



# IMPLEMENTATION OF DANISH ACTION PLANS, 1990-2013

---

Gitte Blicher-Mathiesen, Anton  
Rasmussen, Jonas Rolighed  
Department of Bioscience  
Aarhus University, Denmark



AARHUS  
UNIVERSITY  
DEPARTMENT OF BIOSCIENCE

---

1. Agriculture in Denmark
2. Environmental indicators in agriculture
  - > Field balances
  - > Trends in modelled N leaching from the root zone
3. Conclusions

Data and figures from:

Bjerring et al., 2015

<http://dce2.au.dk/pub/SR122.pdf>

Blicher-Mathiesen et al., 2015

<http://dce2.au.dk/pub/SR120.pdf>

Hansen et al., 2015

<http://dce2.au.dk/pub/SR123.pdf>

Thorling et al., 2015

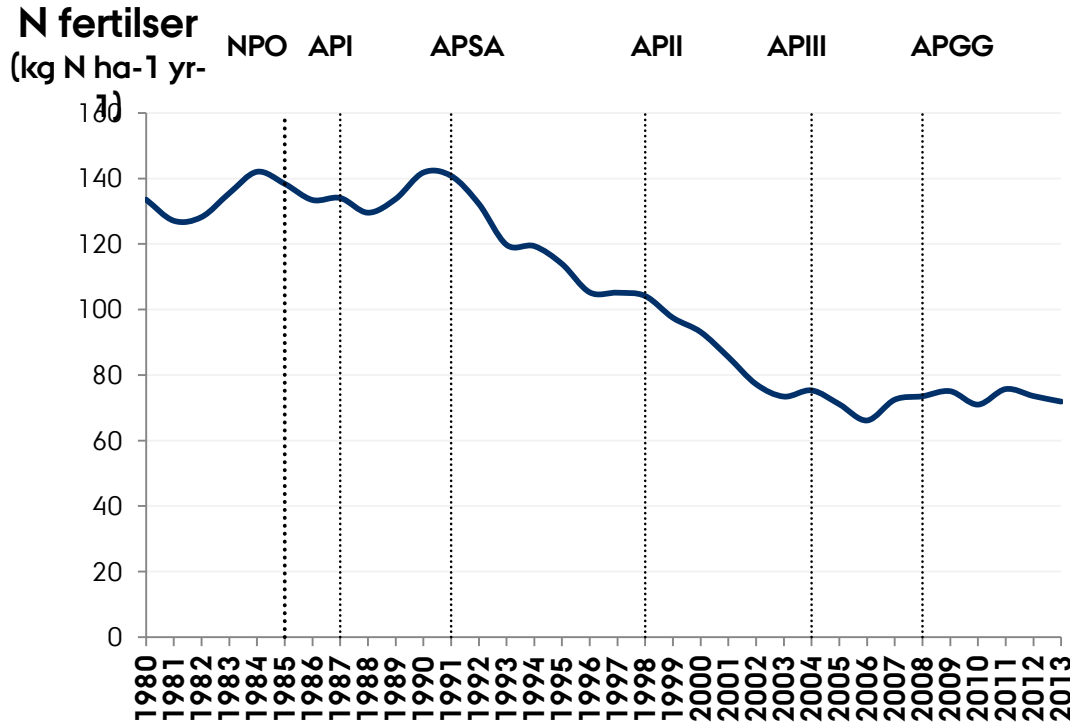
<http://www.geus.dk/publications/grundvandsovervaagning/index.htm>

Wiberg-Larsen et al., 2015

<http://dce2.au.dk/pub/SR121.pdf>



Almost all Action plans were agreed on the Parliament with both left- and right-wing parties



### Mitigation measures:

Manure storage capacity

Spreading techniques

Implementation of a N-quota system

Increased the utilization of nitrogen in manure

Increased use:

