Introduction LuWQ2022

Agriculture and the Environment

-

How to improve water quality

Dico Fraters, Brian Kronvang, Frank Wendland, Karel Kovar

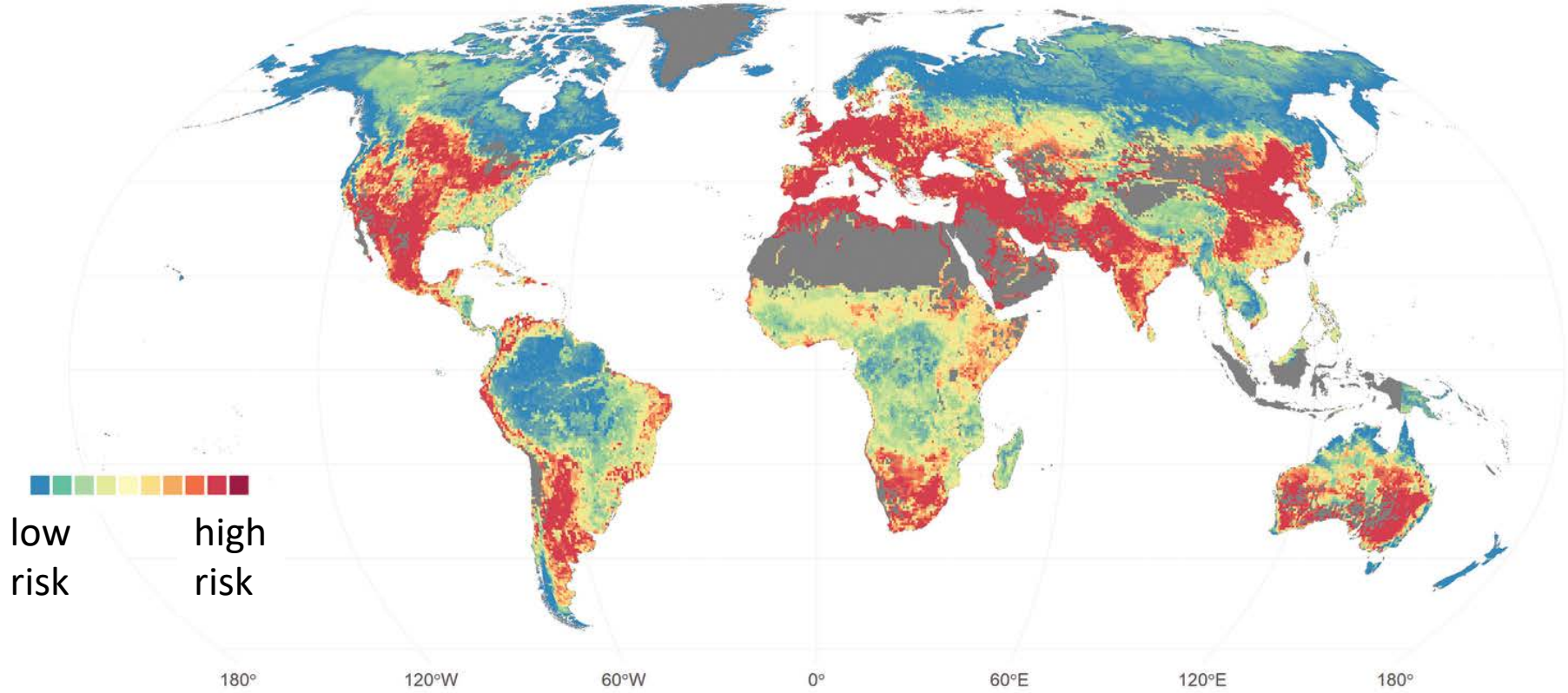
National Institute for Public Health and the Environment
Ministry of Health, Welfare and Sport

AARHUS UNIVERSITY
DEPARTMENT OF BIOSCIENCE

JÜLICH
FORSCHUNGSZENTRUM

LuWQ 2022
International Interdisciplinary Conference on
Land Use and Water Quality
Agriculture and the Environment
Maastricht, the Netherlands, 12–15 September 2022

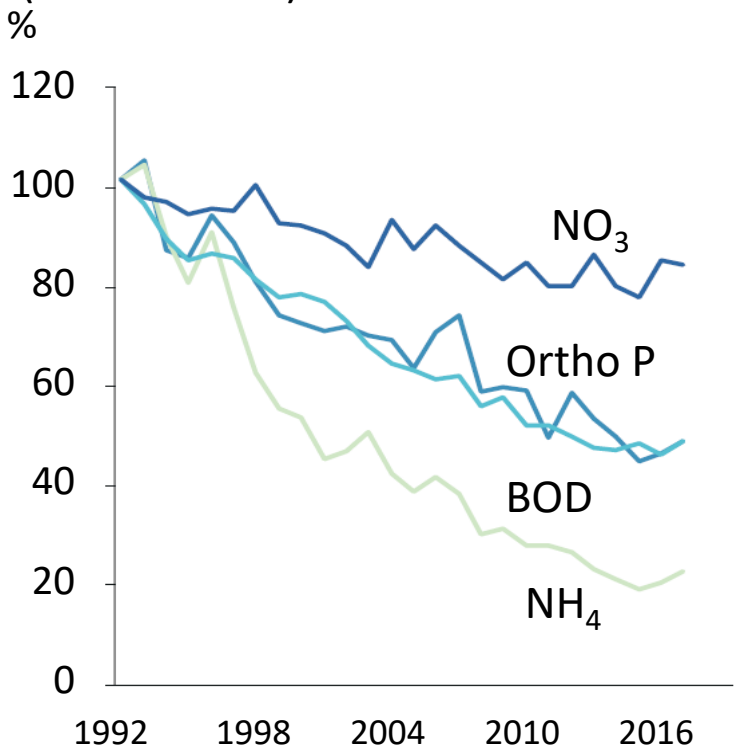
Water Quality Risk for Biological Oxygen Demand, Nitrogen, and Electrical Conductivity



Source: World Bank (2019) www.worldbank.org/qualityunknown (based on data 2000-2010 period)

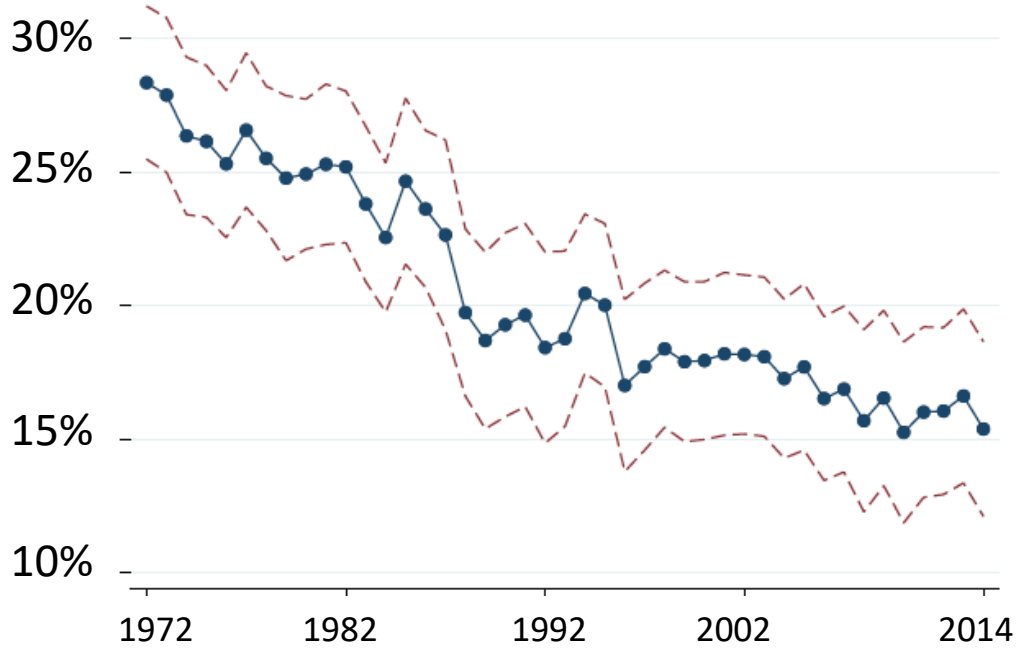
Improvement of water quality slows down

Trend in concentrations in rivers in Europe (1992 = 100%)



