Kväve i ett internationellt perspektiv

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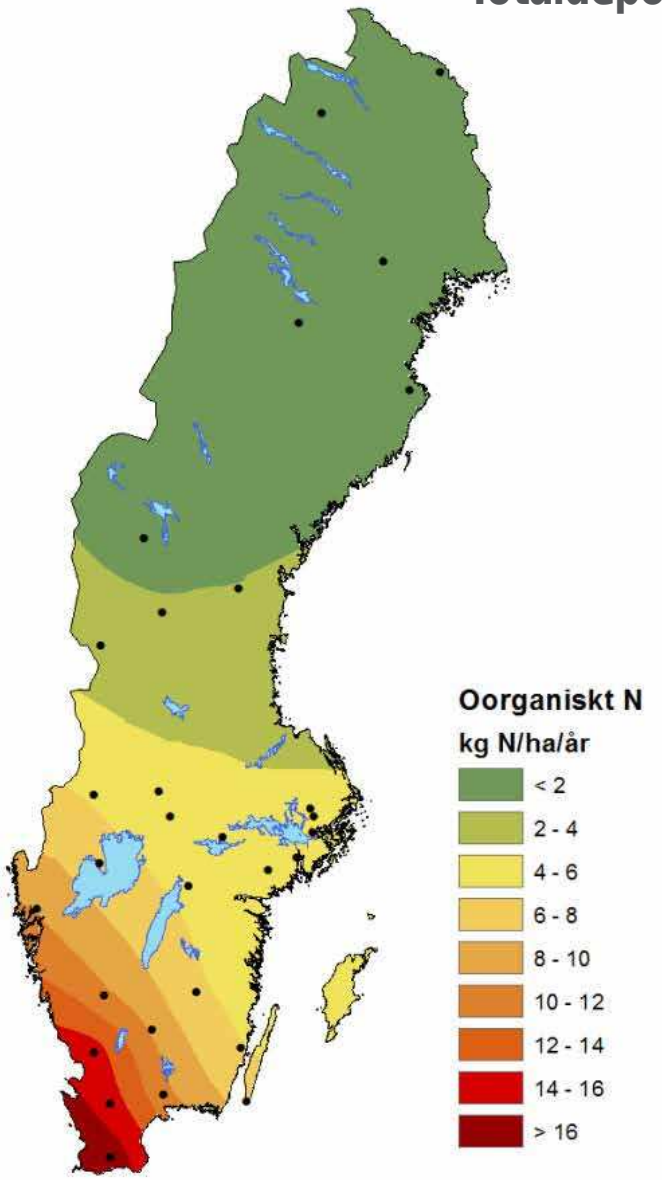
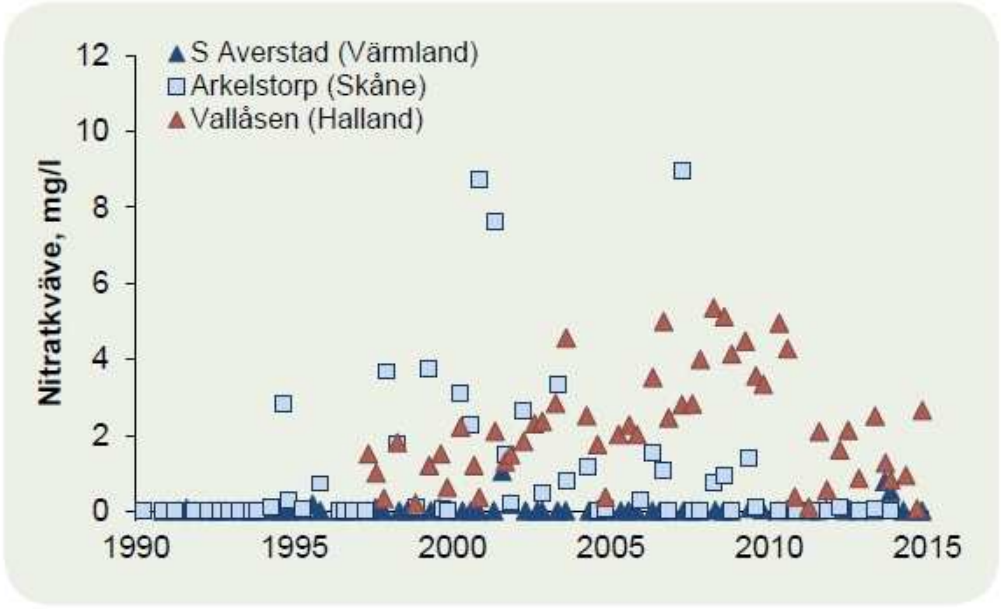
Totaldeposition av kväve 2012-2014



Markvattnets nitratkvävehalt 2012-2014

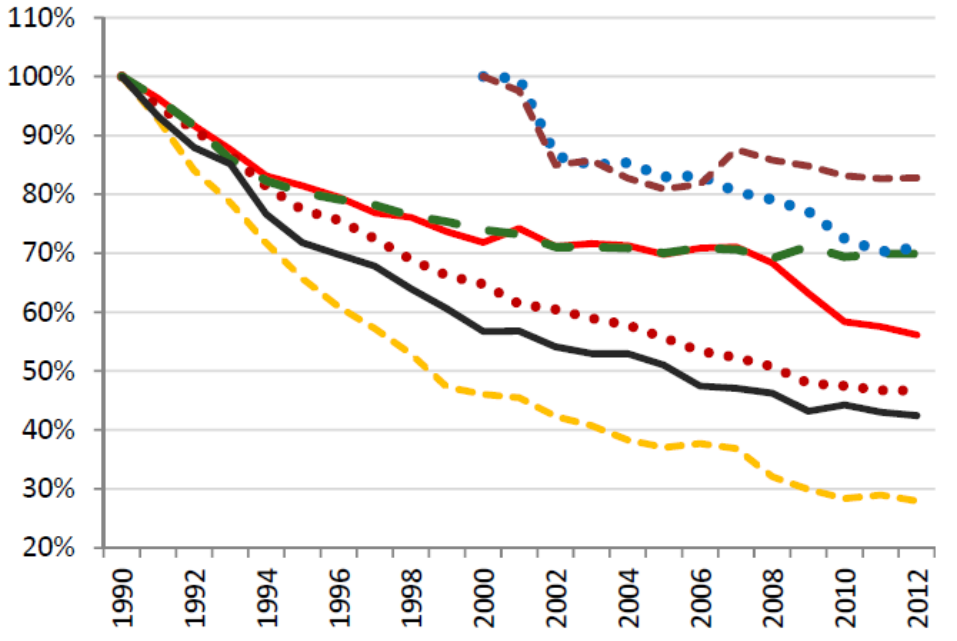


Internationella luftvårdsfrågor som rör kväve

- Försurningen – N viktigare än S i många områden: NH_3, NOx -> Nitrat
- Biodiversitet: NH_3, NOx – N som näringsämne
- Marknära ozon: Nox, VOC och metan ->Ozon
- Hälsa: kvävedioxid NO_2 och ammoniumnitrat-partiklar : NH_3, NOx ->psrtiklar

