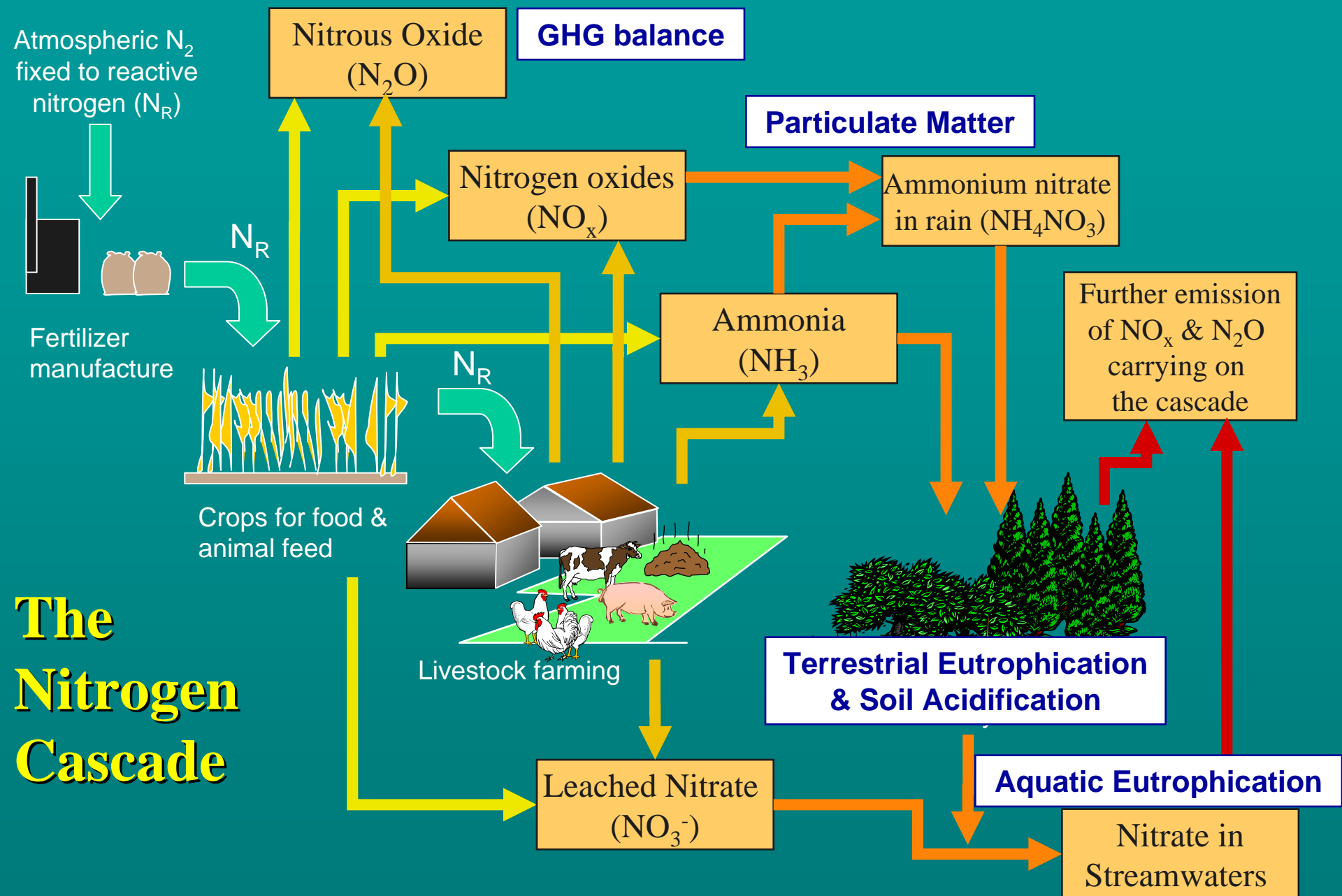




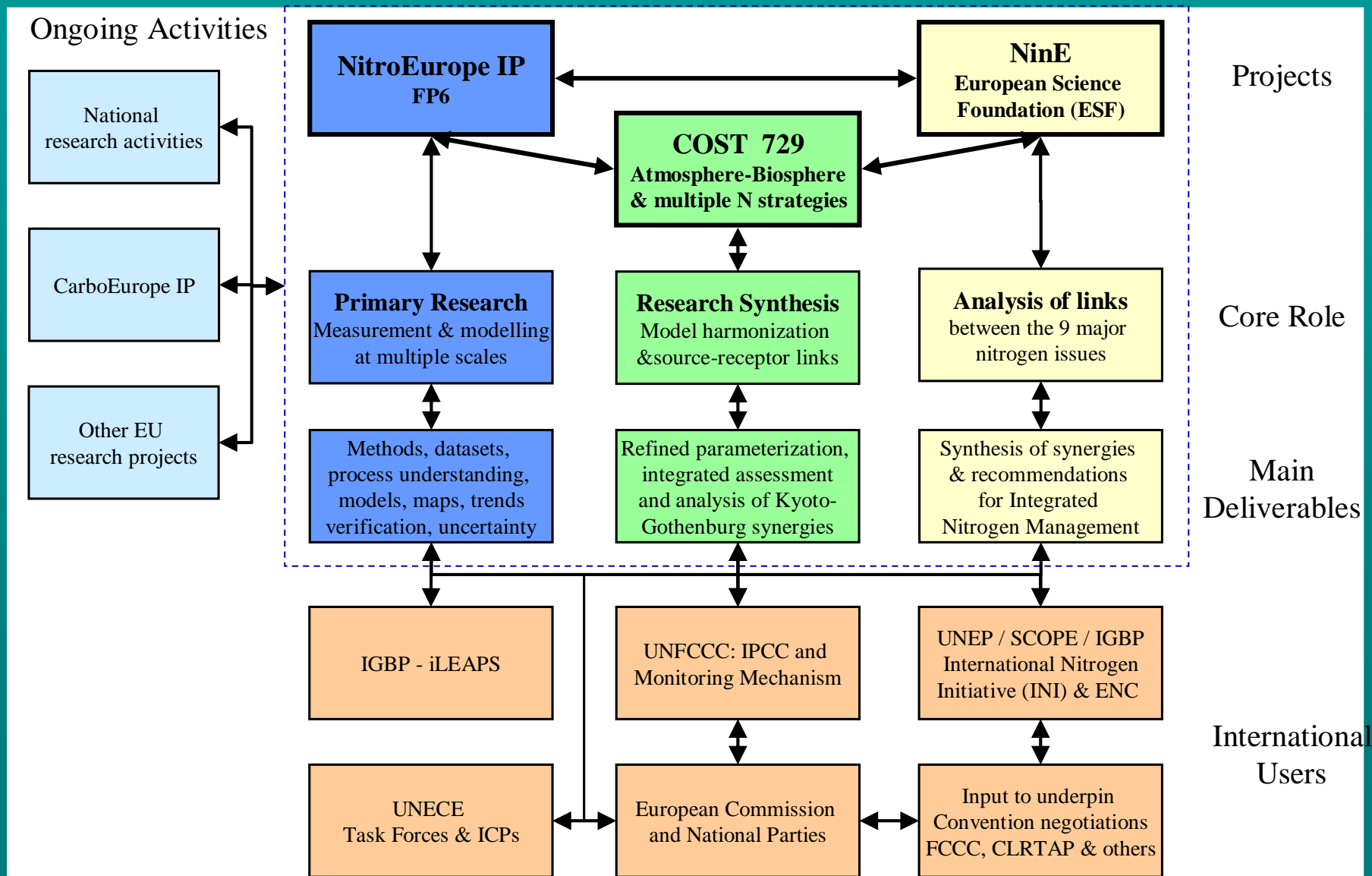
# **Integrated Nitrogen Activities in Europe**