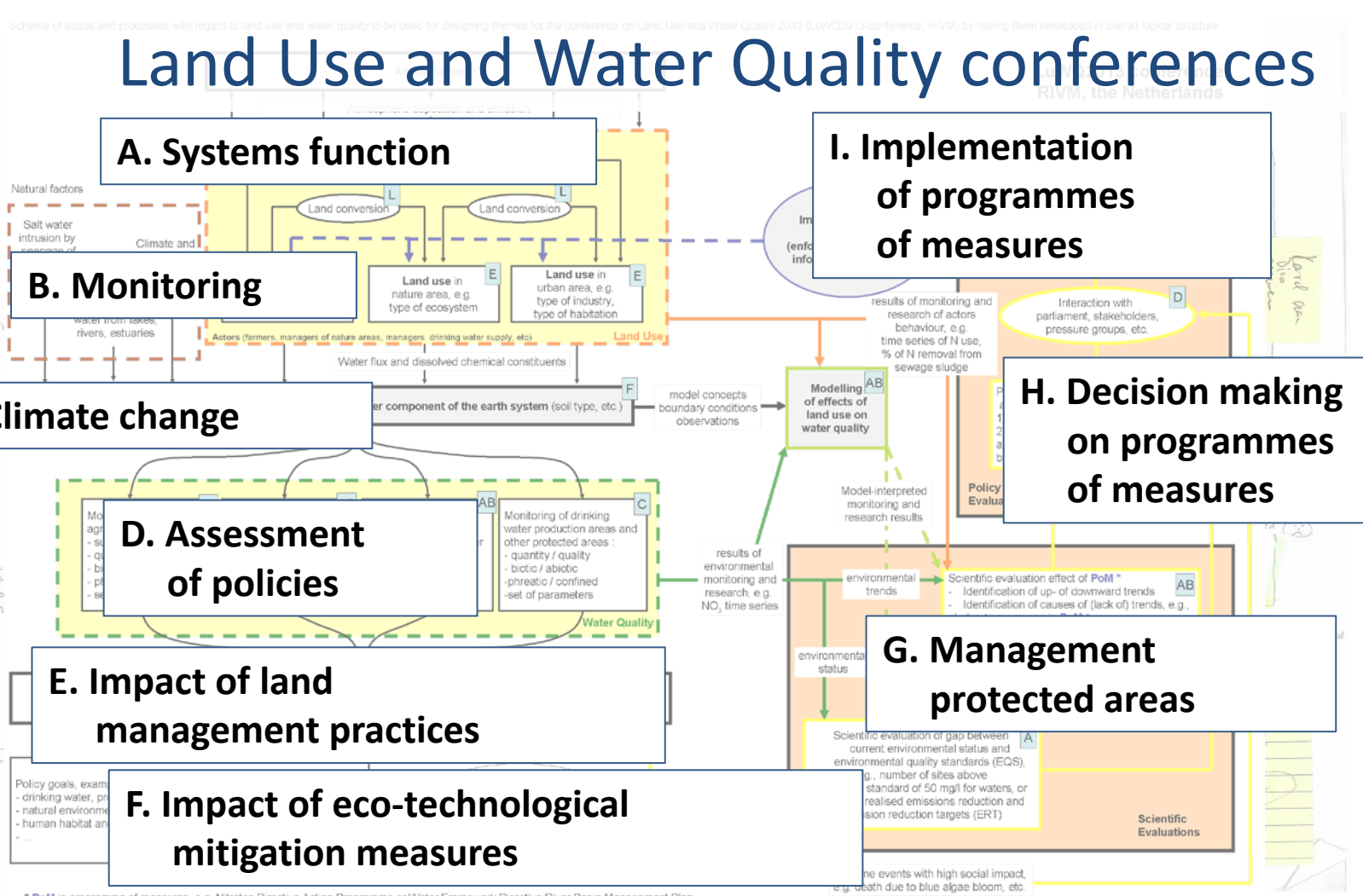
https://www.eea.europa.eu/soer/publications/soer-2020

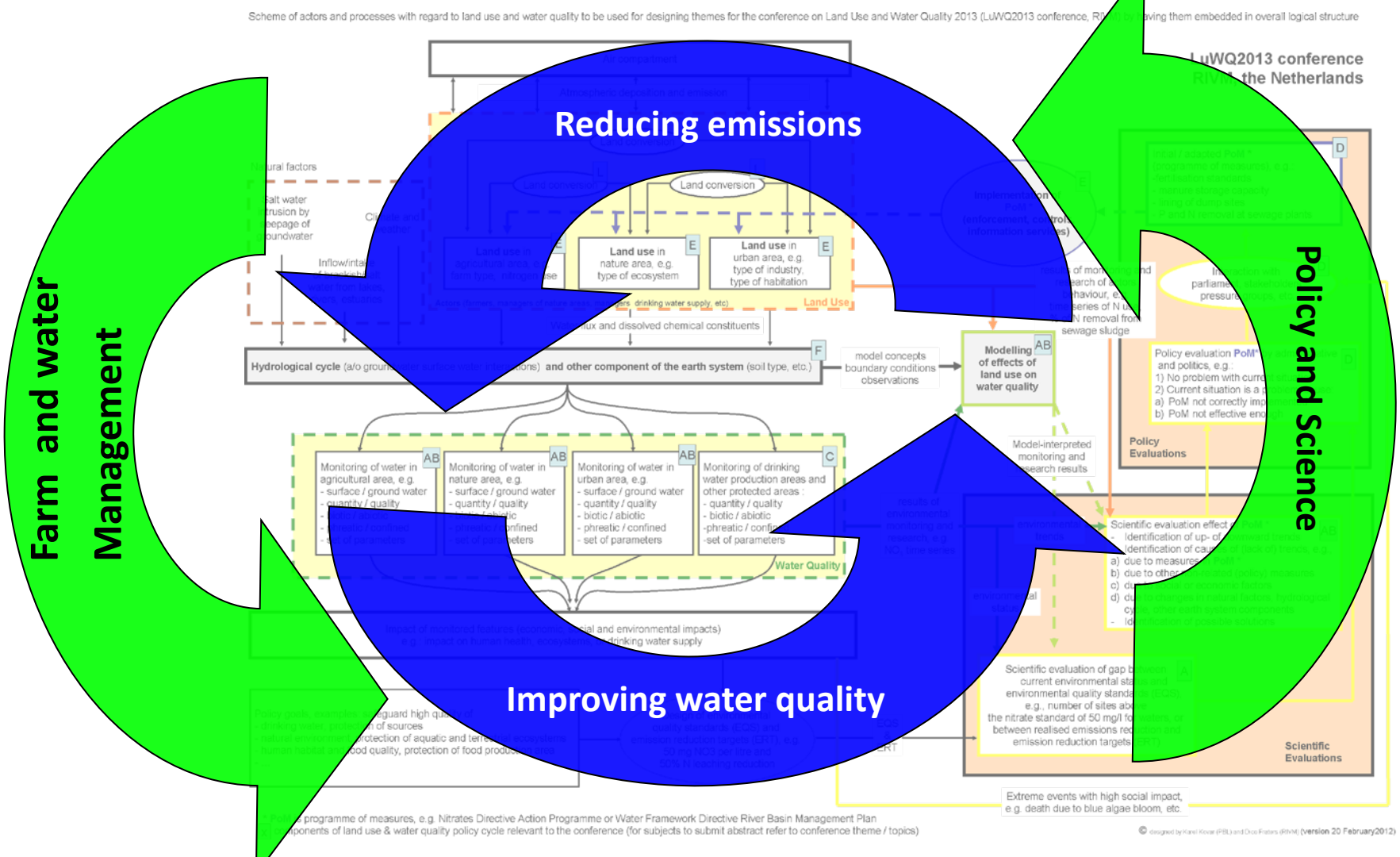
Trend in share of NOT fishable surface waters in the USA



https://voxeu.org/article/clean-water-rule-and-economic-research-us-water-pollution-regulation

