4.77	6.07	7.50	6.89	8.78	8.76	8.76
India	74.99	97.21	102.54	99.33	98.85	100.02	102.51
Maldives	4.25	18.41	10.14	43.77	27.54	29.42	34.06
Nepal	1.18	18.50	23.49	19.75	33.66	41.59	45.49
Pakistan	91.03	108.15	103.03	91.77	103.57	100.45	101.13
Sri Lanka	87.71	76.19	91.43	73.01	55.54	99.06	98.01
South Asia	73.71	90.44	93.91	94.78	95.49	97.18	98.04
World	57.55	65.13	66.23	67.73	68.87	69.56	68.61

Source: <http://www.fao.org/faostat/en/#data/EF> (2018)

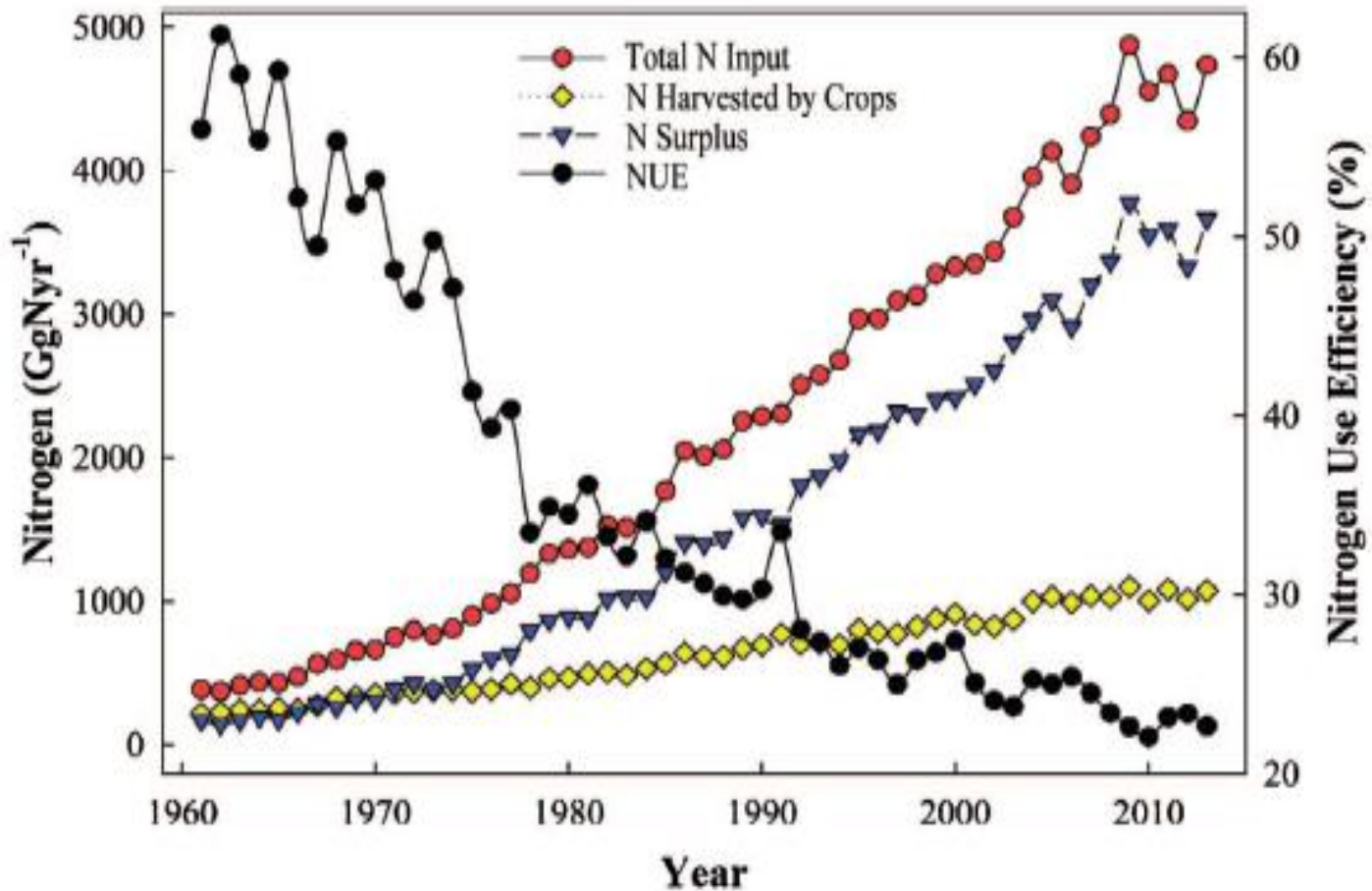


**Relationship between food grain production, N fertiliser and urea-N consumption in India**

# Nitrogen Fertilizer Industry (India)



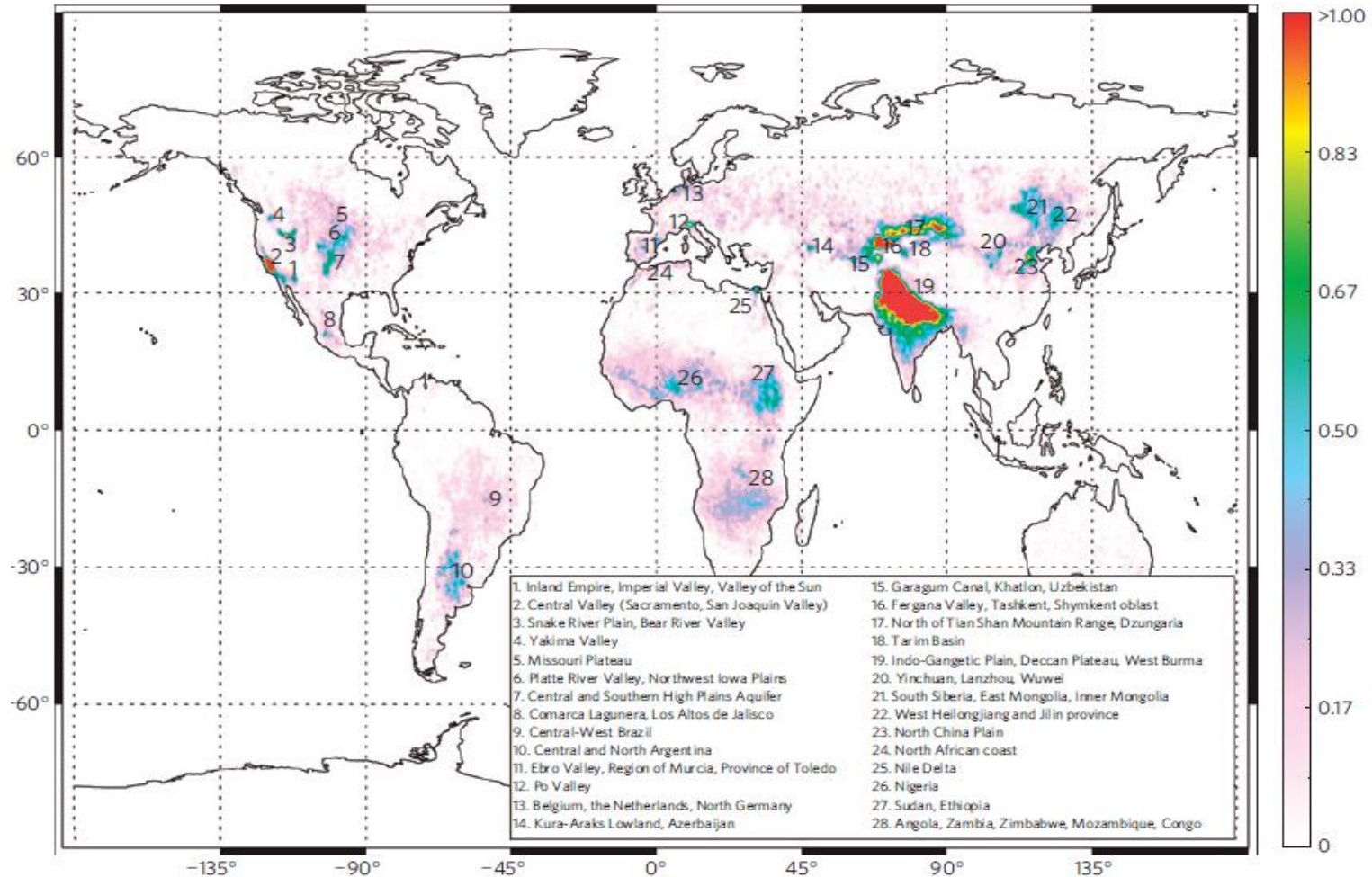