**Workshop: TFIAM/COST729/NinE  
Workshop on integrated Modelling of Nitrogen**

**Mark Sutton  
CEH Edinburgh, INI European Centre**



# Developing an integrated approach: The Building Blocks



# NitroEurope IP



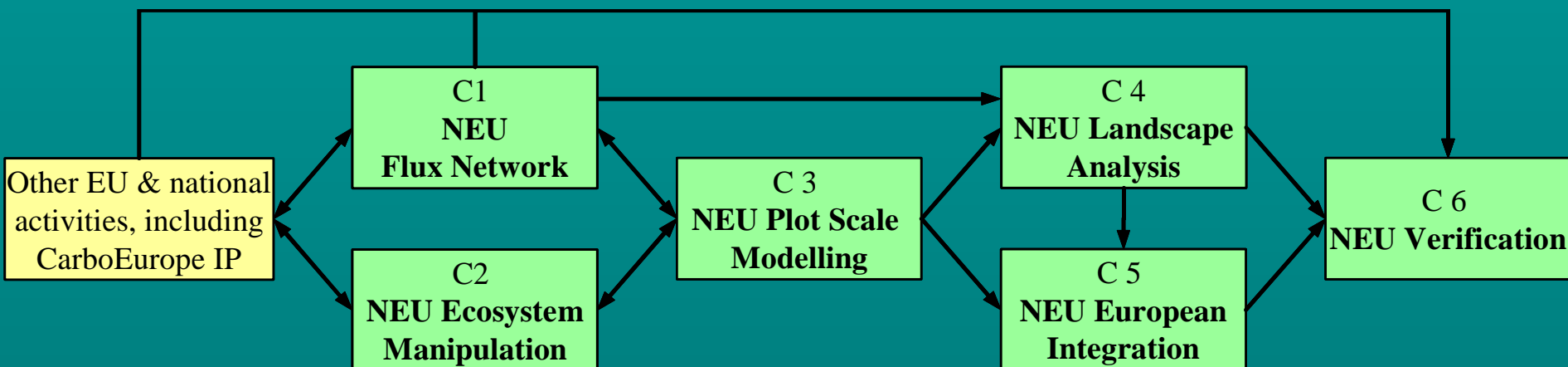
*What is the effect of reactive nitrogen supply on the direction and magnitude of net greenhouse gas budgets for Europe?*

## Effect of N on the GHG balance:

<b>↑ GHG</b>	<b>?</b>	<b>↓ GHG</b>
<b>N<sub>2</sub>O</b> (+2' from NH <sub>3</sub> , NO <sub>3</sub> <sup>-</sup> )	<b>Cattle CH<sub>4</sub></b>	<b>C uptake by plants</b>
<b>CH<sub>4</sub> from wetlands</b>	<b>SOM decomposition</b>	<b>Nitrogen aerosol</b>
<b>NO<sub>x</sub> → O<sub>3</sub> → less primary production</b>		

# NitroEurope

## Overall Science Structure



Plus four supporting components:

