Advisory Group "Agriculture and Environment"

19th June 2012; Brussels

The Water Blueprint: efficiency improvements in agriculture water use and measures to reduce vulnerability

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2012 Year of Water

European Environment Agency

2012 EEA reports

1. **Towards efficient use of water resources in Europe**
2. **Status of Freshwater eco-systems and Biodiversity**
3. **Vulnerability**
4. **Synthesis**

WFD assessment
Water accounts

Towards the 2012 "Blueprint to safeguard Europe's water resources"

http://www.eea.europa.eu/themes/water/publications-2012

European Environment Agency

Four challenges for Europe's Waters

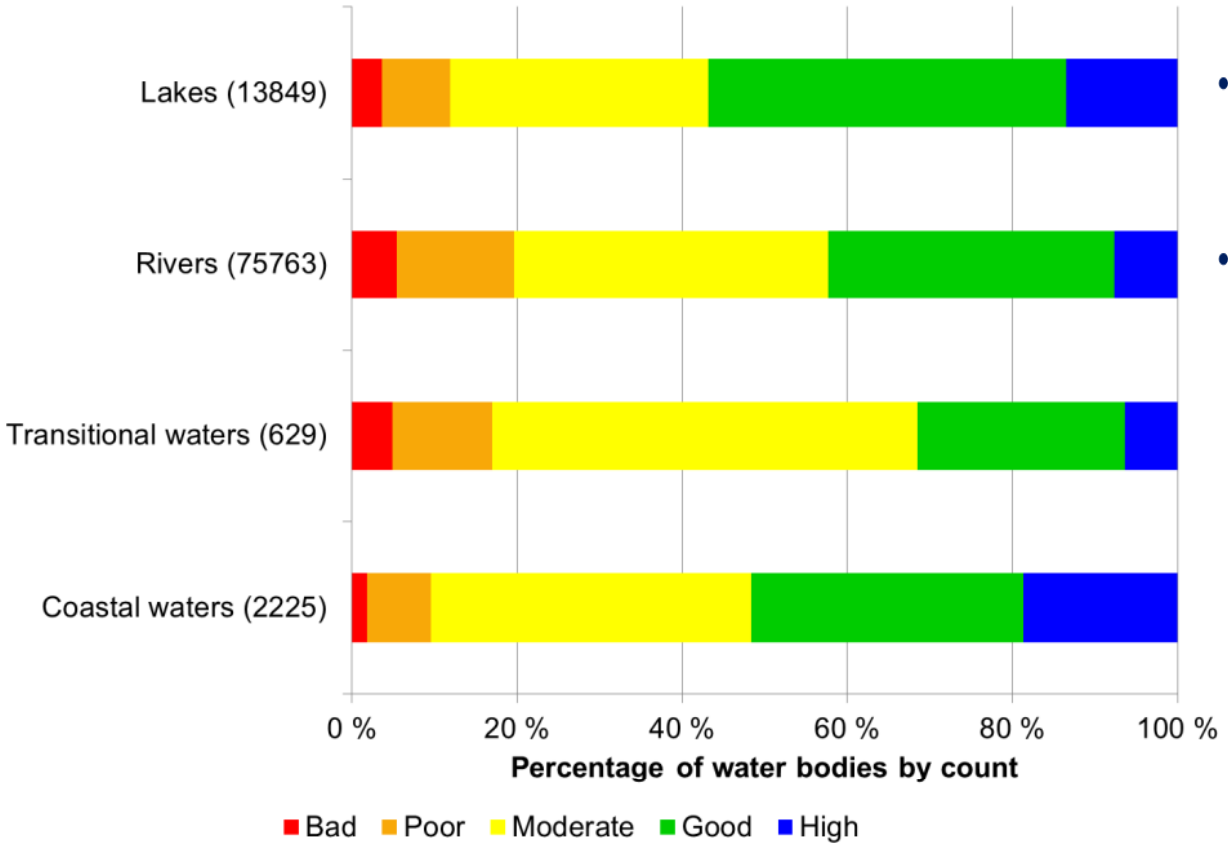
- Overuse of fertilisers and diffuse pollution of surface and groundwater
- Water use for irrigation
- Drainage and affects of small water bodies and wetlands

- Barriers, transverse structures
- changes for water abstraction, flow and water level regulation
- Dredging for navigation, and abstraction of e.g. gravel.