Land Use and Water Quality conferences

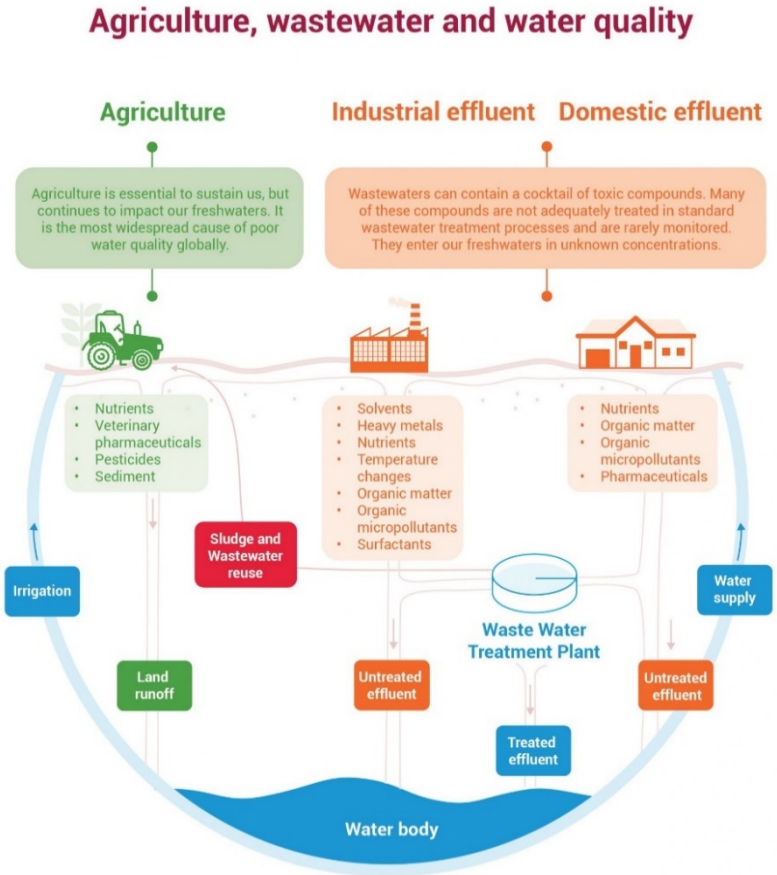



Scheme of actors and processes with regard to land use and water quality to be used for designing themes for the conference on Land Use and Water Quality 2013 (LuWQ2013 conference, RIVM
LuWQ2013 conference
the Netherlands
Reducing emissions
Farm and water Management
Policy and Science
Improving water quality
Land conversion
Land use in nature area, e.g. type of ecosystem
Land use in urban area, e.g. type of industry, type of habitation
Land Use
Hydrological cycle (a/o groun
and other component of the earth system (soil type, etc.)
model concepts boundary conditions observations
Modelling of effects of land use on water quality
Monitoring of water in agricultural area, e.g. - surface / ground water - quantity / quality
Monitoring of water in nature area, e.g. - surface / ground water - quantity / quality
Monitoring of water in urban area, e.g. - surface / ground water - quantity / quality - biotic / abiotic - phreatic / confined - set of parameters
Monitoring of drinking water production areas and other protected areas : - quantity / quality - biotic / abiotic -phreatic / confi -set of parameters
Water Quality
Model-interpreted monitoring and research results
Policy Evaluations
Scientific Evaluations
Scientific evaluation effect
Scientific evaluation of gap
Extreme events with high social impact, e.g. death due to blue algae bloom, etc.
programme of measures, e.g. Nitrates Directive Action Programme or Water Framework Directive River Basin Management Plan
components of land use & water quality policy cycle relevant to the conference (for subjects to submit abstract refer to conference theme / topics)
designed by Karel Kovar (PBL) and Dico Fraters (RIVM) (version 20 February2012)