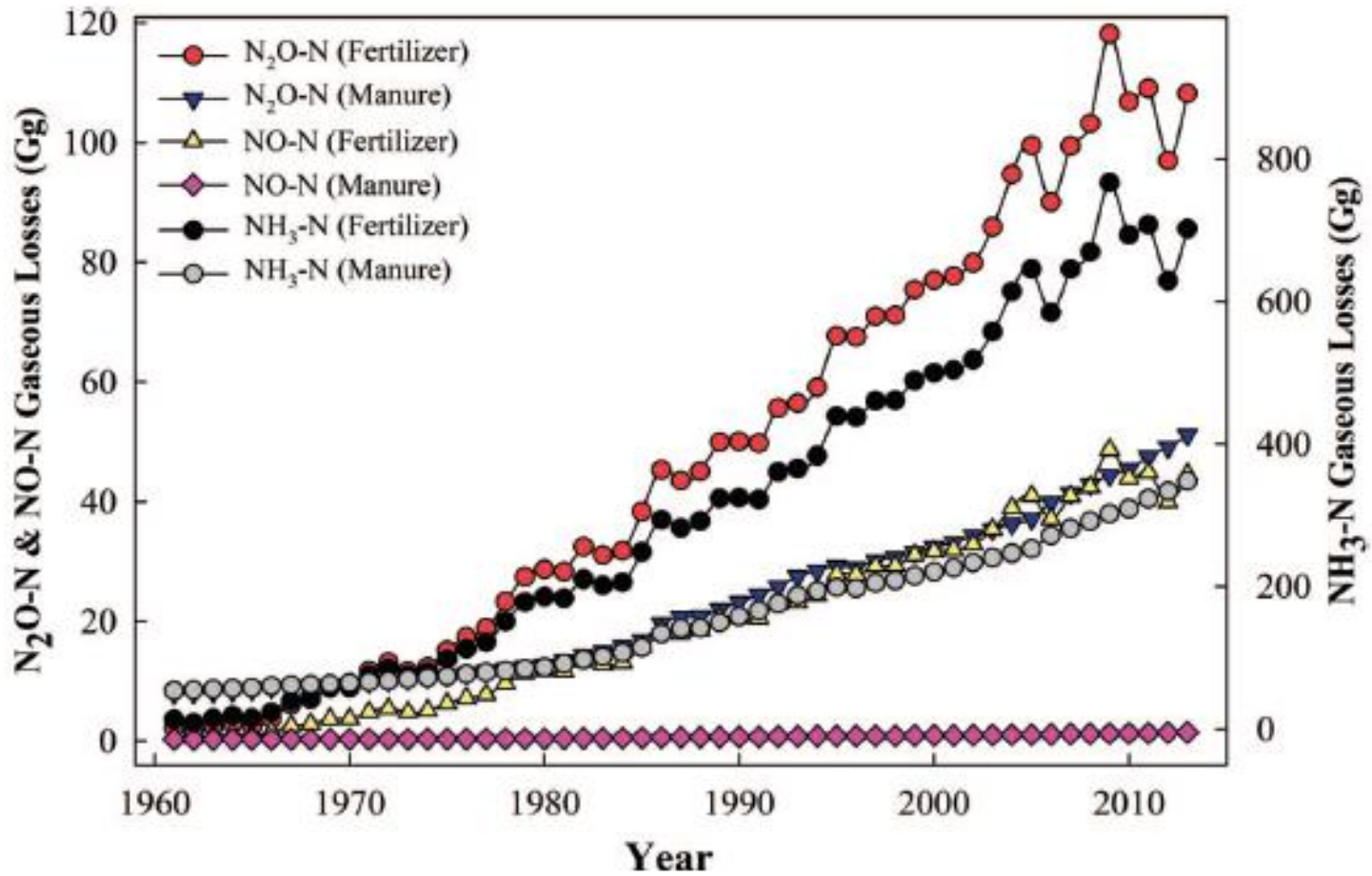


**Historical changes in NUE (%), N surplus, and N utilization in crop production in Pakistan**

# Why India and South Asia?

## A global hotspot for nitrogen losses

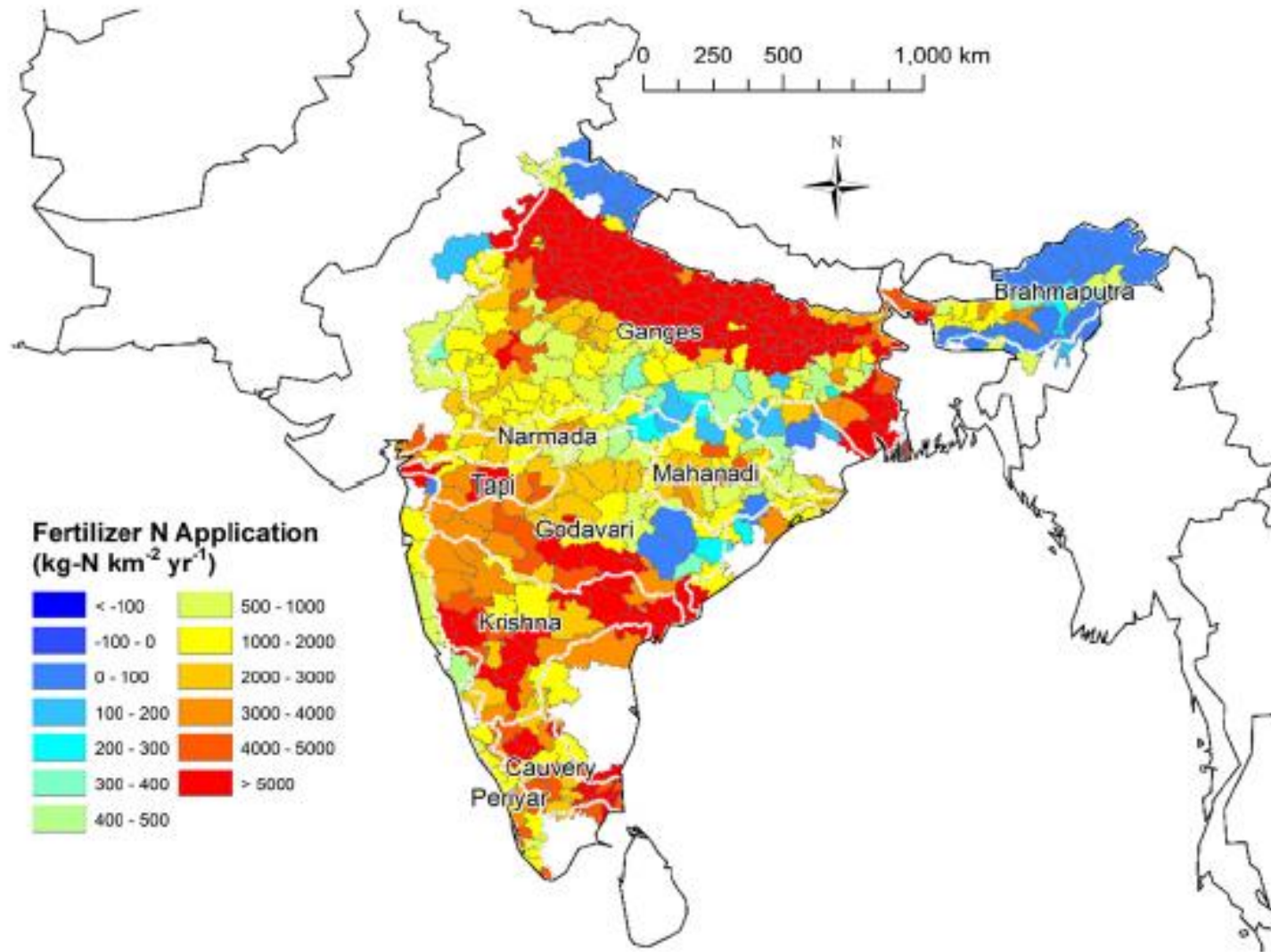