catch crops

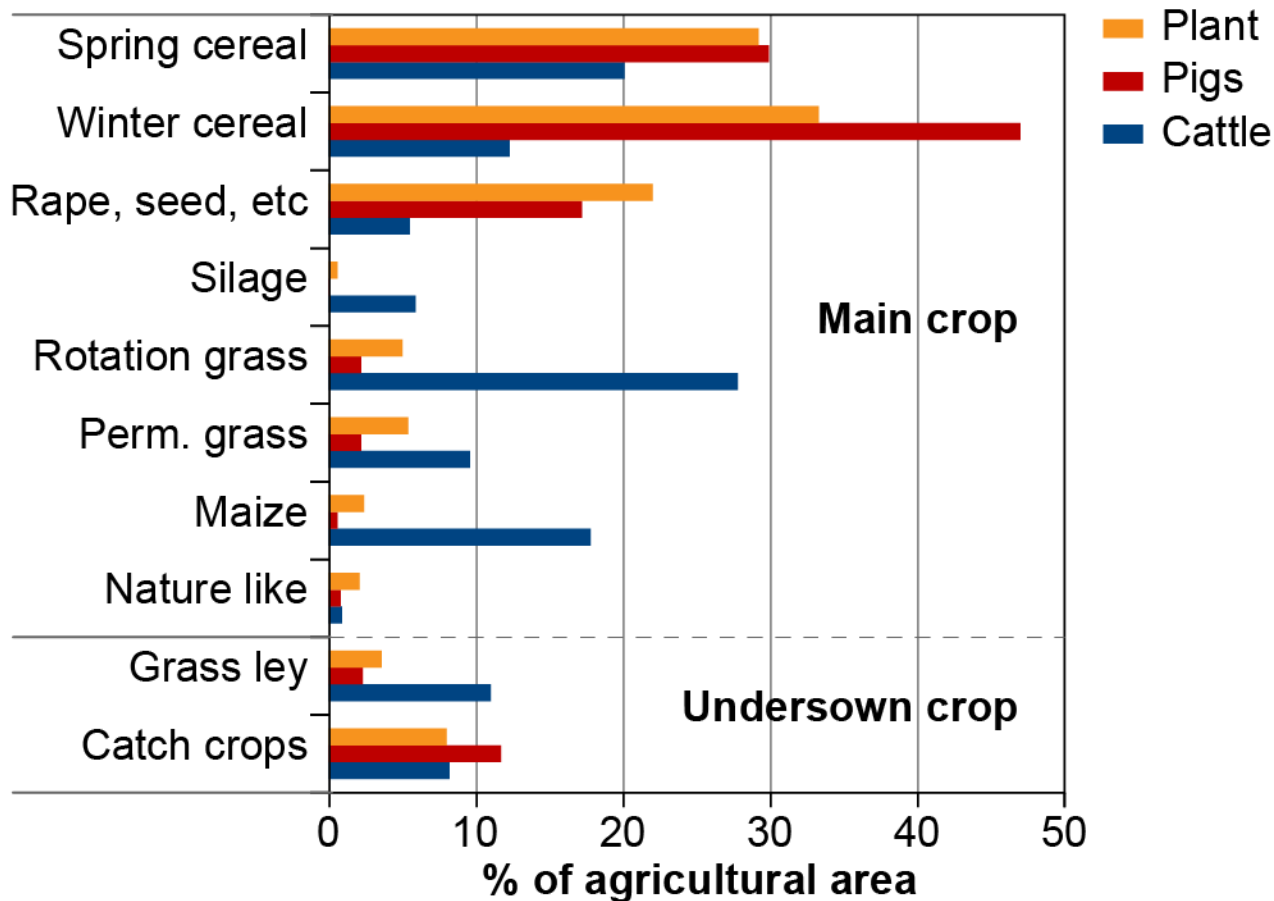
wetlands, afforestation

-> severe eutrophication of waters in the 1980s

-> public demand + political will to act

# Danish crop cover on different farm types

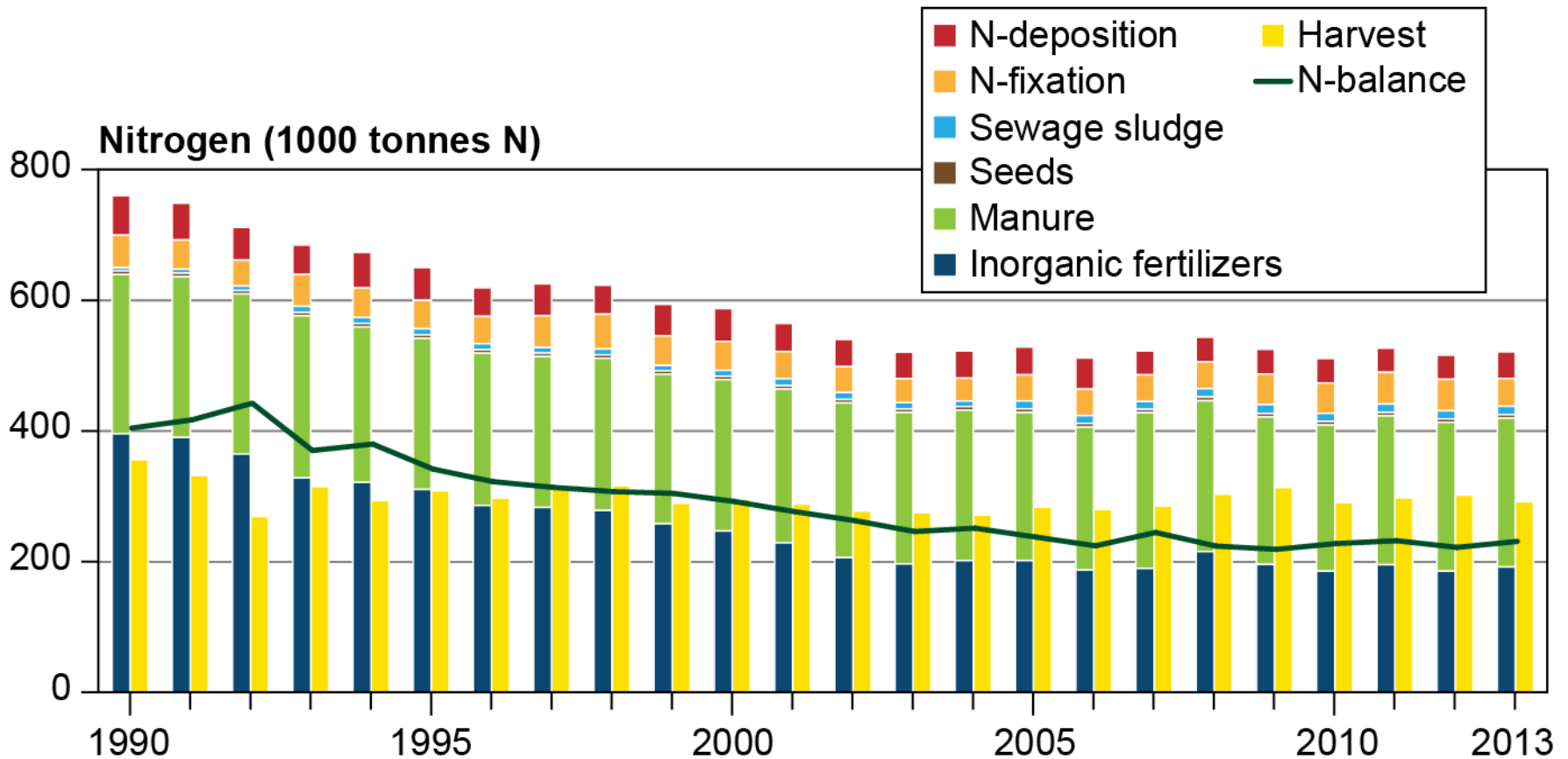
Total agricultural area is 2,671,000 ha  
Covers 62 % of the national territory