Alla föroreningar minskar

European ECE-region



Kväveoxider och ammoniak minskar långsammare än svavel

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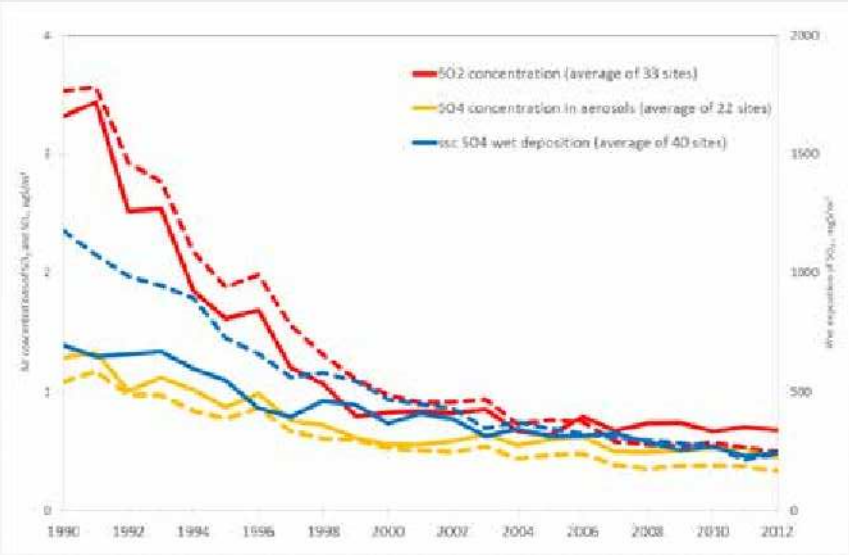
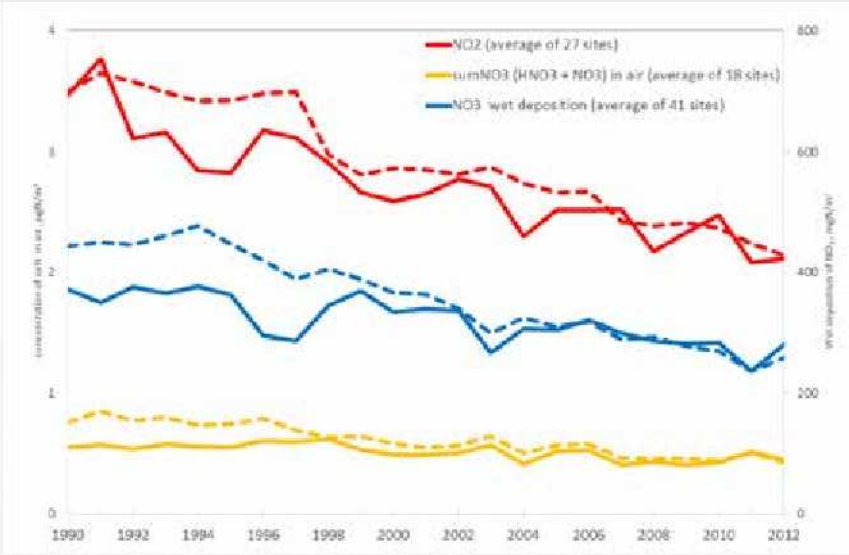
Försurning

Sulfur in air and precipitation



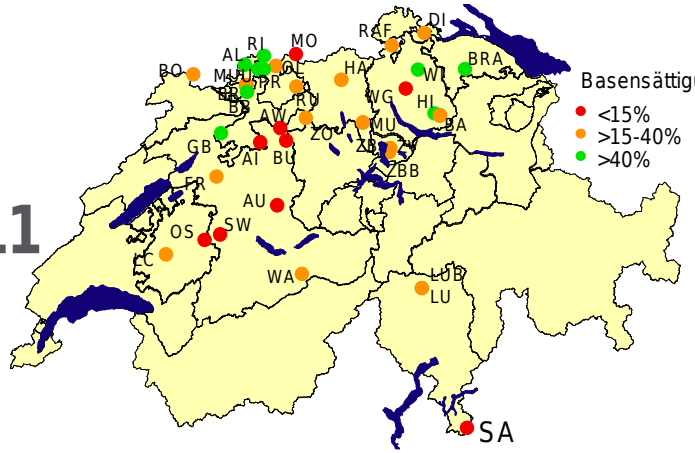
Nitrogen in air and precipitation



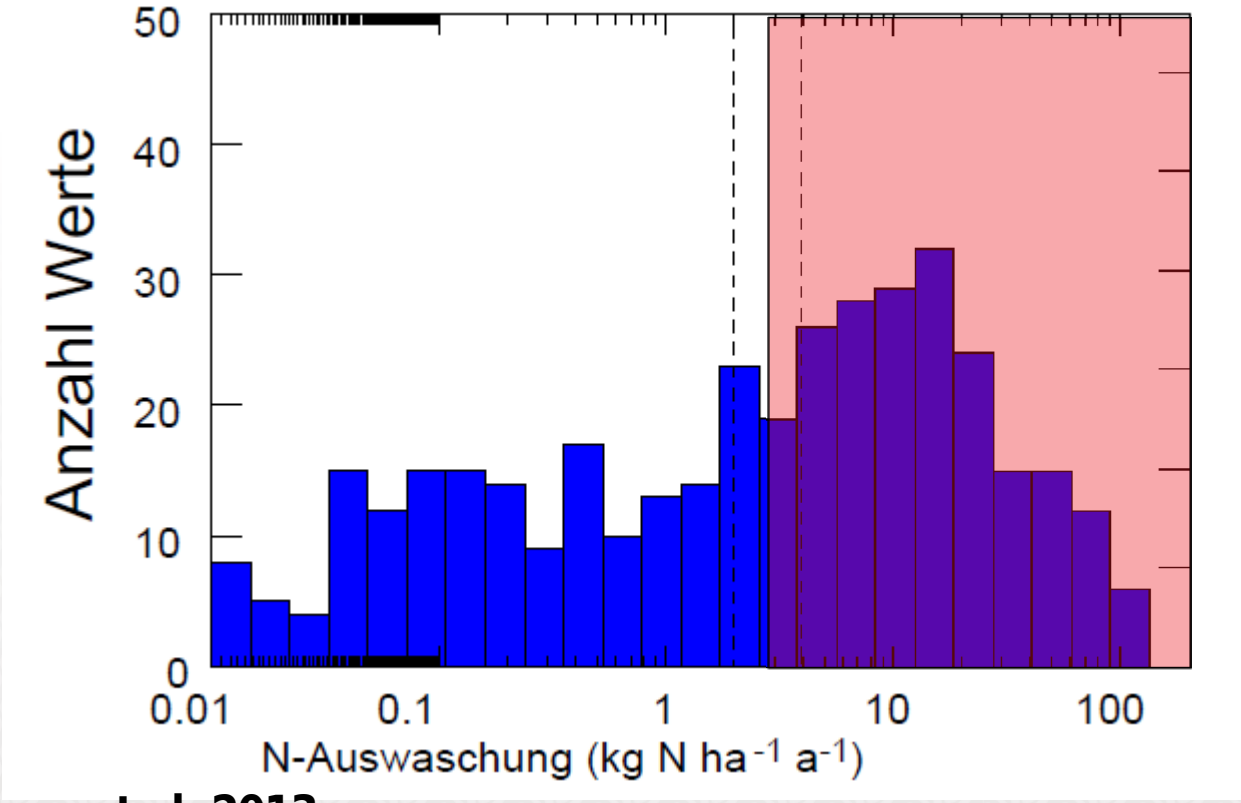
EMEP

Försurningen fortfarande problem i kontinentala Europa:

Schweiz: Årligt läckage av kväve 2005-2011



Critical loads for conifers and deciduous trees : conifers: 2-4 kg N ha^{-1} a^{-1}; deciduous : 4-5 kg N ha^{-1} a^{-1}