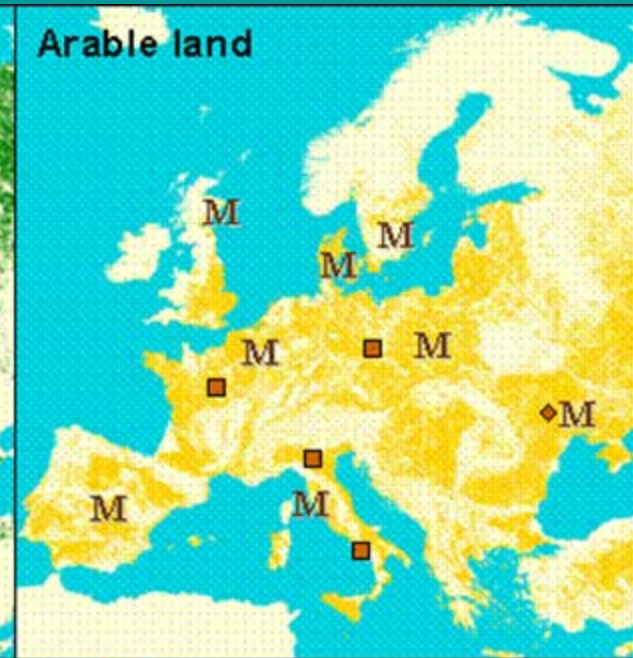
C7. Standards and Data Management

C8. NEU Management

C9: NEU Training

C10: NEU Dissemination

# NitroEurope: Flux network (C1) & Manipulation network (C2)



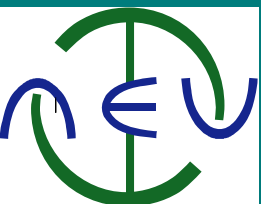
13 Super Sites

9 Regional Sites

55 Inferential Sites

22 Core Manipulation Sites

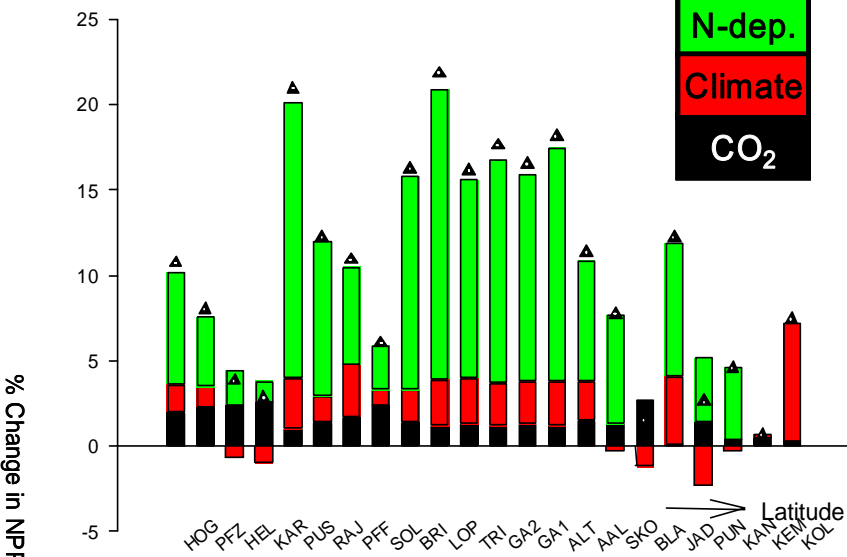
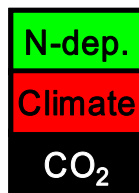
14 Assoc. Manipulation Sites



# Multi model comparison at European forest sites (RECOGNITION)

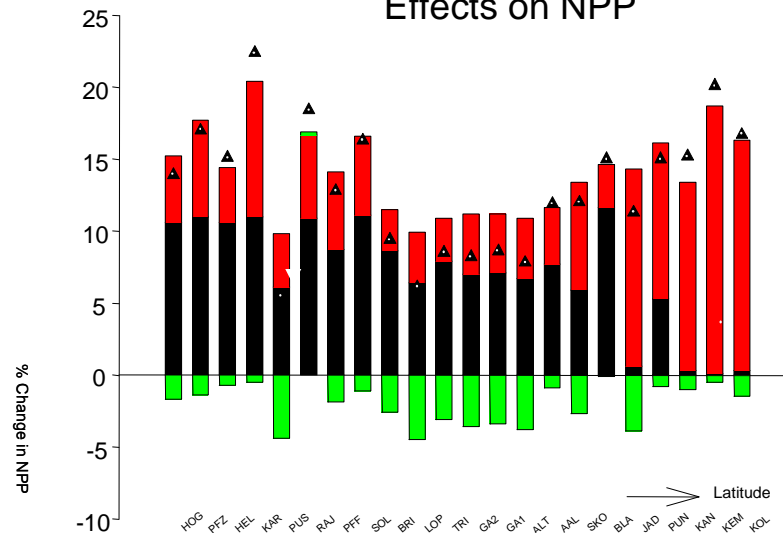
Change in NPP  
(% increase)