# Danish field balances for nitrogen

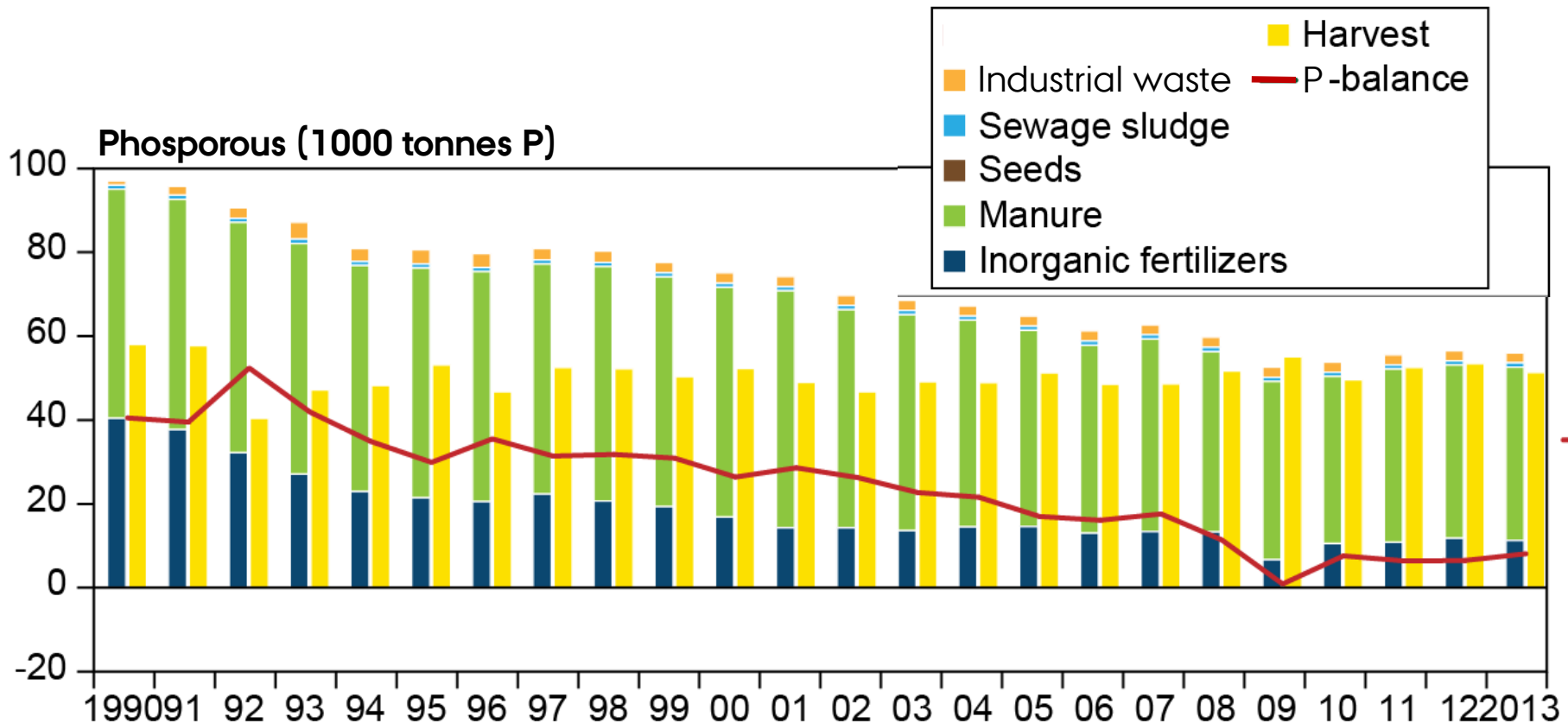
Reduction of 43 pct. in the field balance 1990-2013