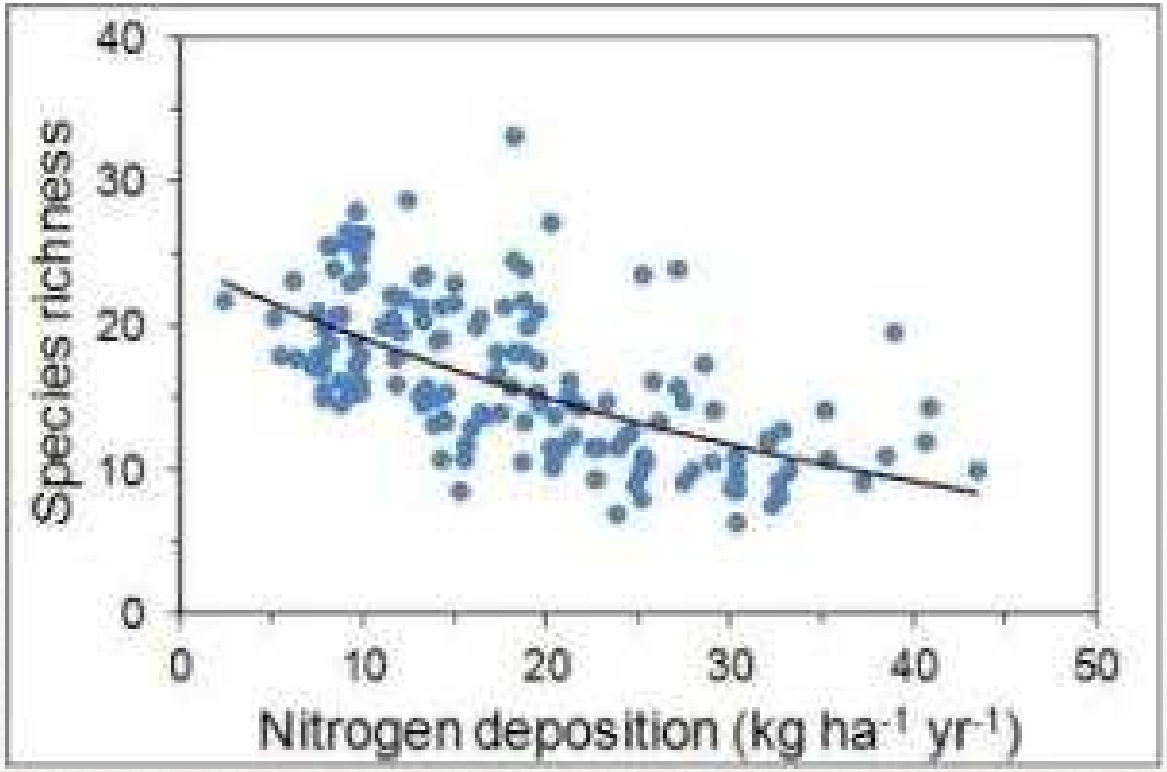


Annual nitrogen deposition in forests: 23.5 kg / ha

Annual acidifying inputs: 2 kmol / ha (85% N, 15% S)

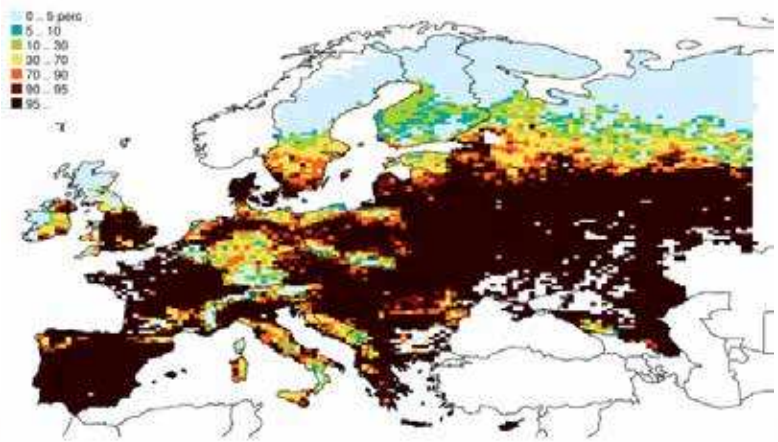
Braun et al. 2013

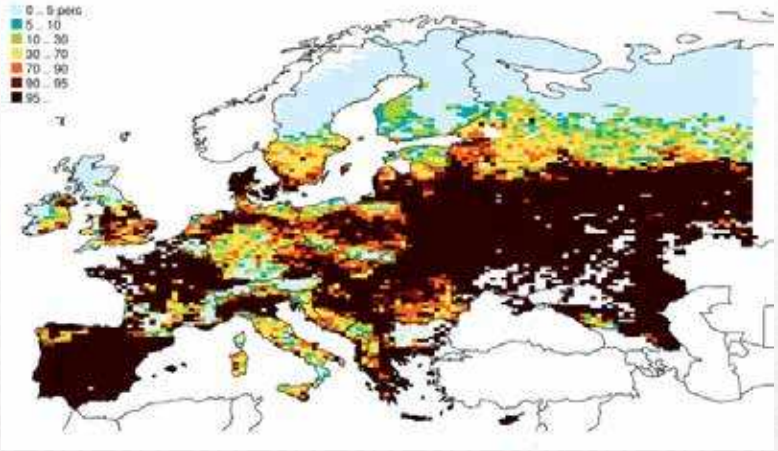
Kväve hotar fortsatt biodiversiteten



Eutrophication

2010: 63% (1,060,000 km²)

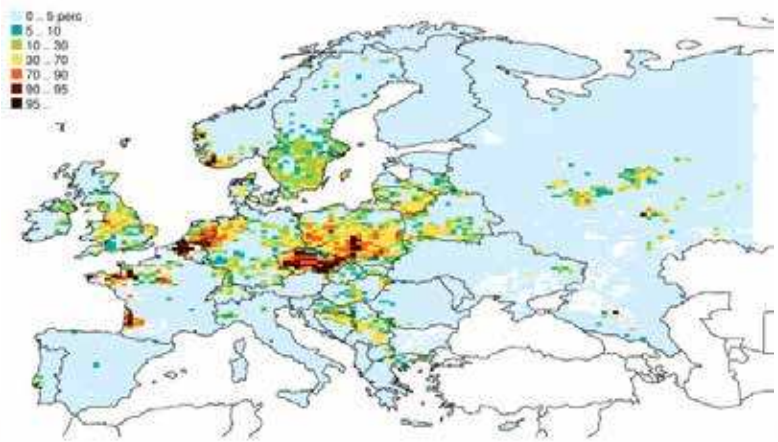


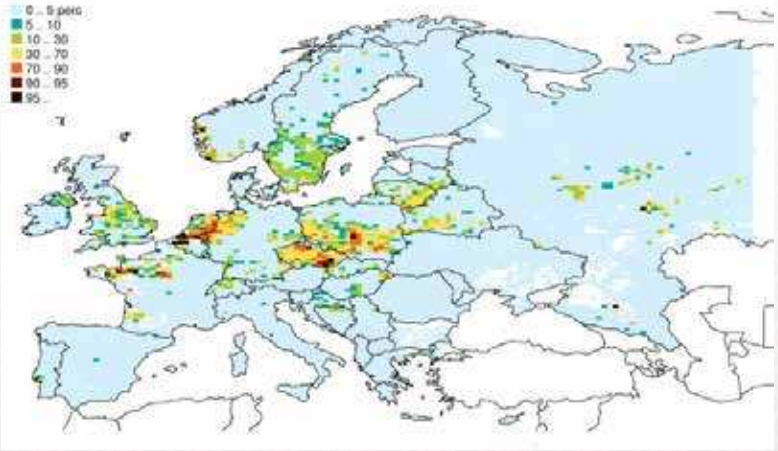


2030 Baseline: 52% (870,000 km²)

Acidification

2010: 7% (124,000 km²)