Causal  
Factors:



20<sup>th</sup> Century

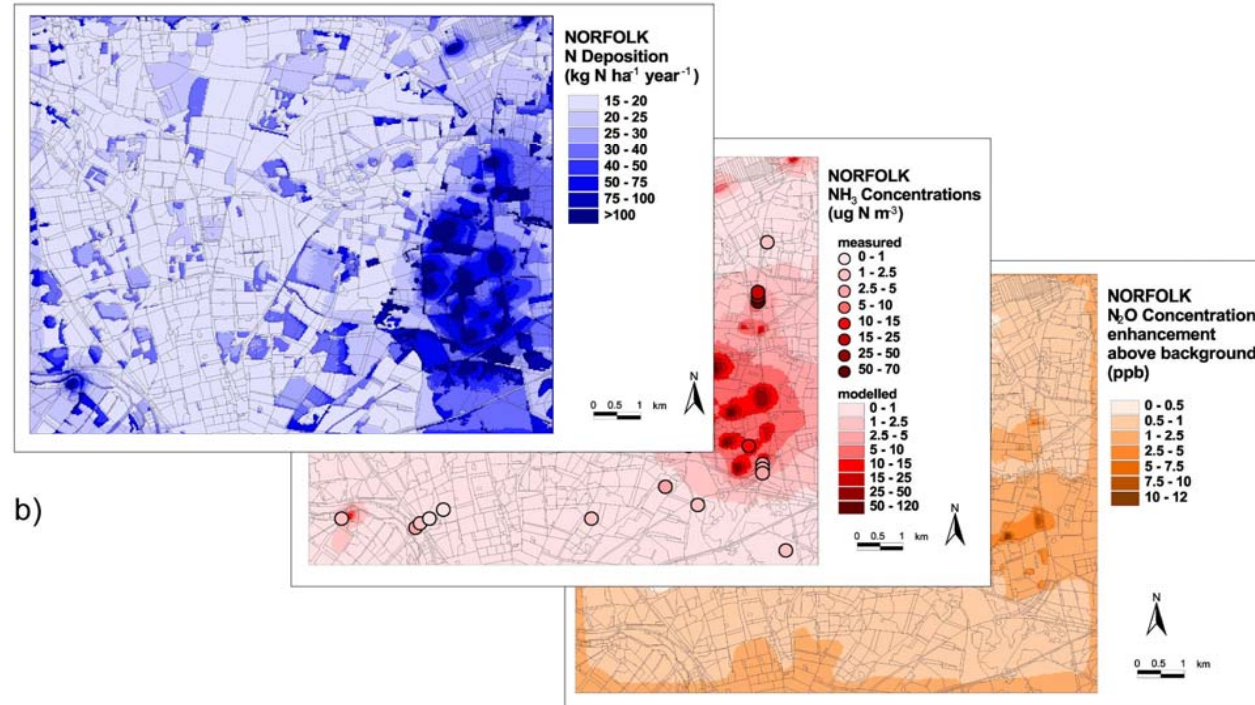
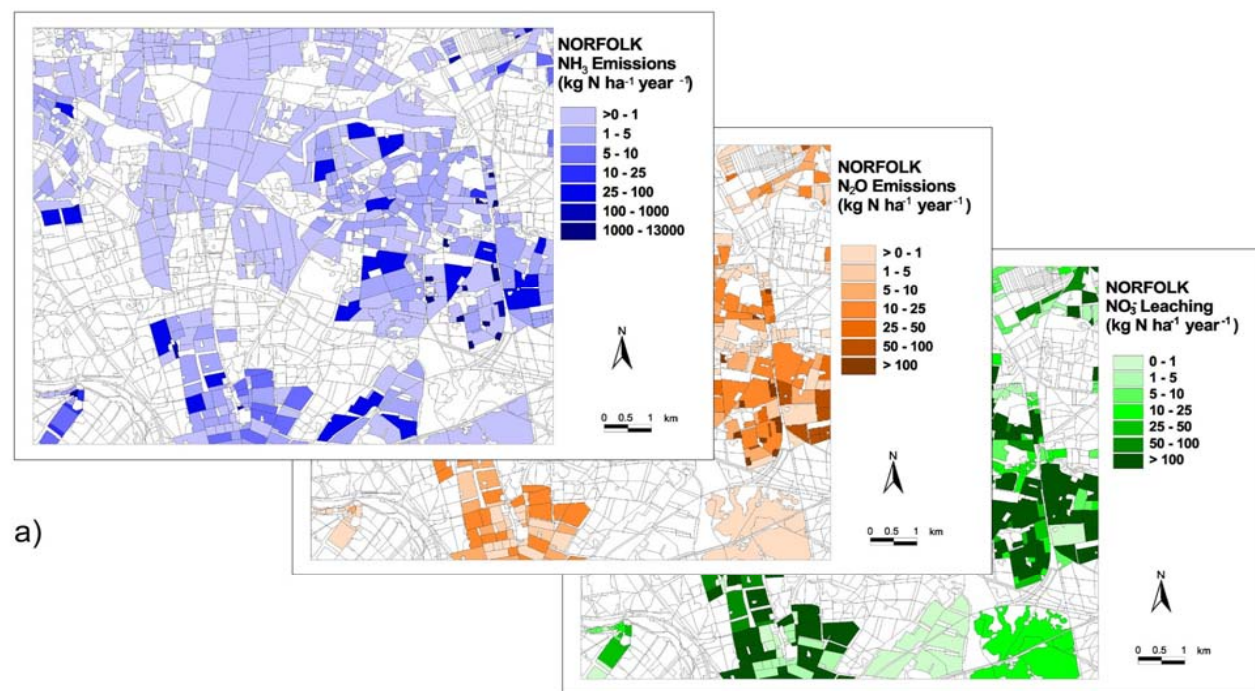
Environmental change 2000-2080:  
Effects on NPP