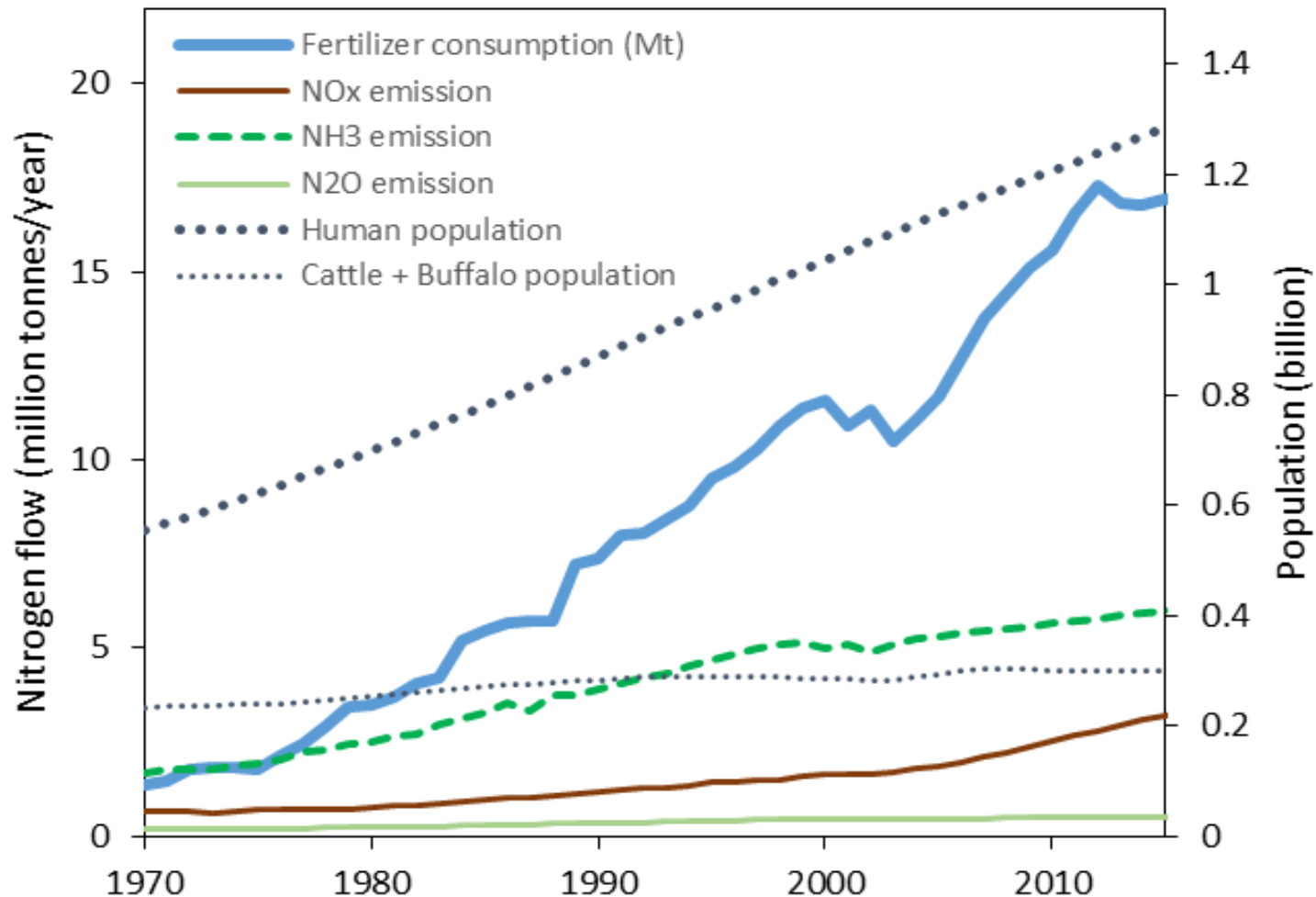
**Gaseous emission of  $N_2O$ , NO, and  $NH_3$  from synthetic N fertilizer and manure applied to soils during 1961–2013**

Raja et al. (2018)

# District-level N fertilizer consumption from Fertilizer Association of India (Chanda et al., 2001)



**Some Regions Use Excess while Others Do not Have Enough -Indian N scenario !**



**Trends in nitrogen flows in India through fertilizer consumption, emissions of nitrogen oxides (NO<sub>x</sub>), ammonia (NH<sub>3</sub>) and nitrous oxide (N<sub>2</sub>O), as compared with trends in the population of humans and major livestock (Sutton et al., 2017)**