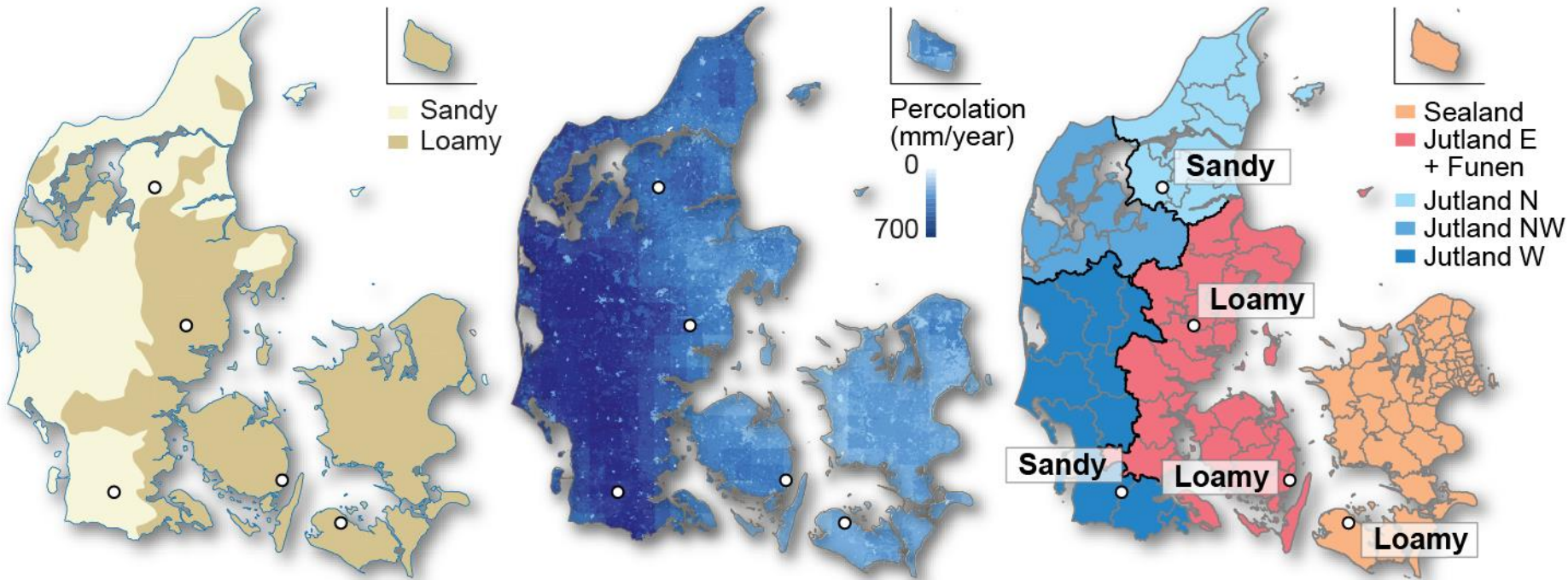
# Danish field balances for phosphorus

Reduction of 80 pct. in the field balance 1990-2013





# Agricultural catchment monitoring sites in Denmark (mini-catchments)





# Importance of the agricultural catchment monitoring

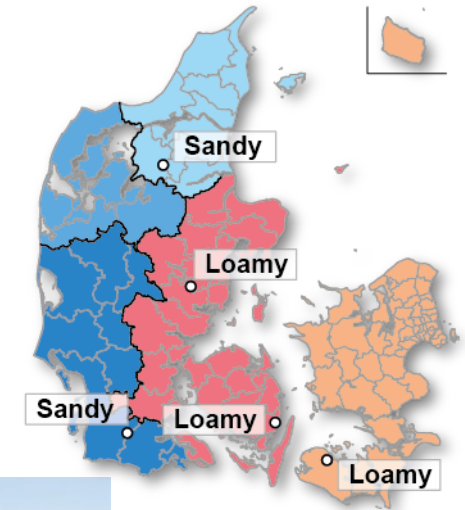
## 5 catchments (5-15 km<sup>2</sup>)

Measuring programme:

- > root zone water, 1 m (32 sites)
- > drainage water (7 sites)
- > upper-groundwater, 1.5-5 m (100 sites)
- > streams (5 sites)

## Annual interviews with farmers:

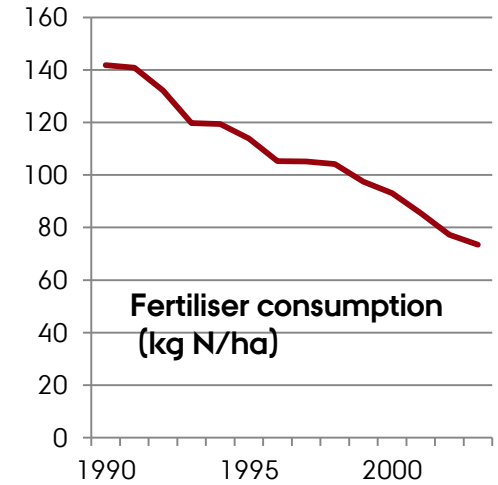
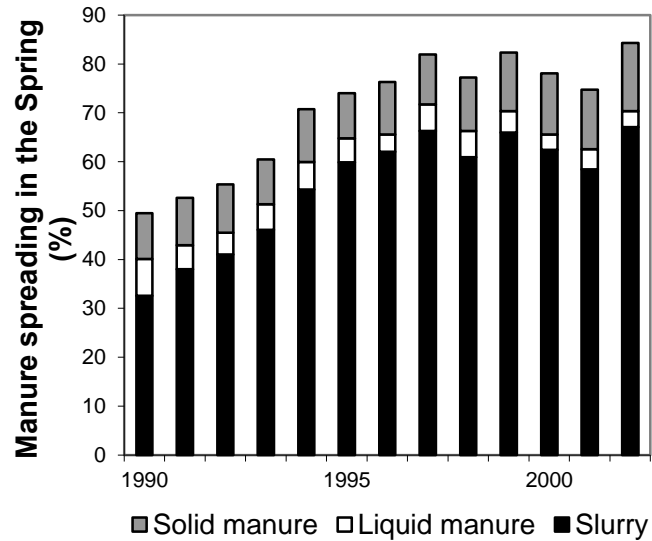
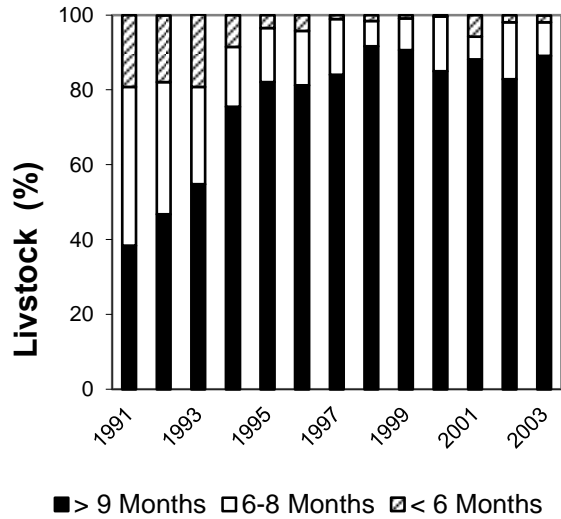
- > **crops**
- > **animals**
- > **fertilizers**
- > **manure**