Land use and Water Quality conferences

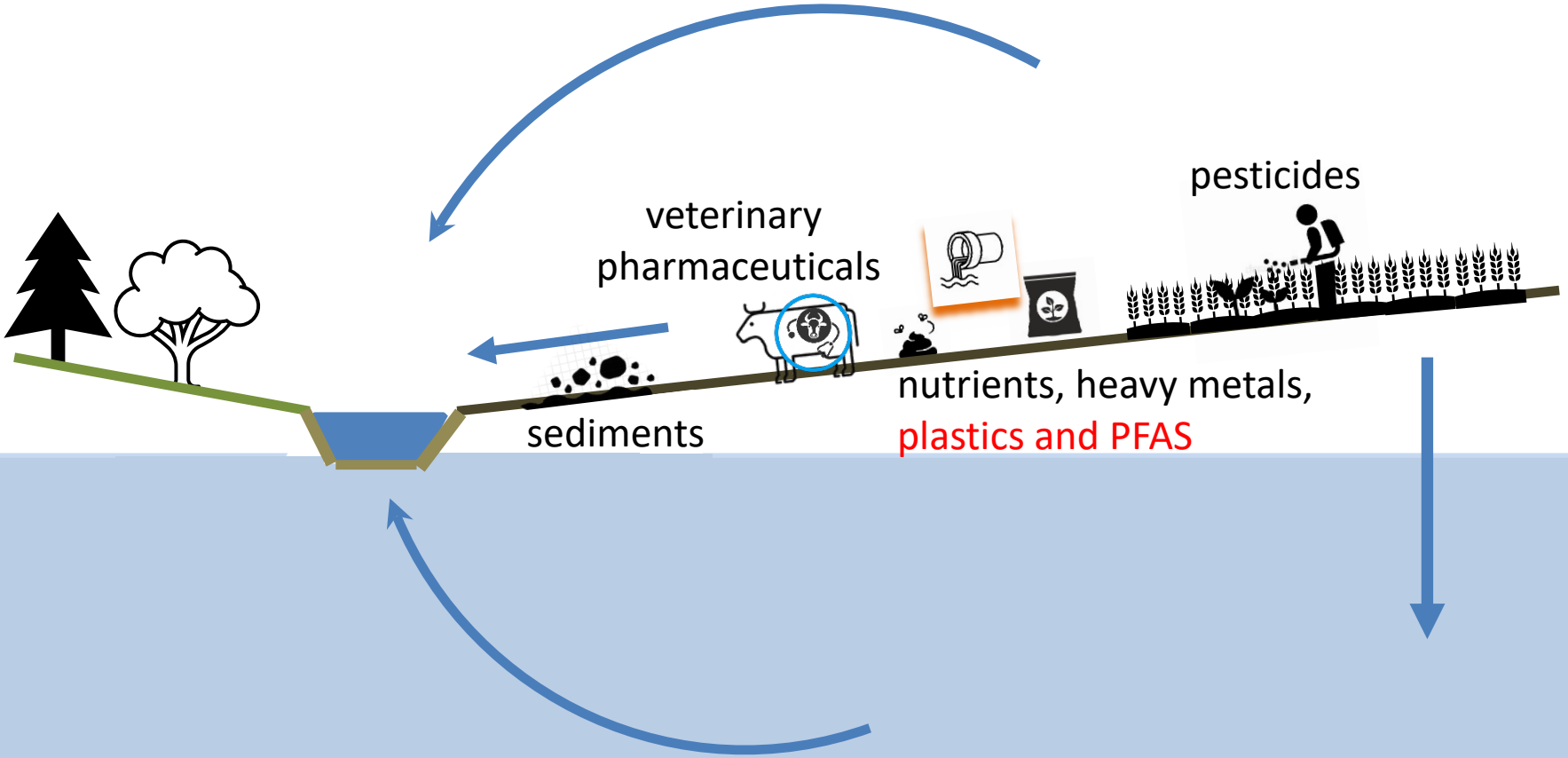
Messages in short

- Many substances play a role in water quality and new substances arise
- Monitoring is crucial to determine current status and trends
- Sharing of data and information is important for decision making and involving stakeholders
- Be aware of that improving water quality
  1. needs a long haul
  2. needs involvement of all concerned
  3. faces many challenge

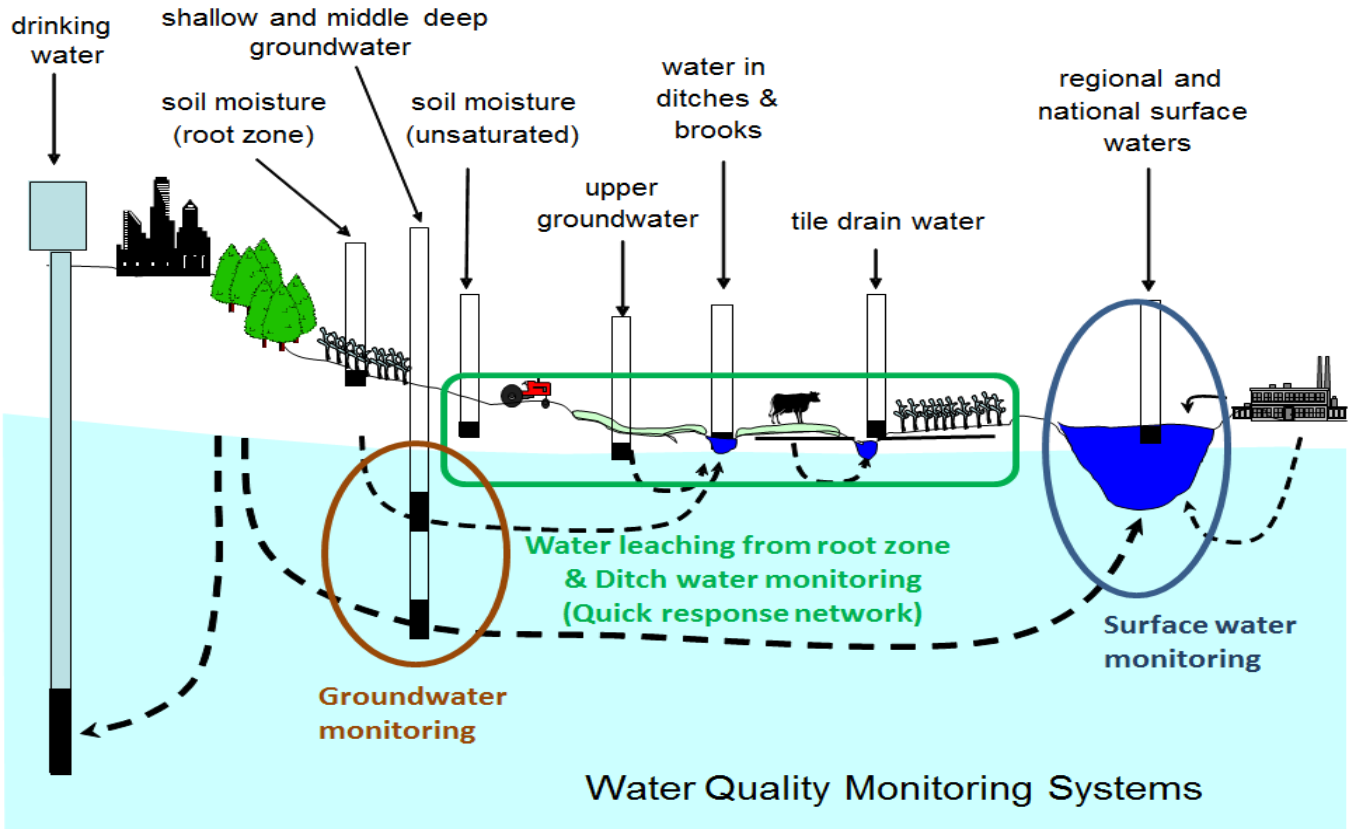


https://www.unwater.org/publications/progress-on-ambient-water-quality-632-2021-update/

Agriculture and Water Quality - Many substances play a role



Agriculture and Water Quality – Monitoring is crucial



Points of attention

Selection of
- Monitoring stations
- Sampling frequency
- WQ parameters

Quality controls
- Field work
- Laboratory analyses
- Data storage and handling

Agriculture and Water Quality – Monitoring is crucial

Monitoring is conservative,
but needs constant attention

- New problems or pollutants arise, or old ones gain political attention
- Representativeness of monitoring stations changes in time due to changes in o/a land use
- Risk of sudden jump in data quality and problems with analyses of trends due to:
  - Introduction of new sampling and/or analytical methods and instruments
  - Change of laboratory
  - Change in data handling or storage
  - …

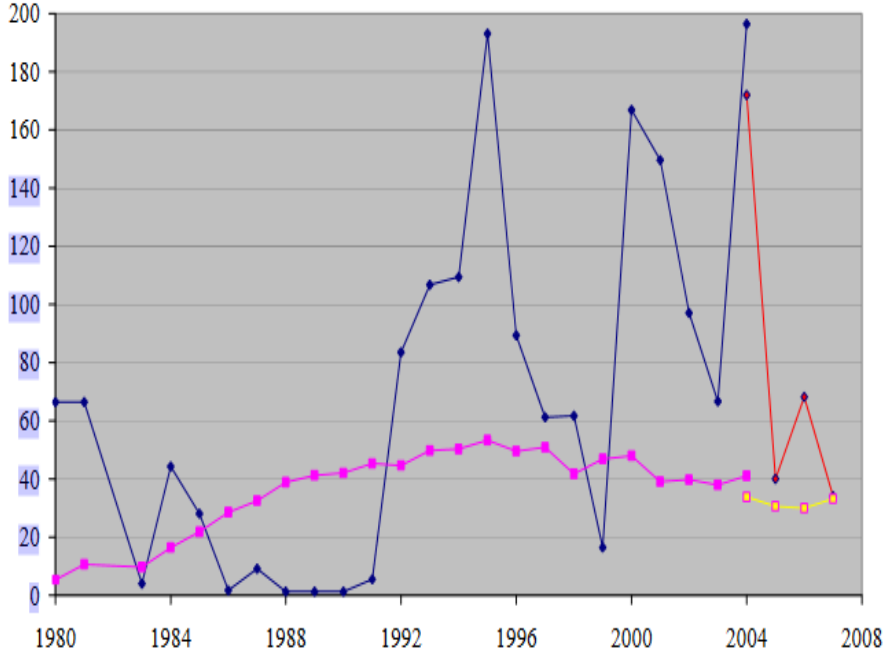
Agriculture and Water Quality – Monitoring is crucial