# Gaps in knowledge

Although there could be location-specific issues, most of the important information gaps for prudent management of the reactive-N scenario in the south Asian region include:

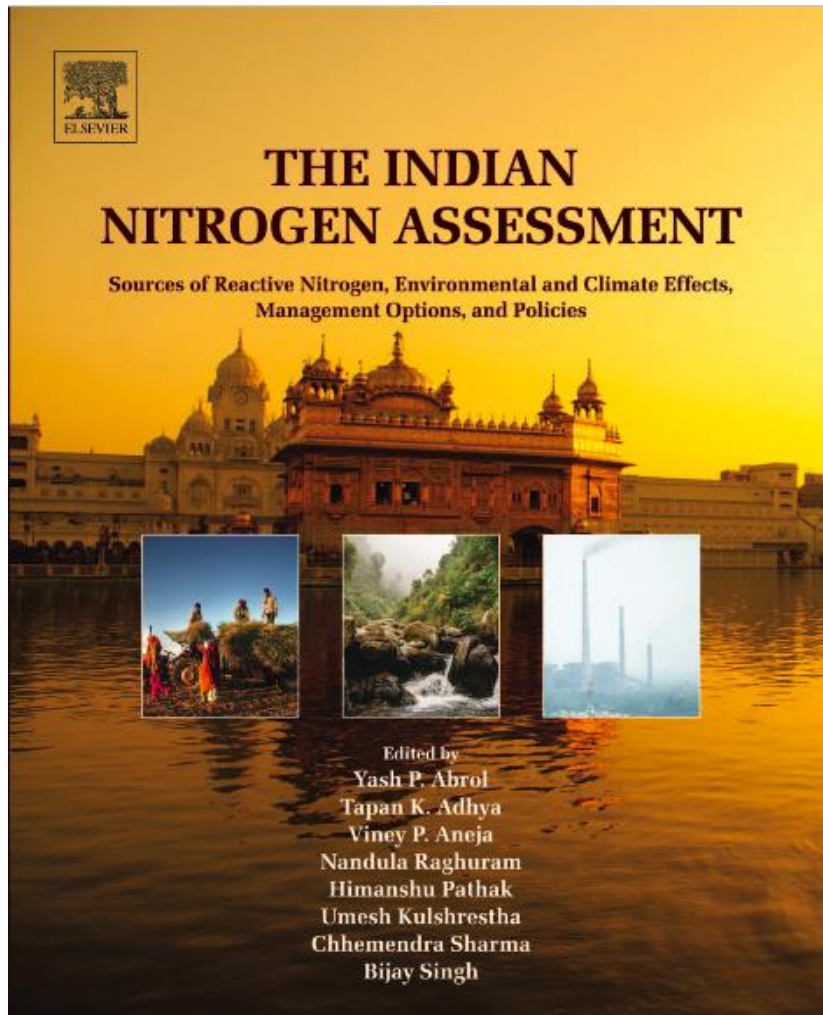
- Seasonal and annual variation in N-loads from land-based activities,
- Extent of contamination of coastal sediments,
- Coverage, treatment types, and discharge data for urban sewerage systems.
- Knowledge about the chemical, physical, hydrological and biological processes taking place in estuaries, marine habitats and coastal waters.

# **Policy actions to address gaps**

- 1. Effective ecosystem-based actions need to integrate social, economic and environmental concerns, the cornerstones of sustainable development.**
- 2. Nutrient use efficiency and site-specific nutrient management should be emphasized in the existing policies and programs in all aspects agriculture, aquaculture, poultry, livestock farming to minimize nutrient leakages throughout the food chain.**
- 3. Sustainable nutrient management should be emphasized, enforced and monitored as above in the existing policies and regulations on municipal wastes, industrial effluents etc., specifying nutrient contamination limits and mandating their recovery and recycling.**

# The Indian Nitrogen Assessment

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# CONCLUSION

The fact that all the South Asian countries are included is really important, meaning that lessons can be shared on interactive experiences in the backdrop of cultural, economical and environmental differences that prevent better management practices being adopted.

The result will be an approach that aims to give a more coherent picture of the N cycle in South Asia: what is stopping us from taking action and what can be done about it.



**THANK YOU**