# Increase in storage capacity





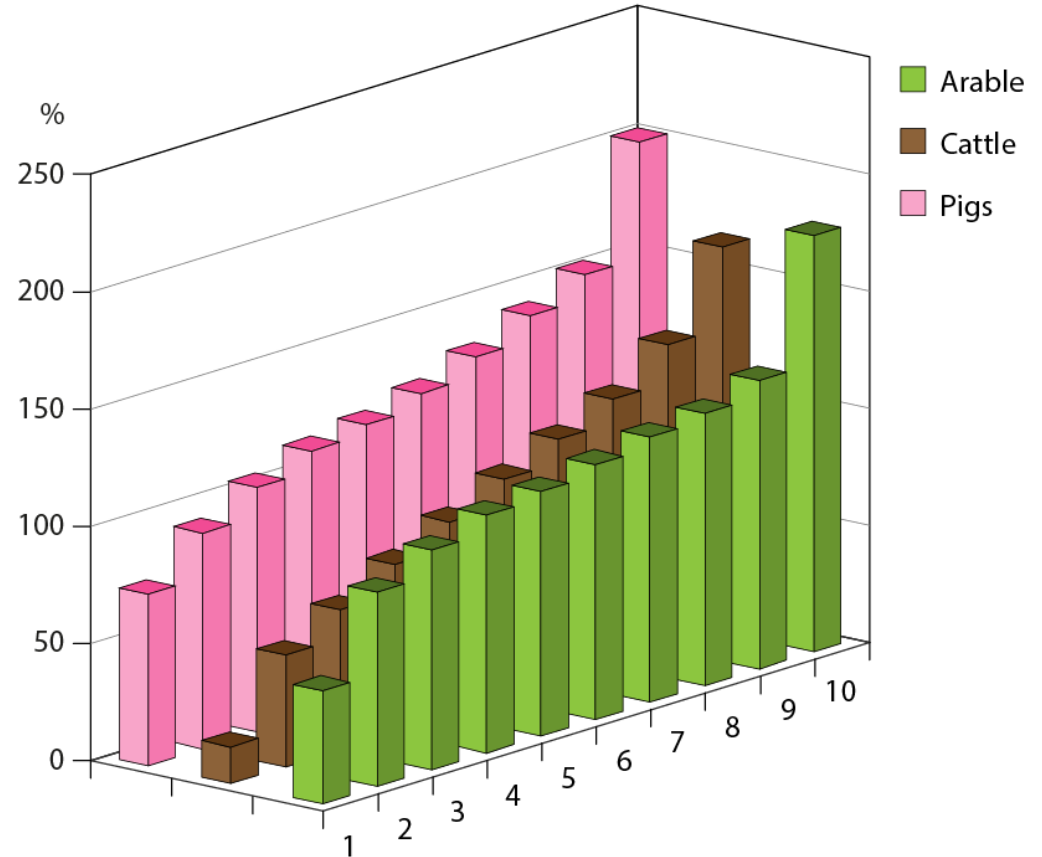
# Annual reporting

Example from 1995

Reports studied by:

Farmers organisations  
Knowledge Centre for Agriculture  
Ministry of Agriculture