Monitoring is conservative, but needs constant attention

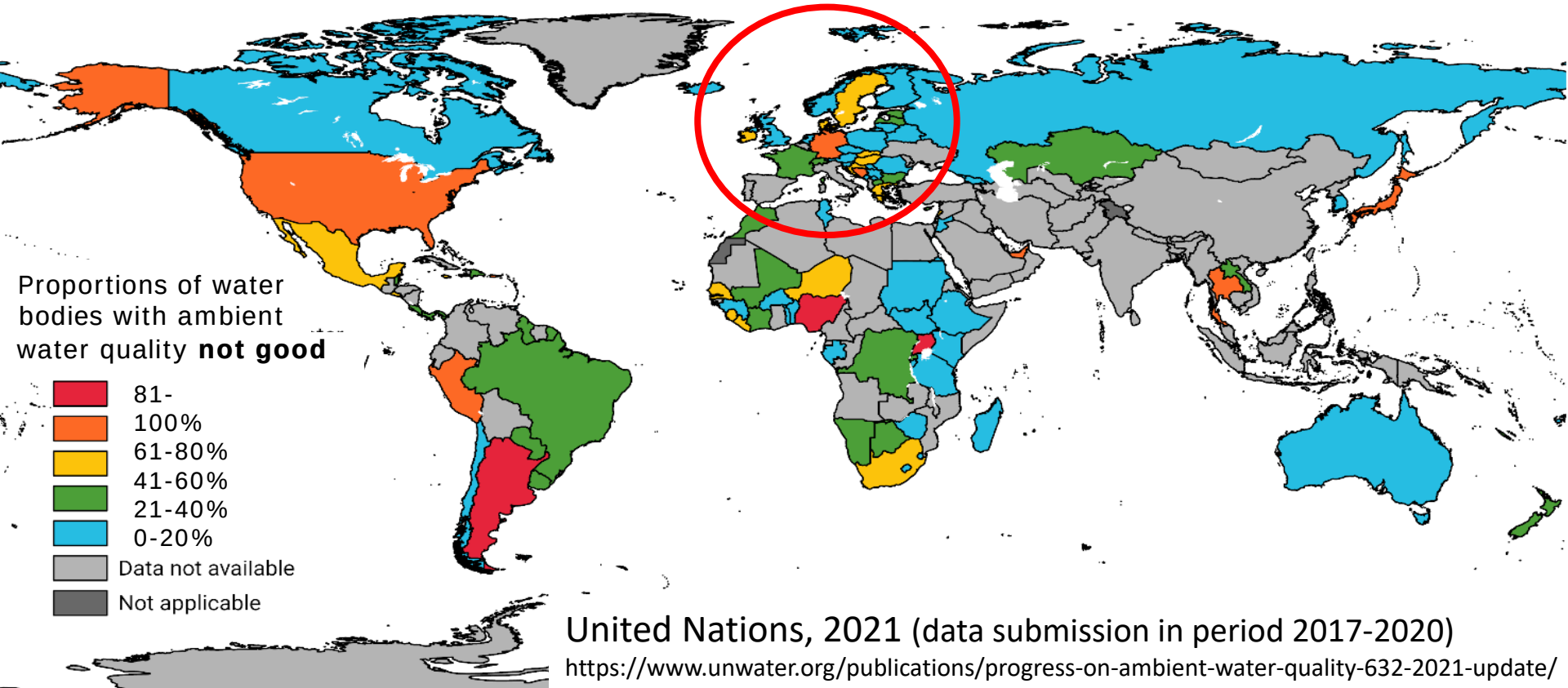
- New problems or pollutants arise, or old ones gain political attention
- Representativeness of monitoring stations changes in time due to changes in o/a land use
- Risk of sudden jump in data quality and problems with analyses of trends due to:
  - Introduction of new sampling and/or analytical methods and instruments
  - Change of laboratory
  - Change in data handling or storage
  - …

Structural break in trend in nitrate in shallow groundwater at two wells
Due to change of laboratory in 2004

Nitrate concentration (mg/L)



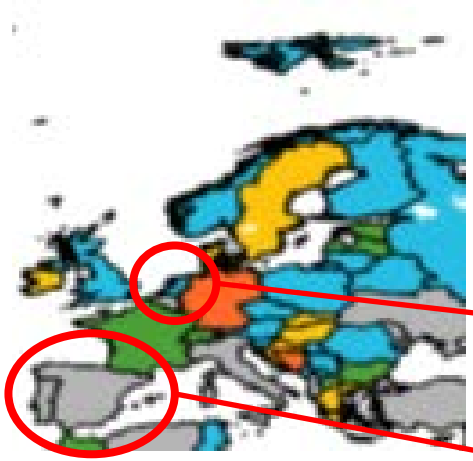
Agriculture and Water Quality - Sharing data for decision making



United Nations, 2021 (data submission in period 2017-2020)

https://www.unwater.org/publications/progress-on-ambient-water-quality-632-2021-update/

Agriculture and Water Quality - Sharing data for decision making

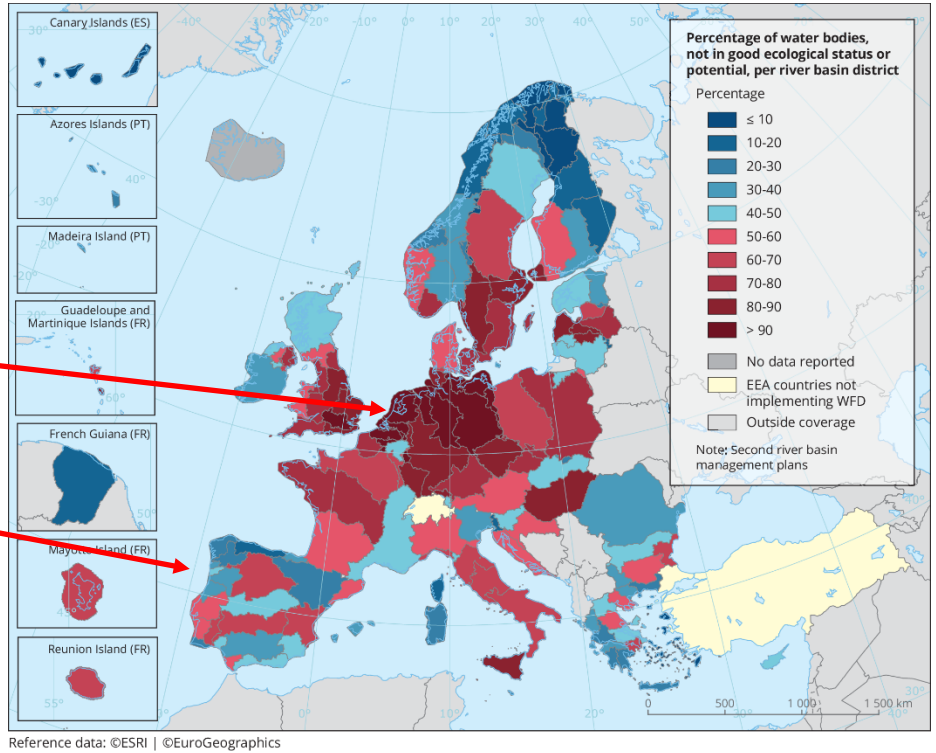


United Nations, 2021

Netherlands
UN: <20% not good
EEA: >90% not good

Spain
UN: no data
EEA: data available at regional scale

Surface water status (2015)