21<sup>st</sup> Century

# Landscape Analysis

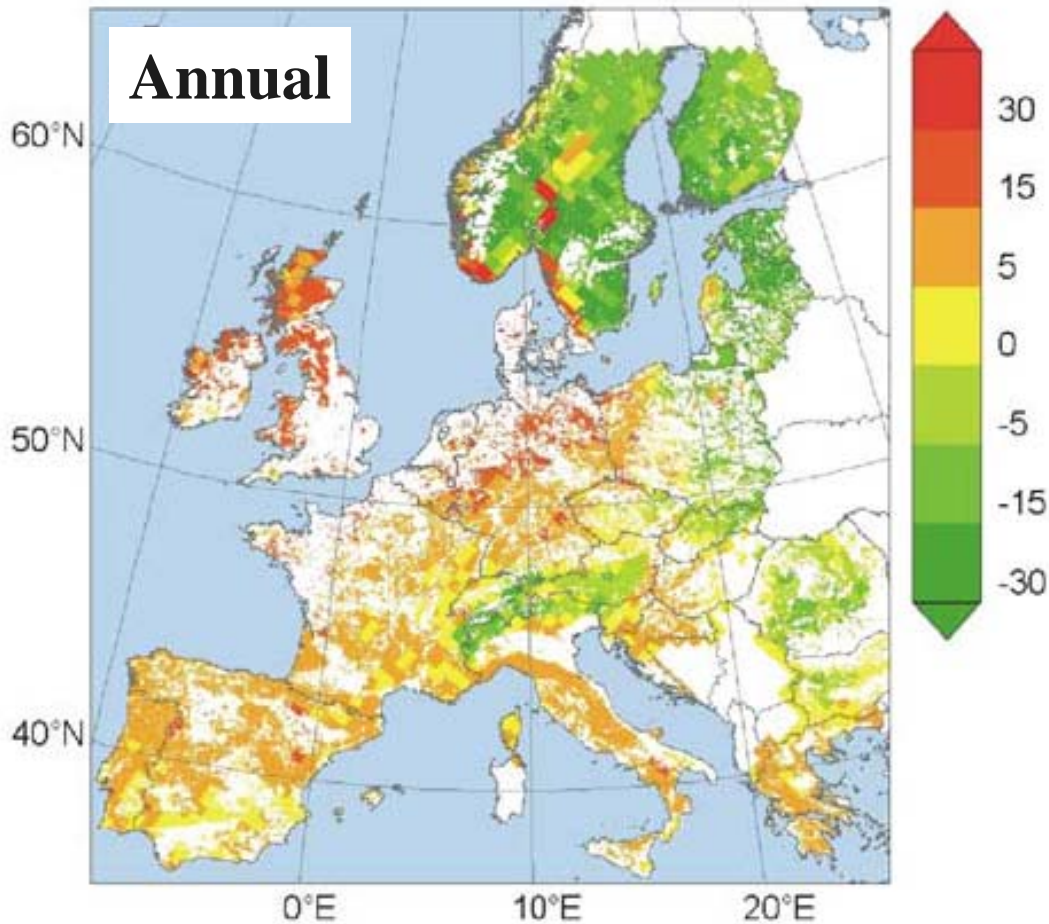
- Spatial interactions
- Complexity
- Management interactions
- Abatement strategies