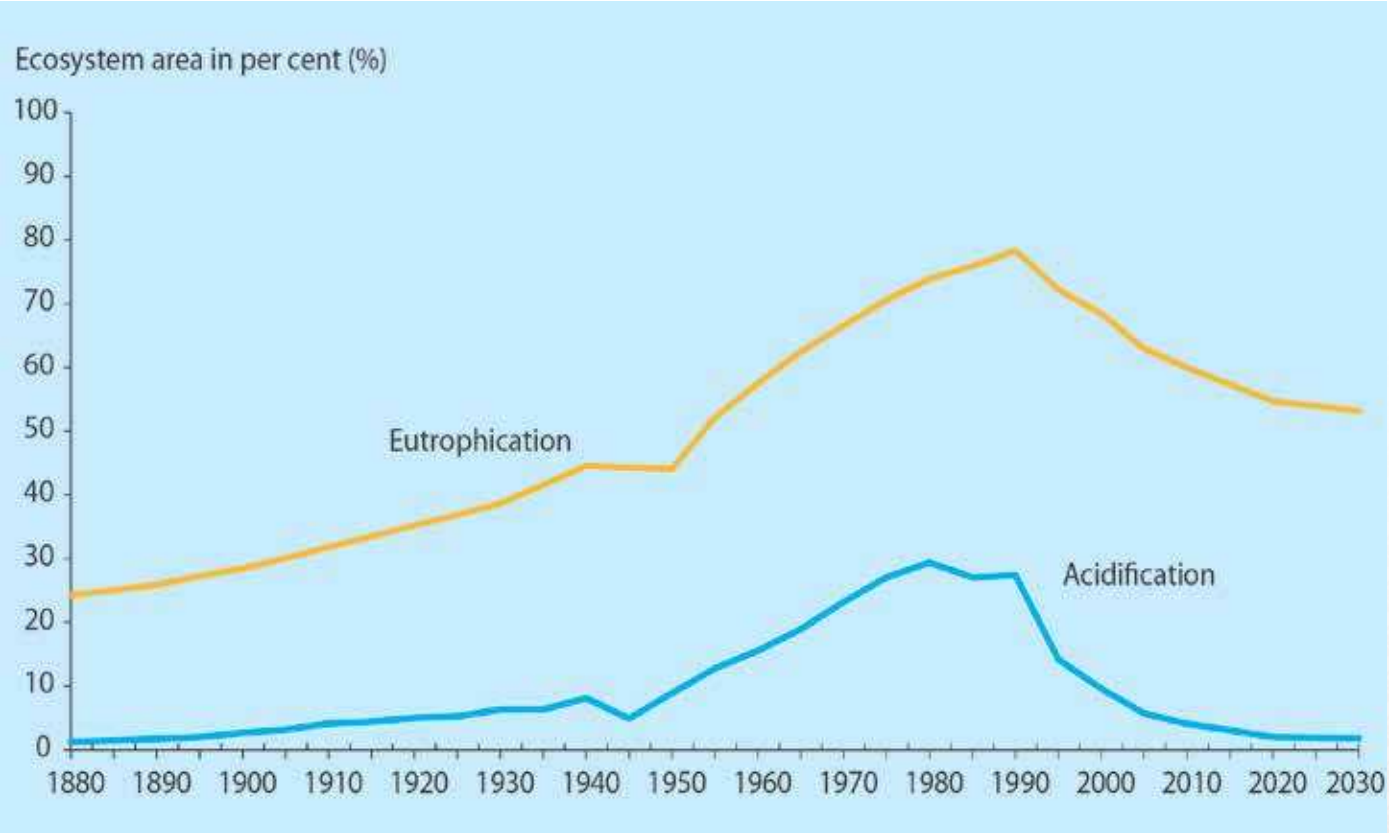


2030 Baseline: 3.3% (58,000 km²)

Source: IIASA (2015)

Exceedance of Critical loads 2010 and 2030 according to EU's baseline scenario

Critical load exceedance in Europe



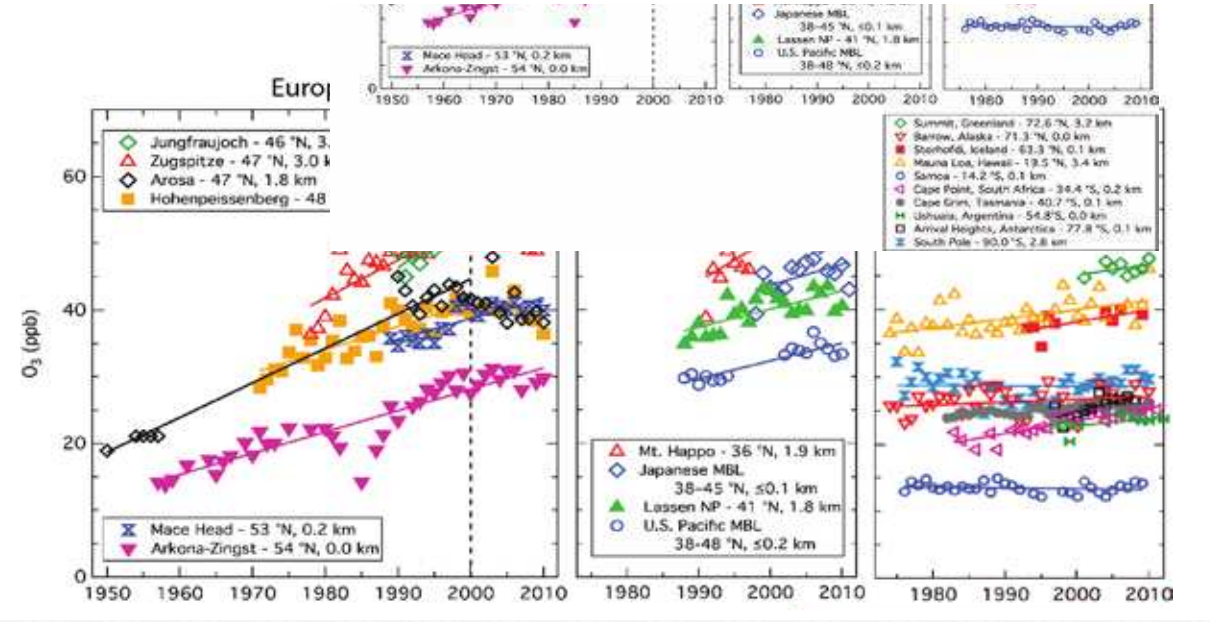
Source: CCE

Ozon – ett problem som uppträder på olika skalor

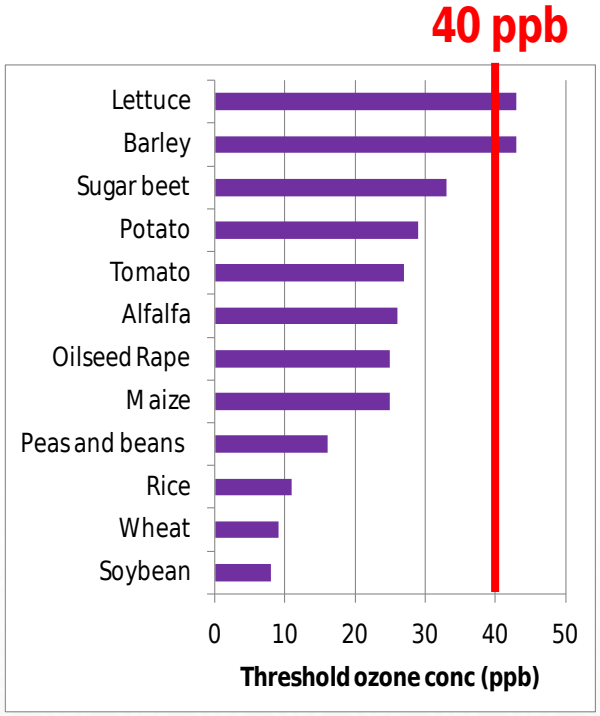
- Lokalt – i stora urbana områden
- Regionalt – ozoneepisoder över Europa, östra Nordamerika etc.
- Norra hemisfären

- Bildas genom solljusinducerade reaktioner mellan kväveoxider, flyktiga organiska ämnen (VOC) och metan