EEA, 2021 (WFD reporting)
https://www.eea.europa.eu/ims/ecological-status-of-surface-waters

Land use and Water Quality conferences

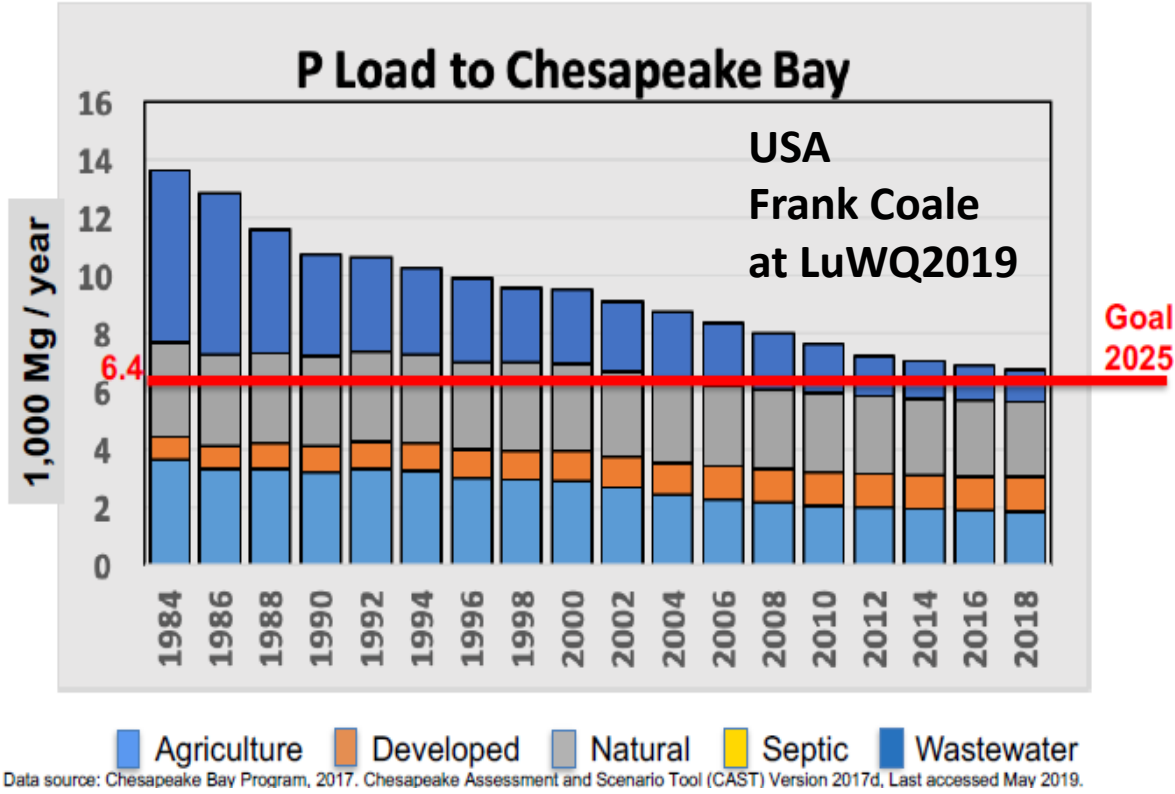
Messages

- Many substances play a role and new substances arise
- Monitoring is crucial to determine current status and the effects of measures on water quality
- Sharing data for decision making and involving stakeholders
- **Be aware of that improving water quality**
  1. needs a long haul
  2. needs involvement of all concerned
  3. faces many challenge

1. Improving water quality – needs a long haul

It takes a lot of time

- To establish relationships and built trust with people involved
- To establish a common goal and find the adequate mix of measurements
- To determine the current water quality and to show improvement



2. Improving water quality – Involvement of all


water boards


farmers


accountant, banker


veterinarian


drinking water


policy makers


extension officer


salesman


Farmers Unions

environmental groups


science

3. Improving water quality – many challenges

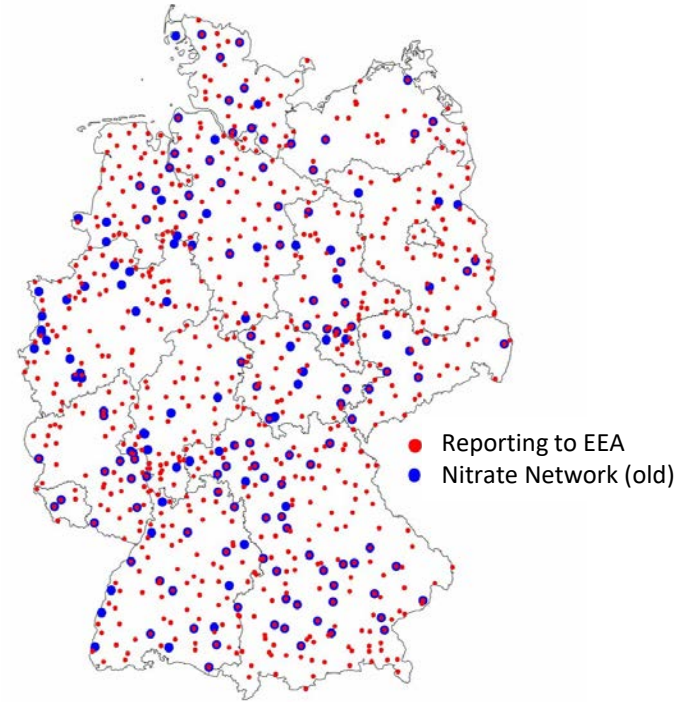
A. Incorrect use or interpretation of data may lead to incorrect conclusions
   Example: Influence of "design" of groundwater monitoring network in Germany

B. Other laws & regulations may have an effects on the environment
   Example: European Milk Quota and water quality in the Netherlands

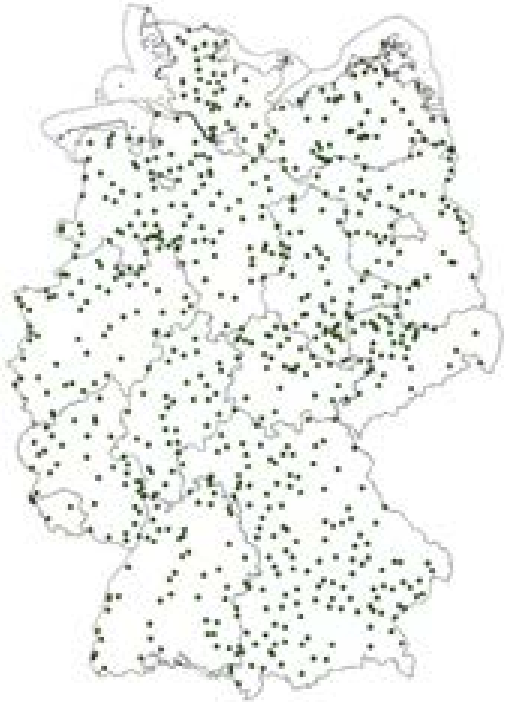
C. Change in policy approach may jeopardise environmental goals
   Example: From a general regulation to a more targeted approach in Denmark

Challenges – A. Incorrect use or interpretation of data

Influence of “design” of groundwater monitoring network in Germany



Reporting for State of Environment (red) & Nitrate Directive, old (blue)