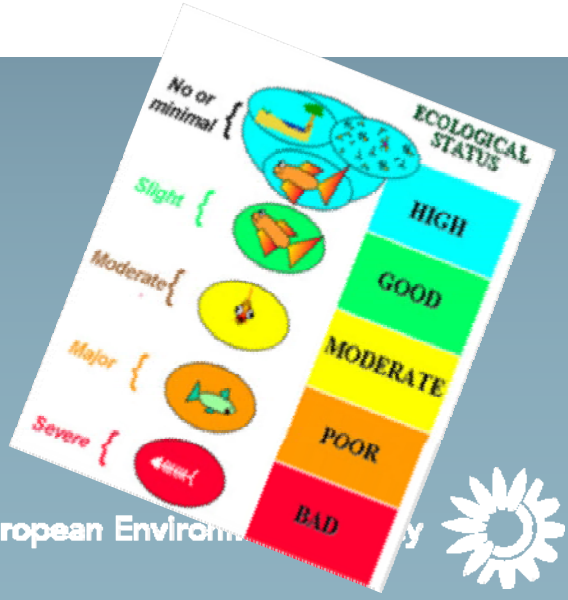
- Climate changes challenges water quantity and quality
- Water scarcity , droughts are increasingly forcing equitable resource allocation
- Flood risks require rethinking of land management

- Systemic challenges require integrated advanced policy solutions
- Communication and solutions to be found on River basin level

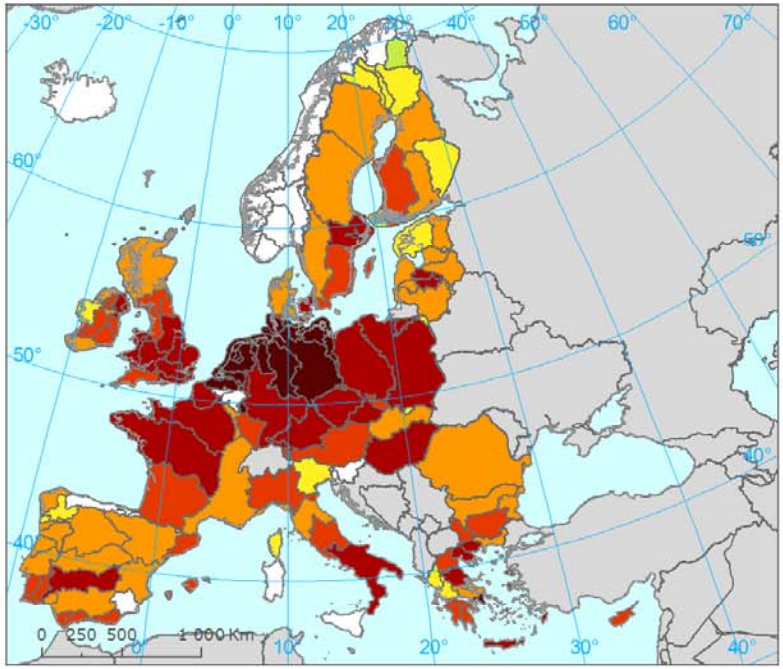
European overview of ecological status and potential



- **More than half** of the surface water bodies in Europe are in **less than good** ecological status or potential.
- **Rivers and transitional** waters are reported to have **worse** ecological status or potential and more pressures and impacts than water bodies in lakes and coastal waters.



European overview of ecological status of rivers and lakes



- More than half the surface water bodies in Europe are reported to be in less than good ecological status or potential.
- Only few River Basin Districts are close to the aim of WFD of achieving at least good status

% of classified water bodies in less than good ecological status or potential
(left map: rivers and lakes, right map: transitional and coastal waters)

no data reported | <10 % | 10-30 % | 30-50 % | 50-70 % | 70-90 % | >=90 %

% Water Bodies in less than good ecological status

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Pollution from diffuse and point sources are still affecting many European surface waters

Downward trends in water quality determinants related to urban and industrial wastewater are evident in most of Europe's surface waters, although these trends have levelled in recent years.