Ozonhalterna har ökat under 1900-talet



Changing ozone profile: importance of flux-based approach

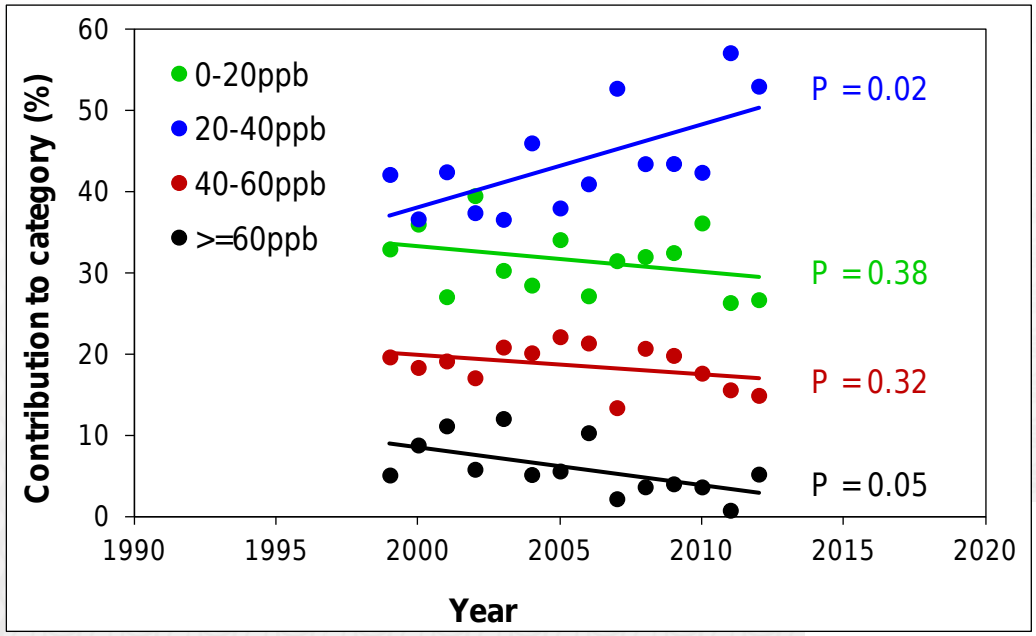


M7 ozone conc. required for a significant effect on yield*

* From Mills and Harmens, 2011, ICP vegetation Food Security Report, http://icpvegetation.ceh.ac.uk/

- The ozone profile has changed - peaks are falling and background is rising to just above/below 40 ppb
- Vegetation (e.g. crops) respond to ozone concentrations well below 40 ppb (i.e. the threshold in AOT40)

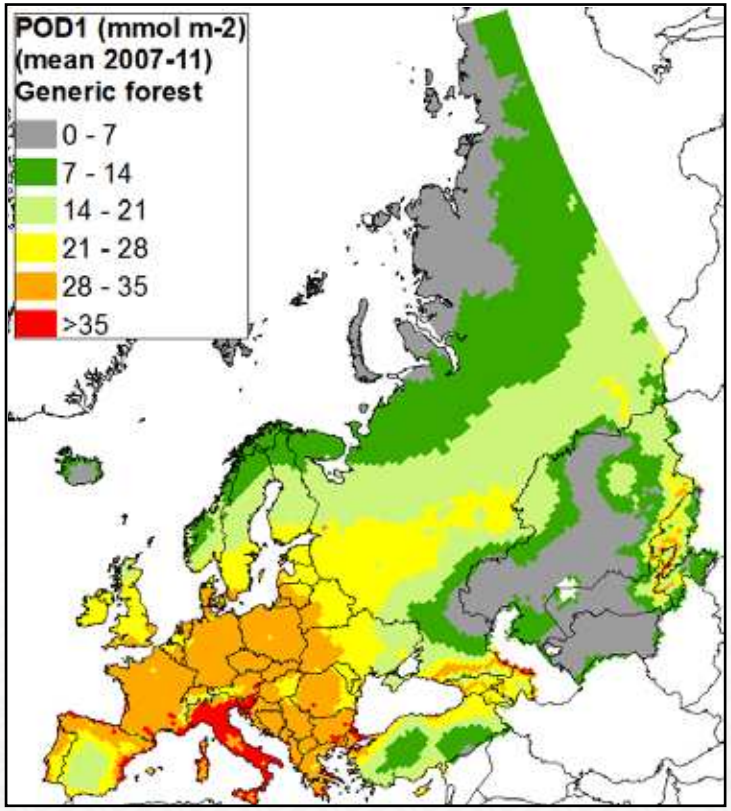
Daily mean O_3 from ICP Vegetation sites (Jun – Aug)



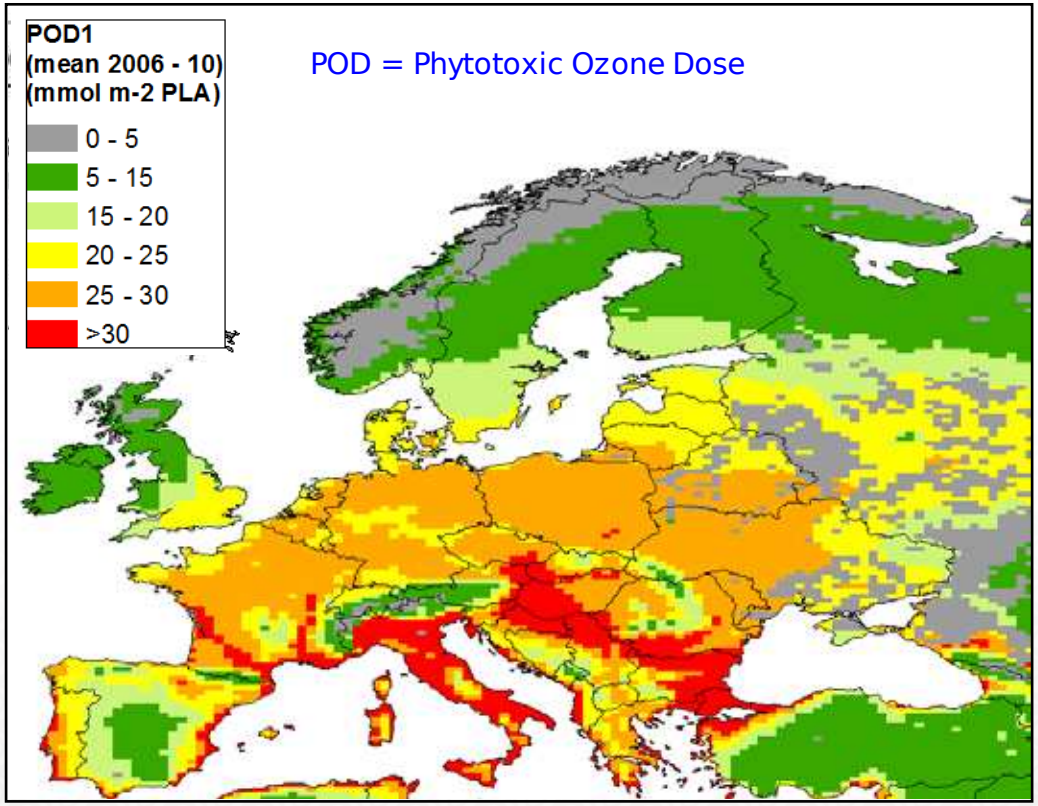
Example contribution to WGE trends report (2015)