Reporting for Nitrate Directive, new since 2015

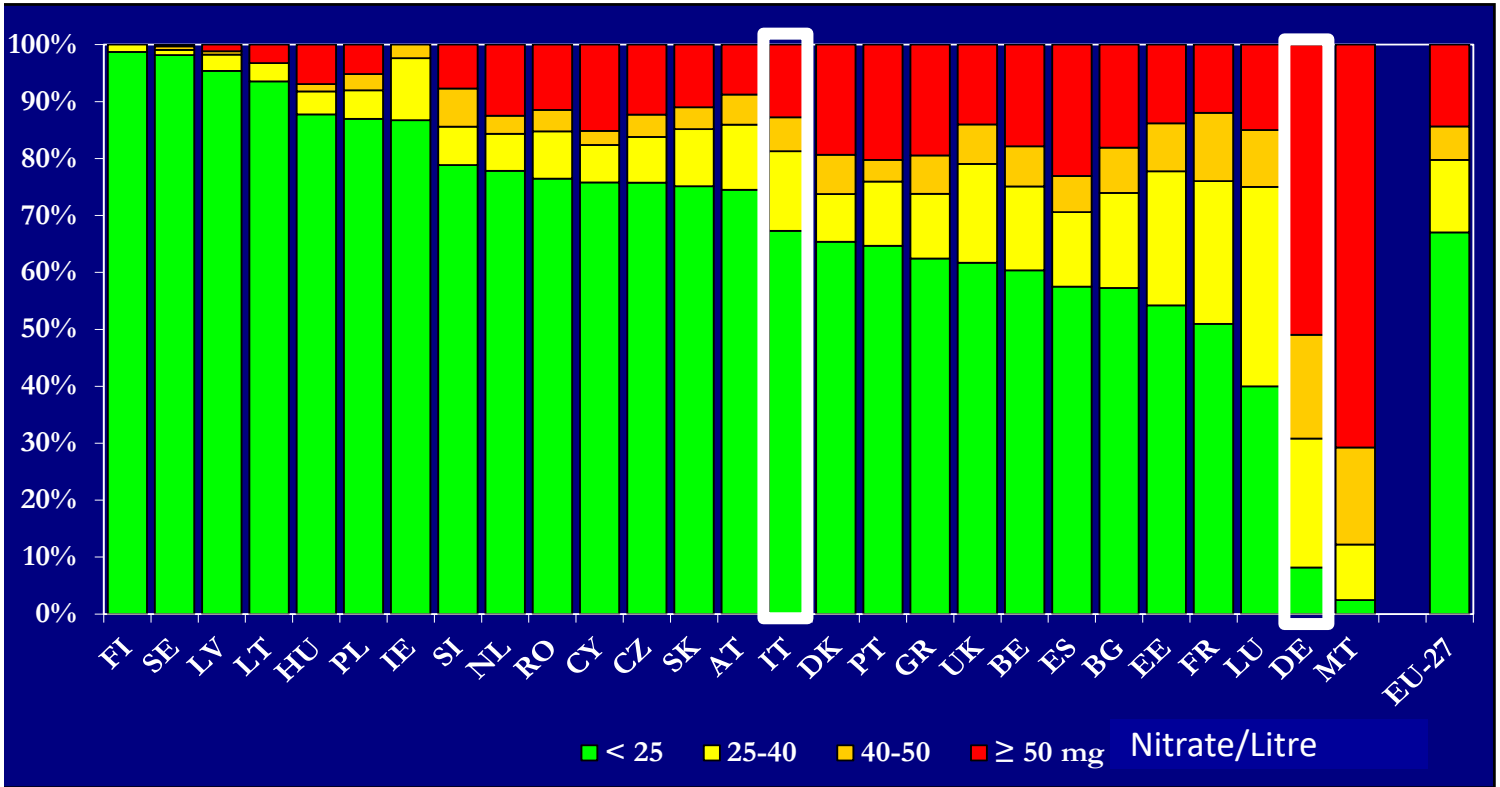
Challenges – A. Incorrect use or interpretation of data

Influence of “design” of groundwater monitoring network in Germany

% of monitoring stations

New Nitrate Network

Old Nitrate Network

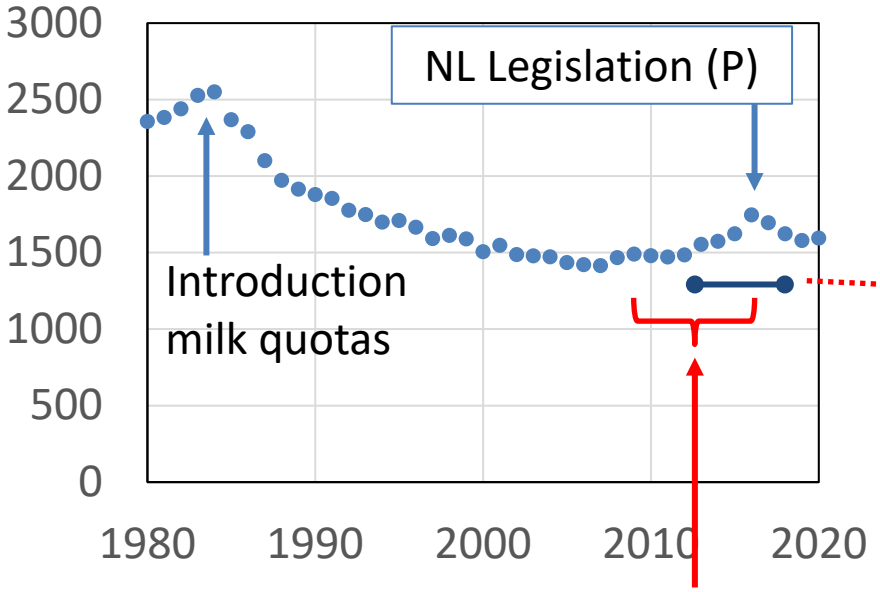


Challenges – B. Effects of other regulations

EU milk quota system regulated milk production since 1984

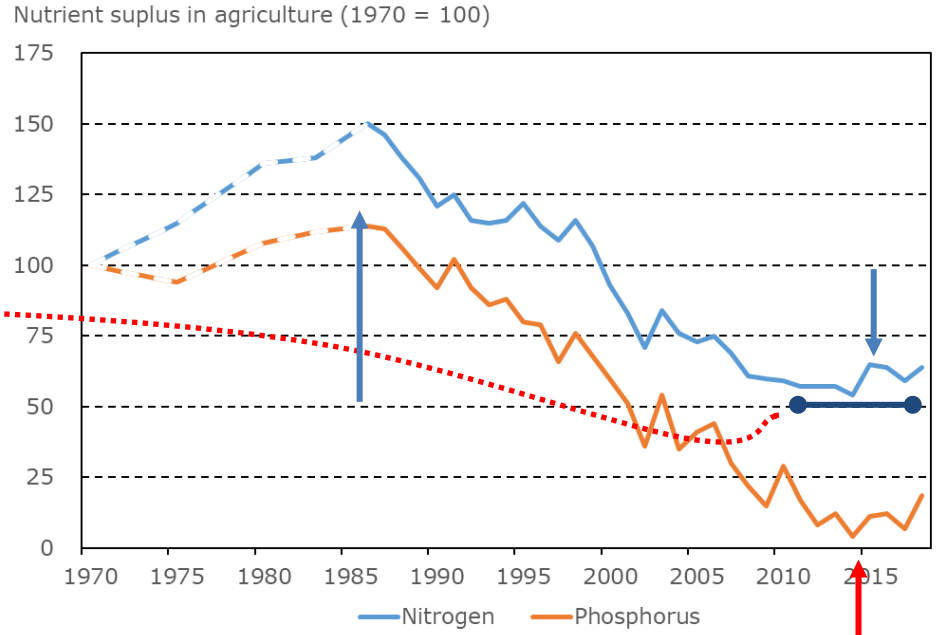
Abolishment in 2015 had an effect on nutrient emissions in the Netherlands