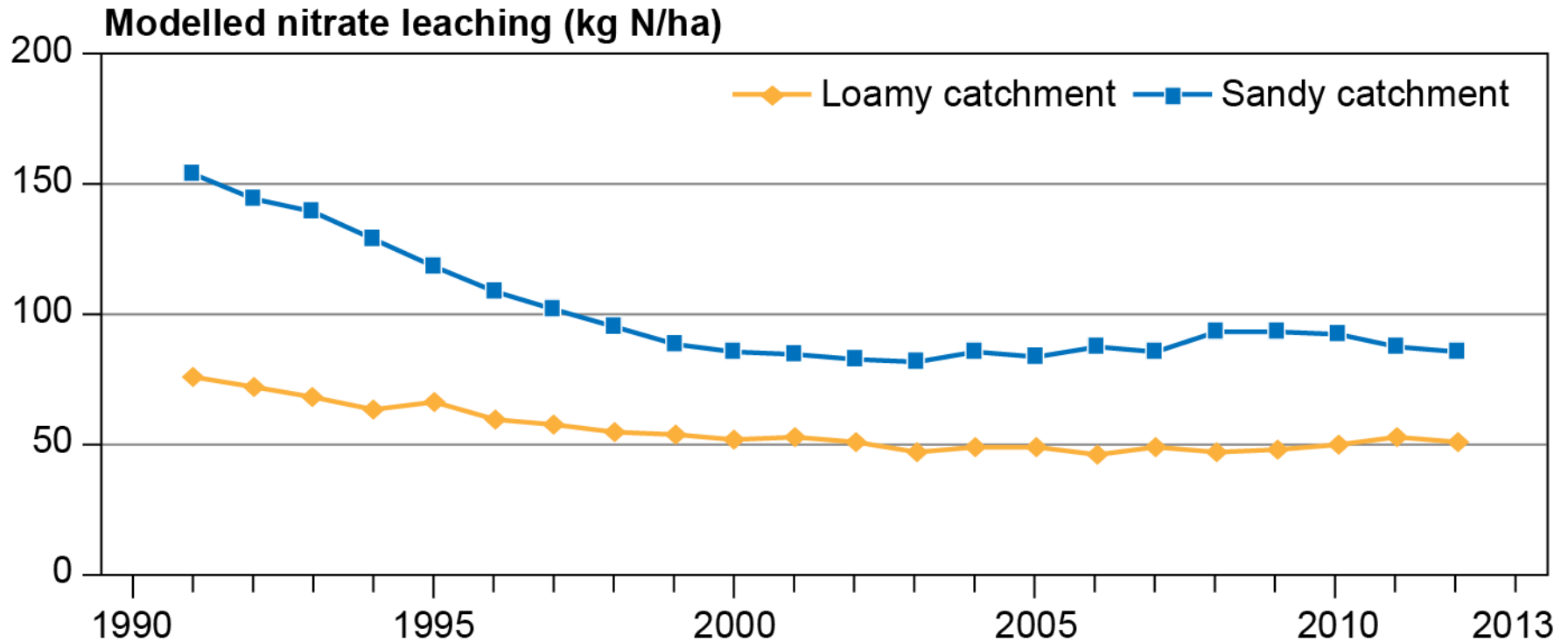
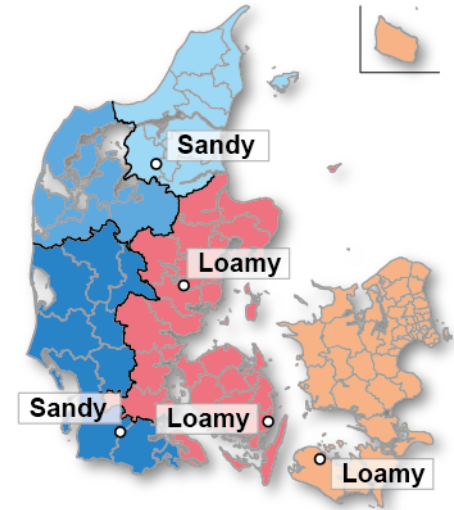
Overfertilisation at field level



- Dialogue between agricultural and environmental institutions
- Further actions needed