GaN<sub>2</sub>E



# Relative change in N<sub>2</sub>O emission forest between 1990s and 2030s



# The Nitrogen Challenge

- **Multi-source**  
agriculture, fossil fuel, natural
- **Multi-pollutant**  
 $\text{N}_2\text{O}$ ,  $\text{NO}_x$ ,  $\text{NH}_3$ , aquatic  $\text{NO}_3^-$ , aerosol etc
- **Multi-problem**  
GHG balance, biodiversity, water quality, human health
- **Multi-receptor**  
Forests & other terrest. ecosystems, agriculture, rivers, stratosphere, urban, coastal & marine, humans

# European Nitrogen Assessment

- **Major Sponsor:** ESF Nitrogen in Europe (NinE)
- **Coordination:** International Nitrogen Initiative (INI) European Centre
- **Reported to:** International Conventions on climate, air, water, biodiversity under the lead of the UNECE Task Force on Reactive Nitrogen (TFRN)
- **Timing:** Planning 2007; Workshops and chapters 2008-09. Delivery 2010.
- **Contributions:** Express interest via ENA website

# Overall structure of the ENA - 1

1. Introduction, Scope & Objectives

## A. Nitrogen in Europe: the present position.

2. European N problem in global perspective
3. N in current European policies
4. Challenge to integrated N science & policies

## B. Nitrogen processing in the biosphere

5. N processes & effects in terrestrial ecosystems
6. N processes & effects in aquatic ecosystems
7. N processes & effects in coastal/marine ecosystems
8. N processes & effects in the atmosphere

# Overall structure of the ENA - 2

## C. Dispersion, budgets & impacts of nitrogen on different scales

9. Rural landscapes

10. Urban landscapes

11. Regional watersheds (inc. coastal & marine)

12. Atmos transport & deposition over Europe

13. Integrating N fluxes at European scale

# Overall structure of the ENA - 3

## D. Managing nitrogen in relation to key societal threats

Need to develop consensus on the 5 priorities!

- GHG balance
- Air quality (esp. particulate and ozone)
- Terrestrial biodiversity
- European water quality
- Soil fertility/soil quality

# Overall structure of the ENA - 4

## D. European N policies and future challenges

19. Future scenarios

20. Costing nitrogen in the environment

21. Integrated approaches to better N management

22. Streamlining European nitrogen management between international conventions

23. Societal choice and the European N challenge

24. Communication and dissemination

[www.nitroeuropa.eu](http://www.nitroeuropa.eu)

[www.nine-esf.org](http://www.nine-esf.org)

[ena@nine-esf.org](mailto:ena@nine-esf.org)