Number of dairy cows (x1000)



milk quotas increase & abolition

Relative Nutrient Surplus (1970 = 100)



Challenges – B. Counter effects of other regulations

http://youngeconomistblog.blogspot.com

Farmers perspective:

1 April 2015 Abolition of Milk Quota

'Liberation Day' , but …

It felt like jumping from the frying pan into the fire

http://www.seppo.net/

Challenges – C. Change in policy approach

From a general regulation to a more targeted approach in Denmark

1. Fertilisation standard

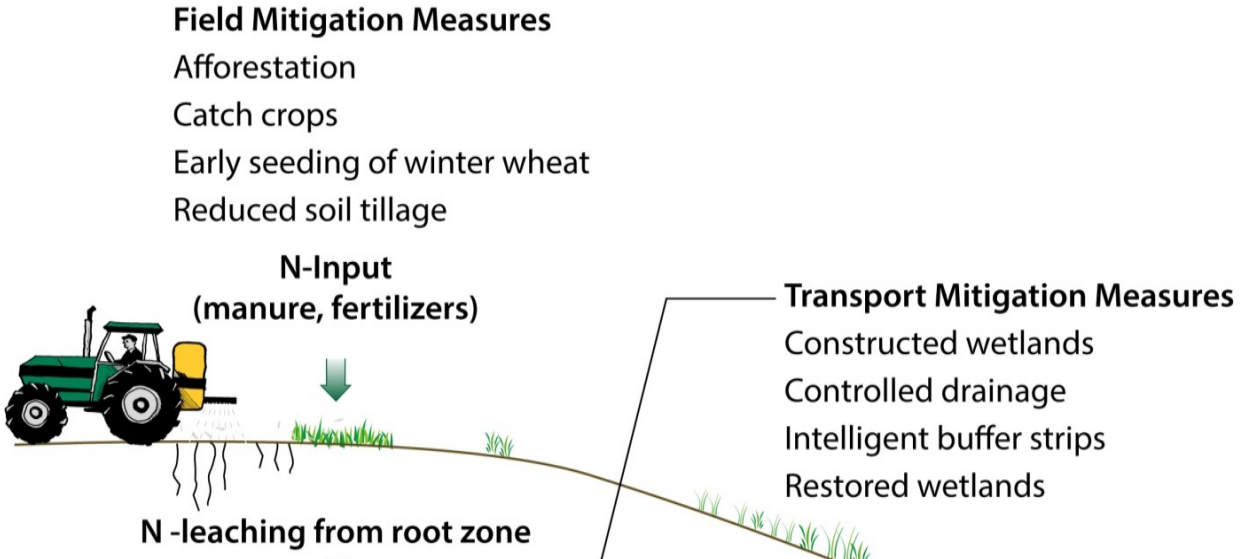
From: Economic Optimum – 20%

To: Increased to Economic optimum

2. Use of nitrogen reduction measures

From: obligation to apply certain measures

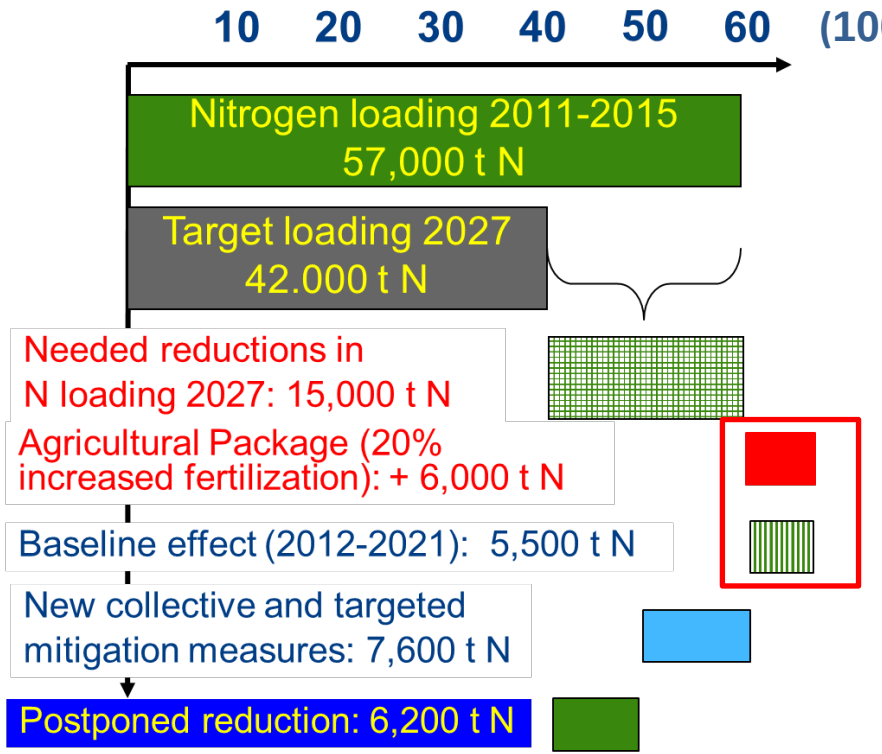
To: free selection of measures to acquire enough nitrogen reduction points



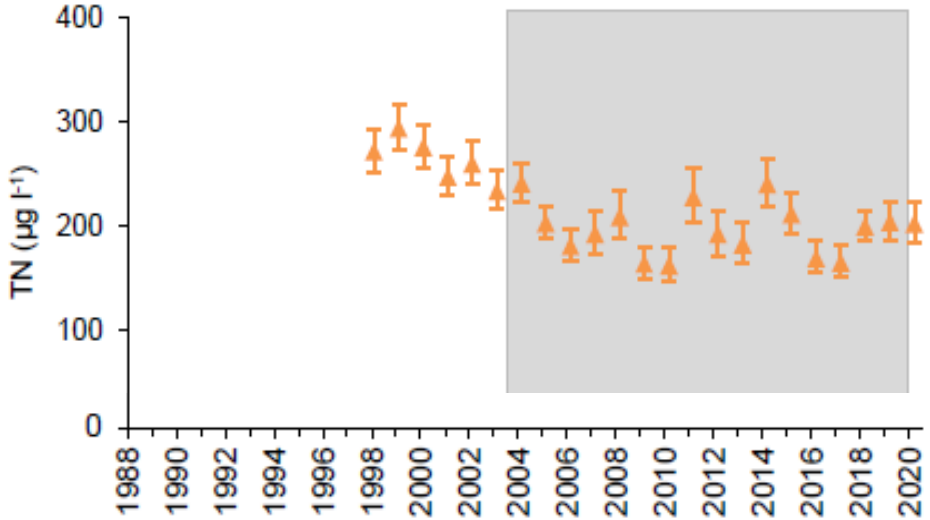
Challenges – C. Change in policy approach

Nitrogen load to marine waters in Denmark

before and after the Agricultural Package was implemented in 2016



Annual average total N in marine waters



Wrap up

- Water quality is improving, but further improvement is required and becomes harder to realise
- Make an in-depth analyses of who, what, where and how, and involve all stakeholders
- Watch out for new potential sources and contaminants
- Assure to have monitoring networks fit for purpose and to achieve reliable WQ monitoring time series for trend detection
- Invest time and capacity in sharing of data and information
- Make sure that everyone realises that success needs time, and that there will be ups and downs


LU WQ 2022
International Interdisciplinary Conference on
Land Use and Water Quality
Agriculture and the Environment
Maastricht, the Netherlands, 12–15 September 2022
Thank you for your attention
and enjoy the conference