Risk of ozone damage to ecosystems

Forest

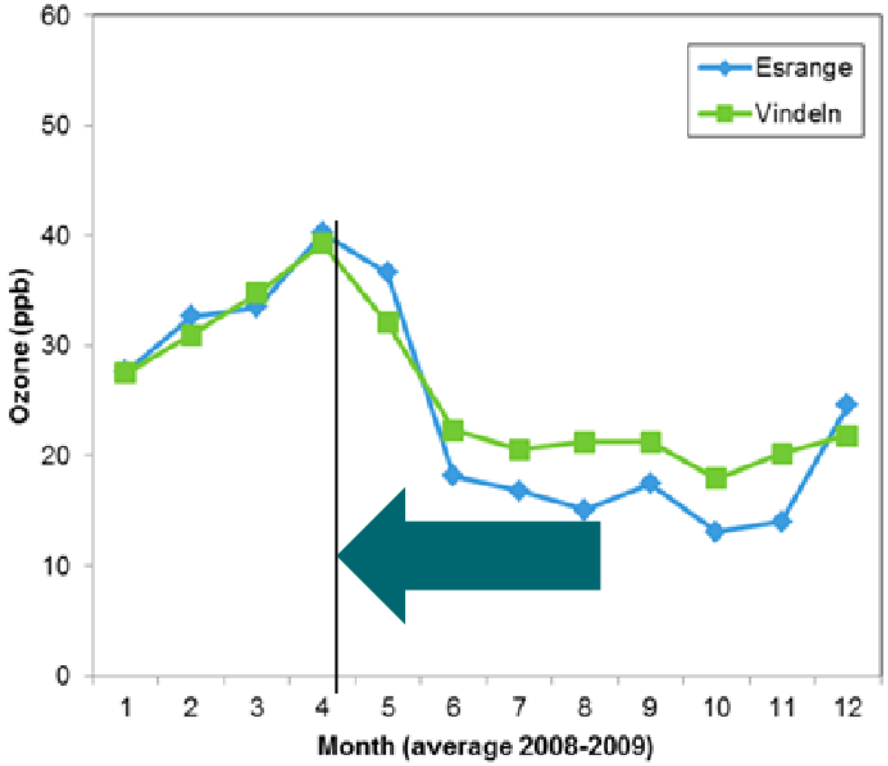


Grassland



- Risk highest in central Europe and parts of southern Europe, where ozone concentrations are higher and/or climate conditions conducive to high ozone uptake by vegetation

A warmer Arctic may lead to an earlier onset in the photosynthesis.
This may lead to effects on forests and seminatural vegetation



Annual variation in ozone concentrations at two sites in the North of Sweden

Data from P-E Karlsson, IVL

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Partiklar

Smog episode over Paris, 18 March 2015. Large fraction due to transboundary pollution

- En betydande del av partiklarna utgörs av ammoniumnitrat

Råcker tekniska åtgärder till?

- **Ammoniak**
- Mycket kan åstadkommas genom tekniska åtgärder men
- vi behöver gå längre
  - Ökad N effektivitet inom jordbrukssektorn
  - Ändrade kostvanor - mindre kött

- **Kväveoxider**
- Se till att trafikens utsläpp lever upp till avgaskraven
- Sjöfartens utsläpp

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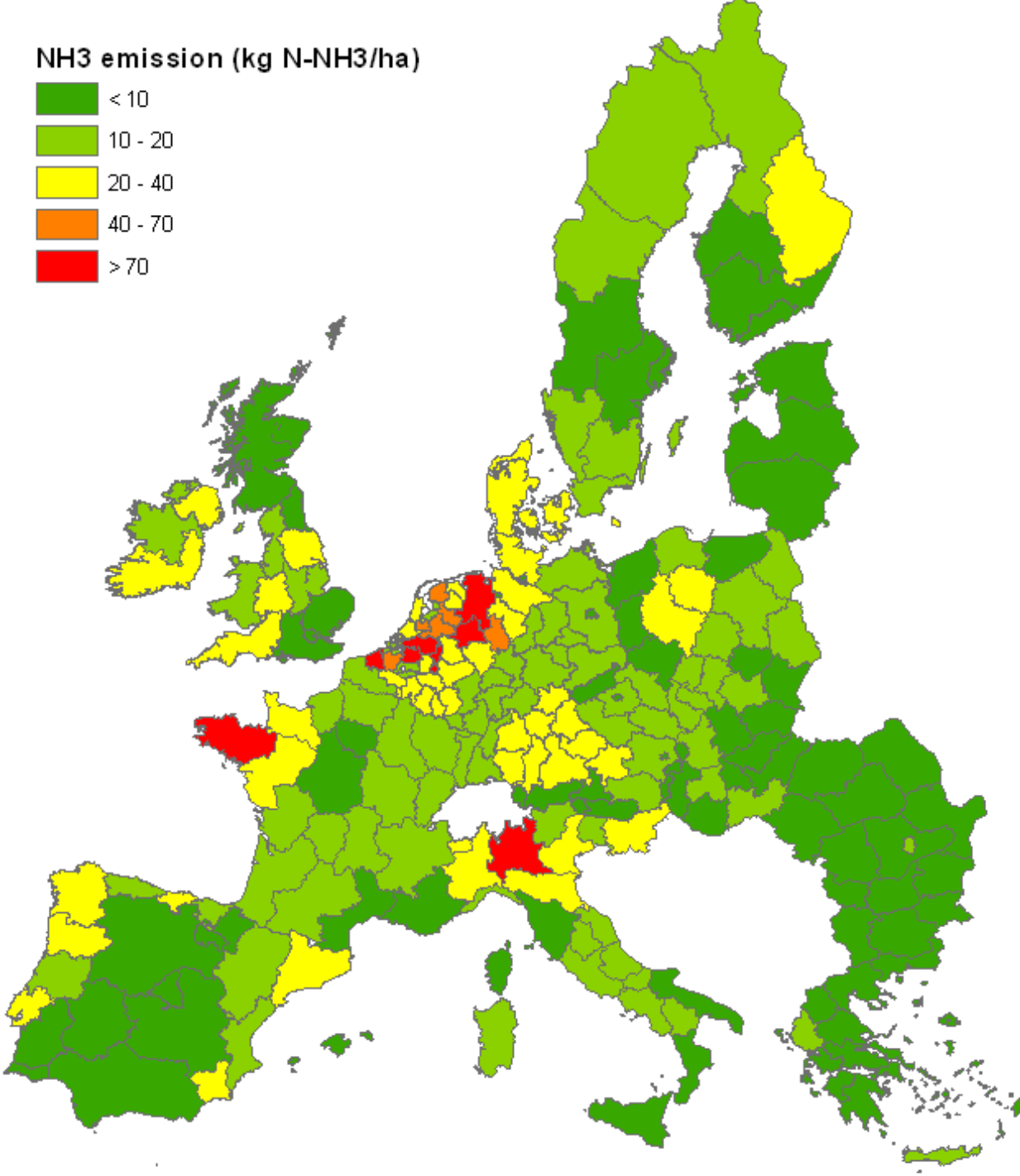
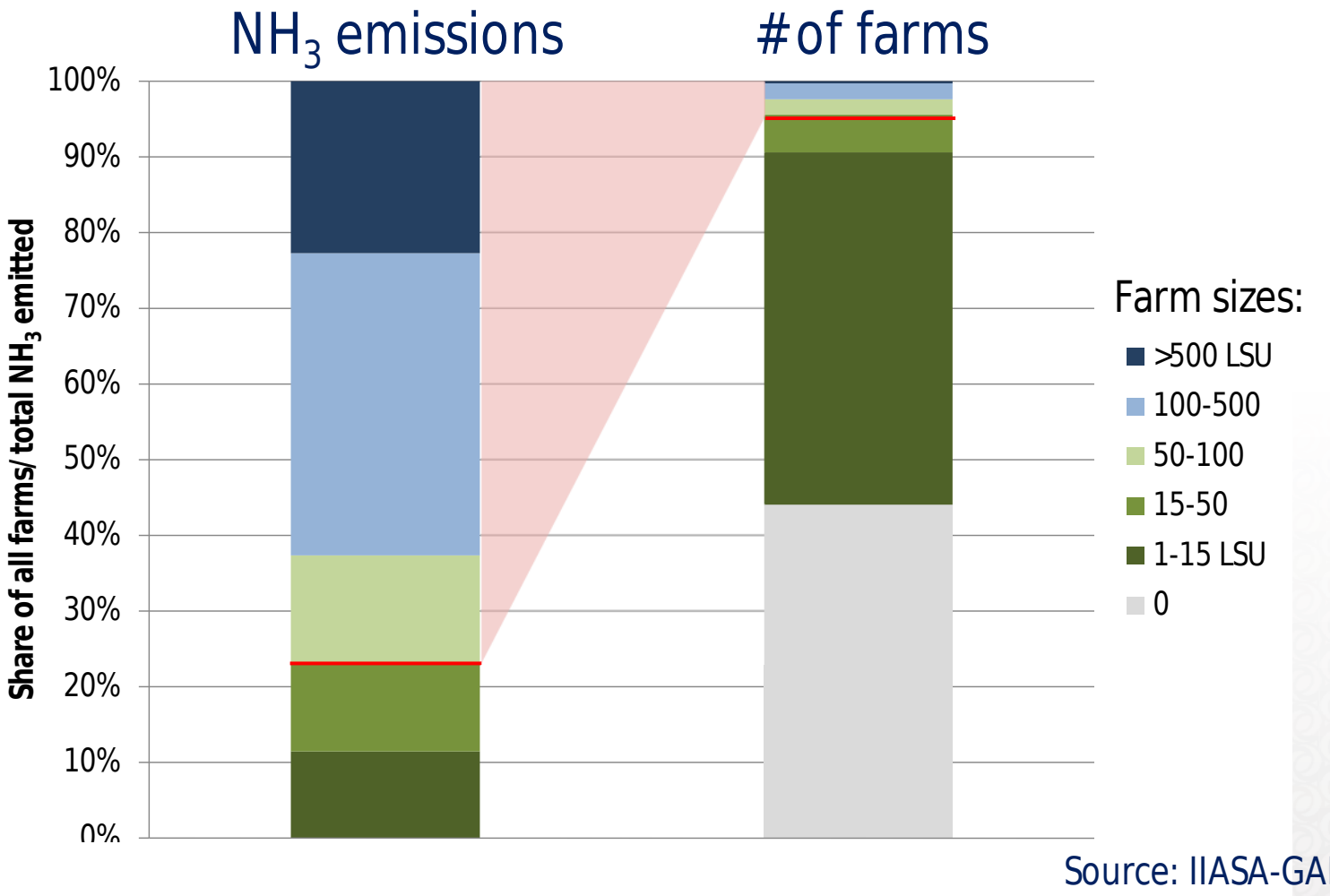
Ammonia remains a challenge for ecosystems and health