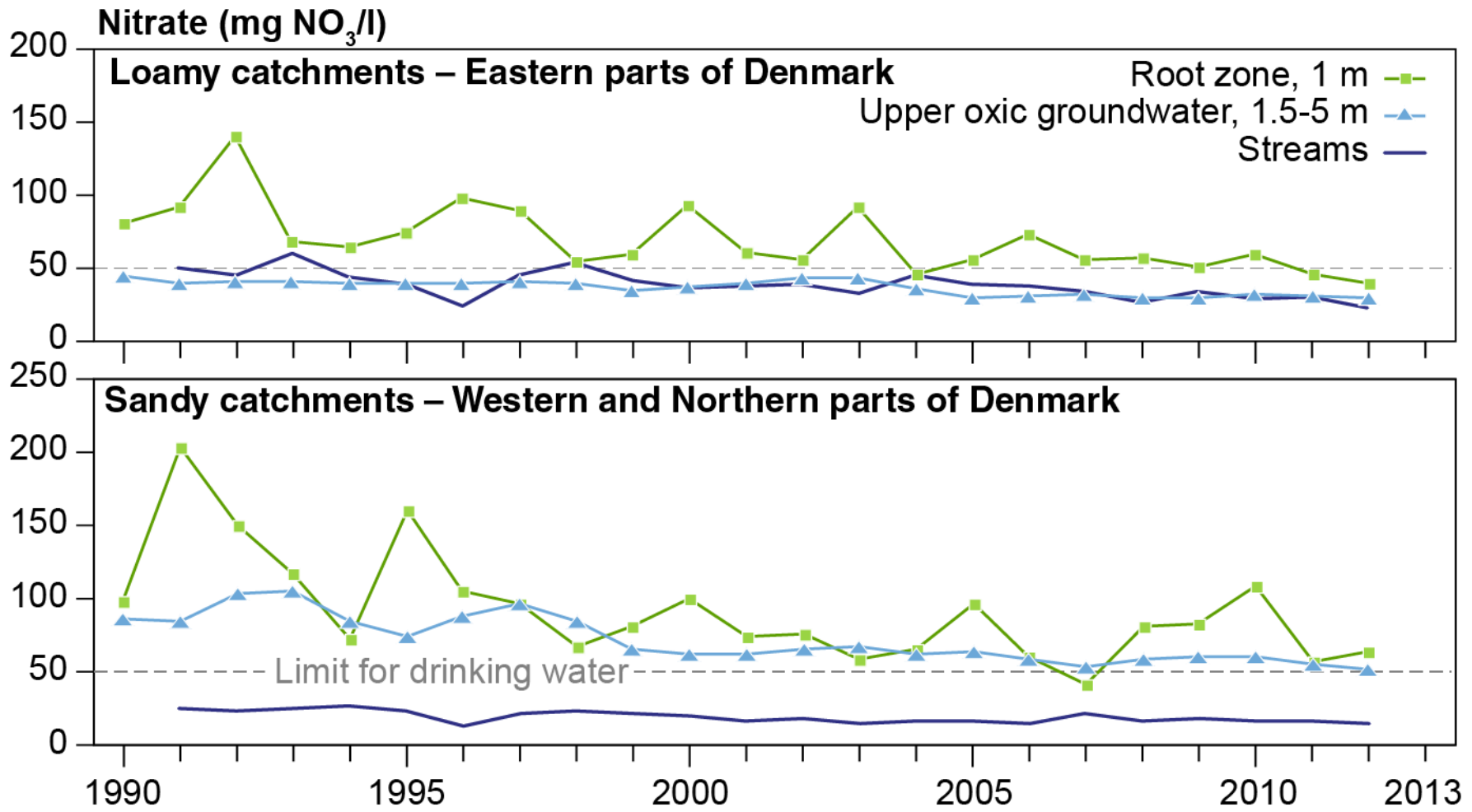
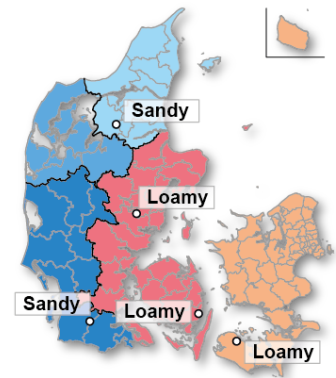


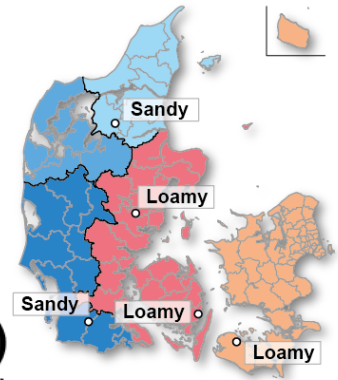
# Modelled nitrate leaching in five agricultural catchments



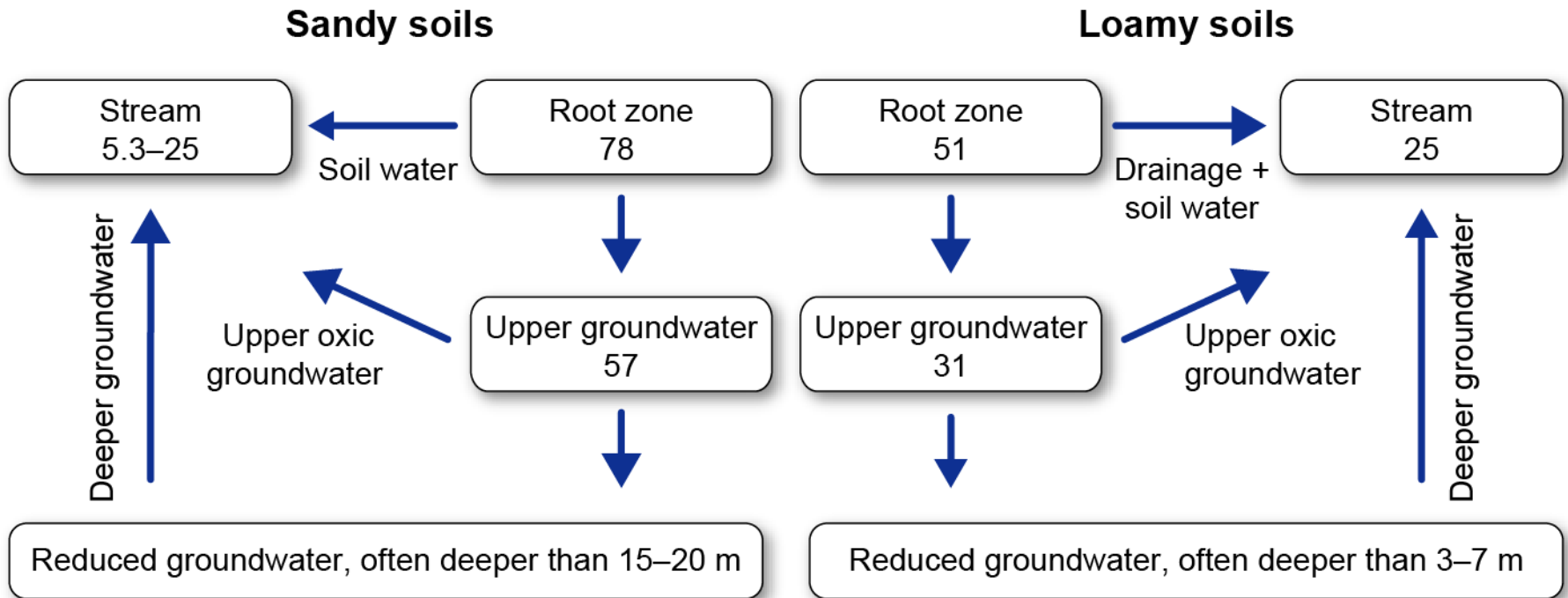


# Measured nitrate concentrations in five agricultural catchments





## Nitrate concentrations 2008/09–2012/13 (mg NO<sub>3</sub>/l) (The arrows show the dominating pathways of the waterflow)