80% of NH_3 emissions emerge from 5% of the farms in the EU



Source: IIASA-GAINS

The NEC proposal suggests measures for 3% of the farms, i.e., for large industrial animal holdings

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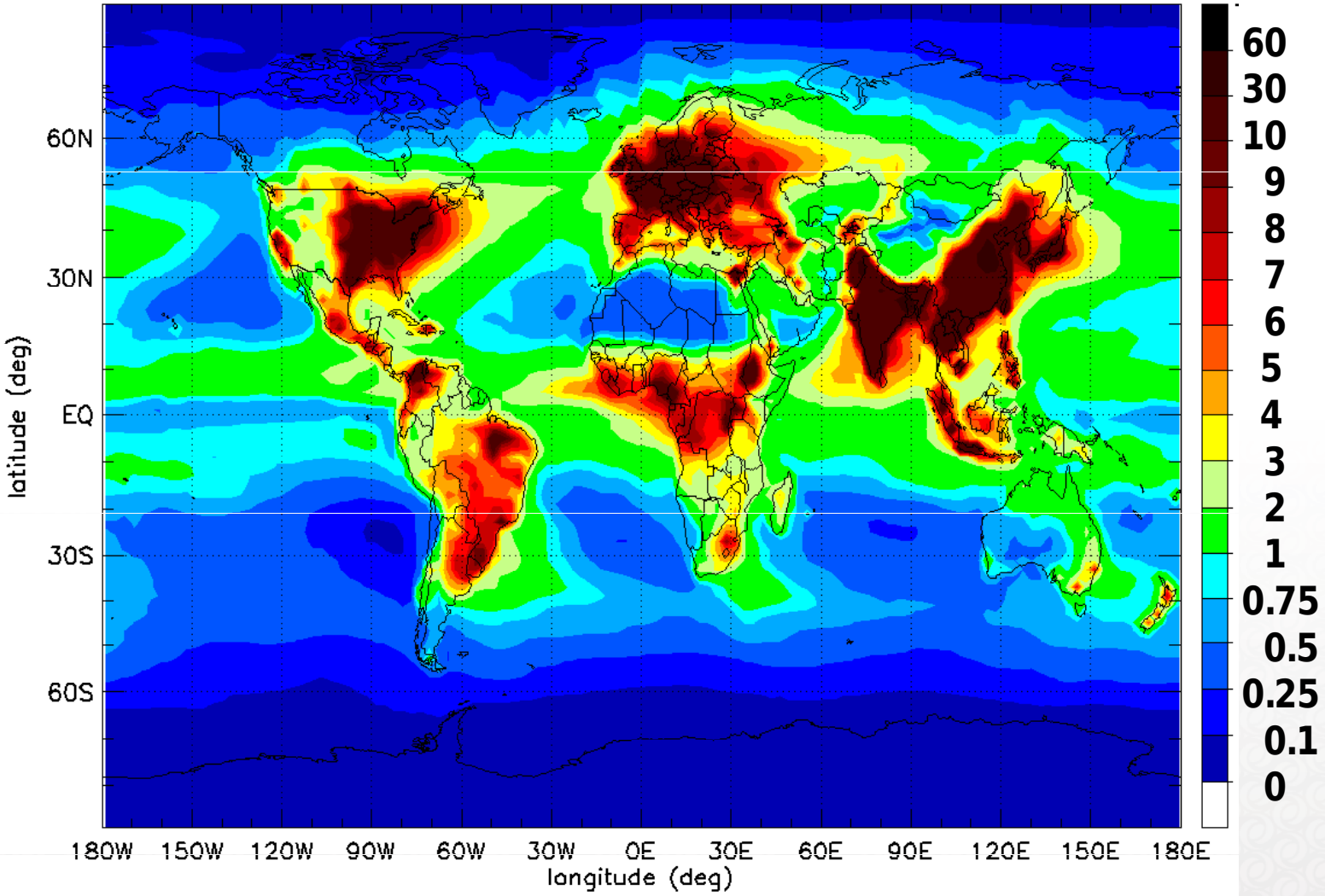
Kväve är ett globalt problem



Annual atmospheric deposition of reactive nitrogen compounds (kg N per hectare)