# Conclusions

Reductions 1990-2013



- ▶ Field balance national level: 43 pct.
- ▶ Agricultural catchments:
- ▶ Modelled nitrate leaching: 30-46 pct.
- ▶ NO<sub>3</sub>-conc in oxic upper groundwater: 40-50 pct.
  
- ▶ Successful implementation of Action Programmes requires:
  - A political goal
  - Mandatory measures
  - Control
  - Monitoring and evaluations
  
  - Dialogue
  - Scientific foundation
  - A genuine political will to reach the goal and a political understanding for the process



## VI. Farmers view

### Main concern

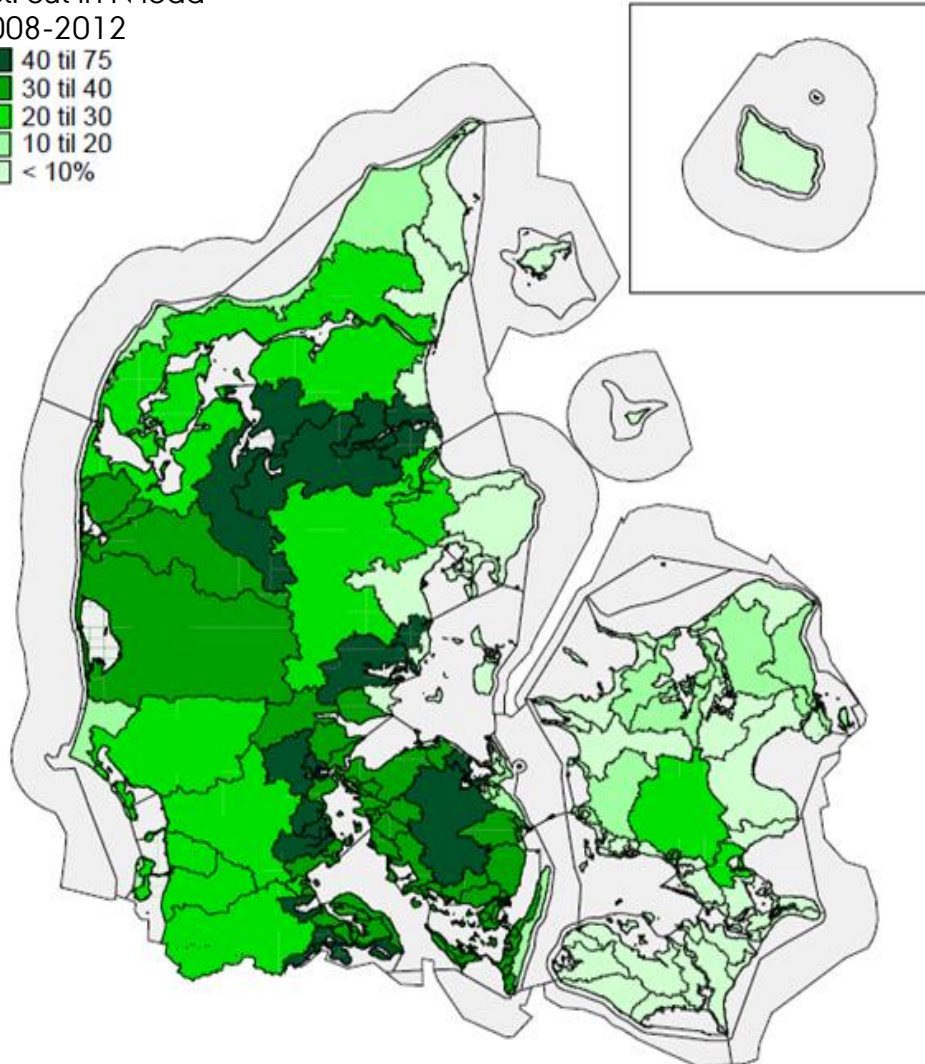
- Reduction of economic fertiliser norms: unfair competition
- Catch crops  
Farmers' lobby has managed influence the fertiliser act to contain some alternatives to catch crop from 2011:  
energy crops, increased N quota, transfer to others farms, separation of organic manure
- 10 m buffer-strips  
Some farmer have refused to establish 10 m bufferstips in 2013, unauthorised estimates say 25 % have not been established



# New agenda to fulfil WRD

## Plan for cut in N load to coastal areas

Pct. cut in N load  
2008-2012







## New right-wing parliament wants to implement:

- No additional buffer strips from 9 to 2 m
- No cut in fertilizer – back to best economic level – add 92.000 tons N in mineral fertilizer
- No further catch crops

Less national regulation more spatial differentiated regulation

More target measures – constructed wetlands, drain filter technologies

Thanks for attention