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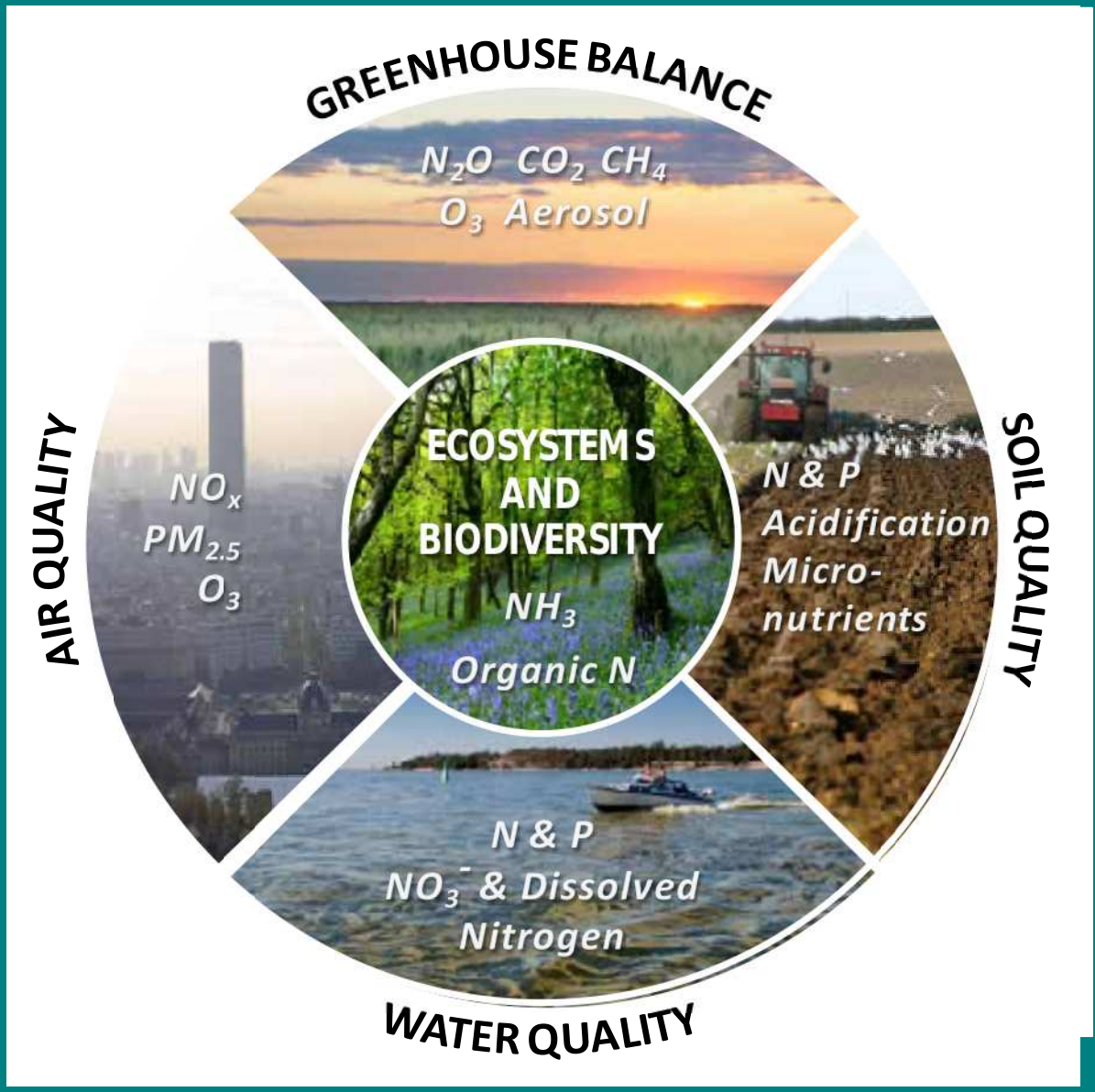
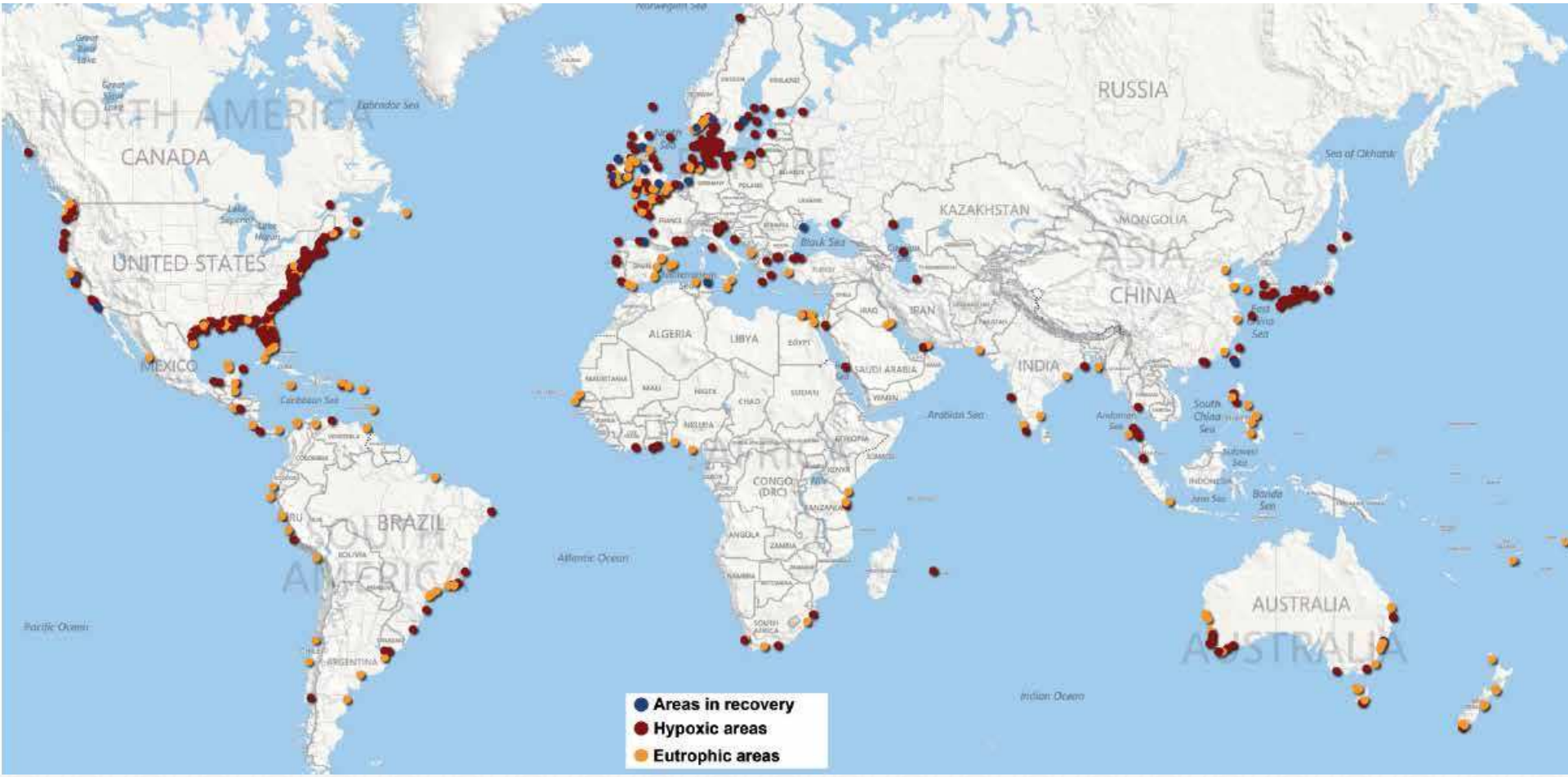
The five key threats of excess Nitrogen

The WAGES of too much nitrogen

Water quality
Air quality
Greenhouse balance
Ecosystems
Soil quality



Coastal areas and nutrient pollution



Kväveproblemet kommer att öka

- Ökande befolkning
- Ändrad kost – mer kött i stället för vegetarisk föda

- Ökat intresset på den internationella agendan
- Flera FN-initiativ inklusive SDG

Ten key actions

Agriculture

1. Improving nitrogen use efficiency in crop production
2. Improving nitrogen use efficiency in animal production
3. Increasing the fertilizer N equivalence value of animal manure

Transport and Industry

4. Low-emission combustion and energy-efficient systems
5. NO_x capture and utilization technology

Waste & Recycling

6. Improving food supply efficiency & reducing food waste
7. Recycling nitrogen (and phosphorus) from waste water systems

Societal consumption patterns

8. Energy and transport saving
9. Lowering the human consumption of animal protein

Integration

10. Spatial optimization and integration

Tack för uppmärksamheten