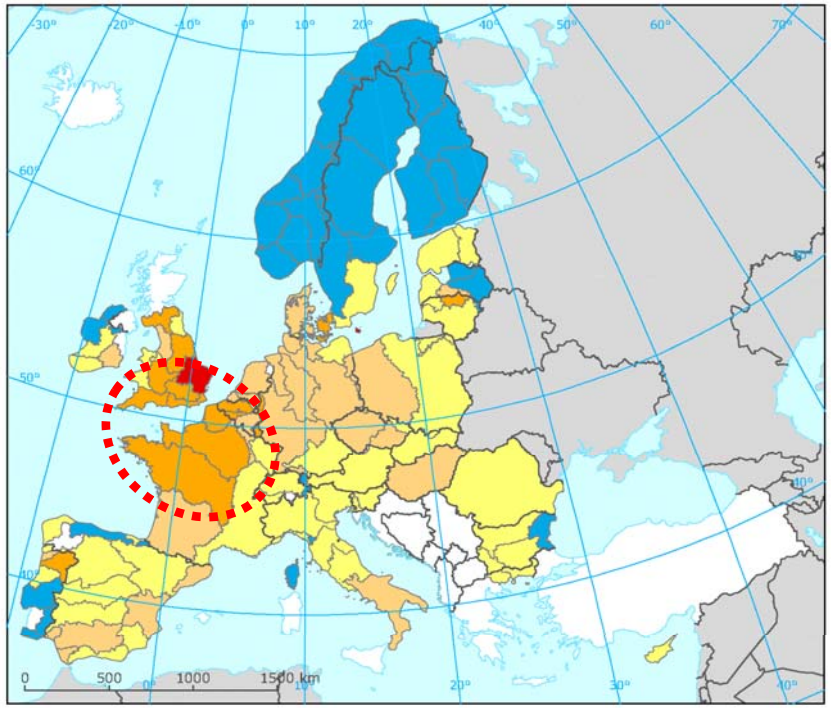
Agricultural inputs of nutrients both nitrogen and phosphorus are still important and need increased attention to achieve good water quality and ecological status

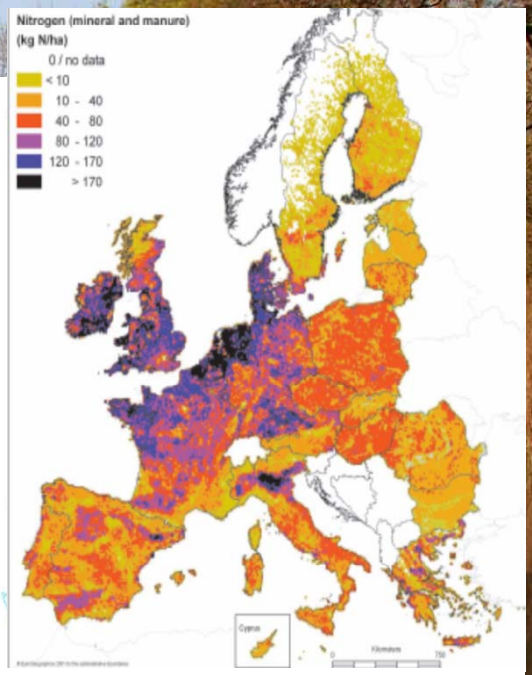
Nitrate concentration per river basin district

latest year (most RBDs 2008))

Nitrate (mg N/l)

< 0.8
0.8-2
2-3.6
3.6-5.6
5.6-11.3
> 11.3





Application of fertilisers and manure

Source: JRC

Hydromorphological pressures are causing altered habitats and affecting the ecological status.

Barriers and transverse structure

Morphological changes

Abstraction and flow regulation and water level regulation

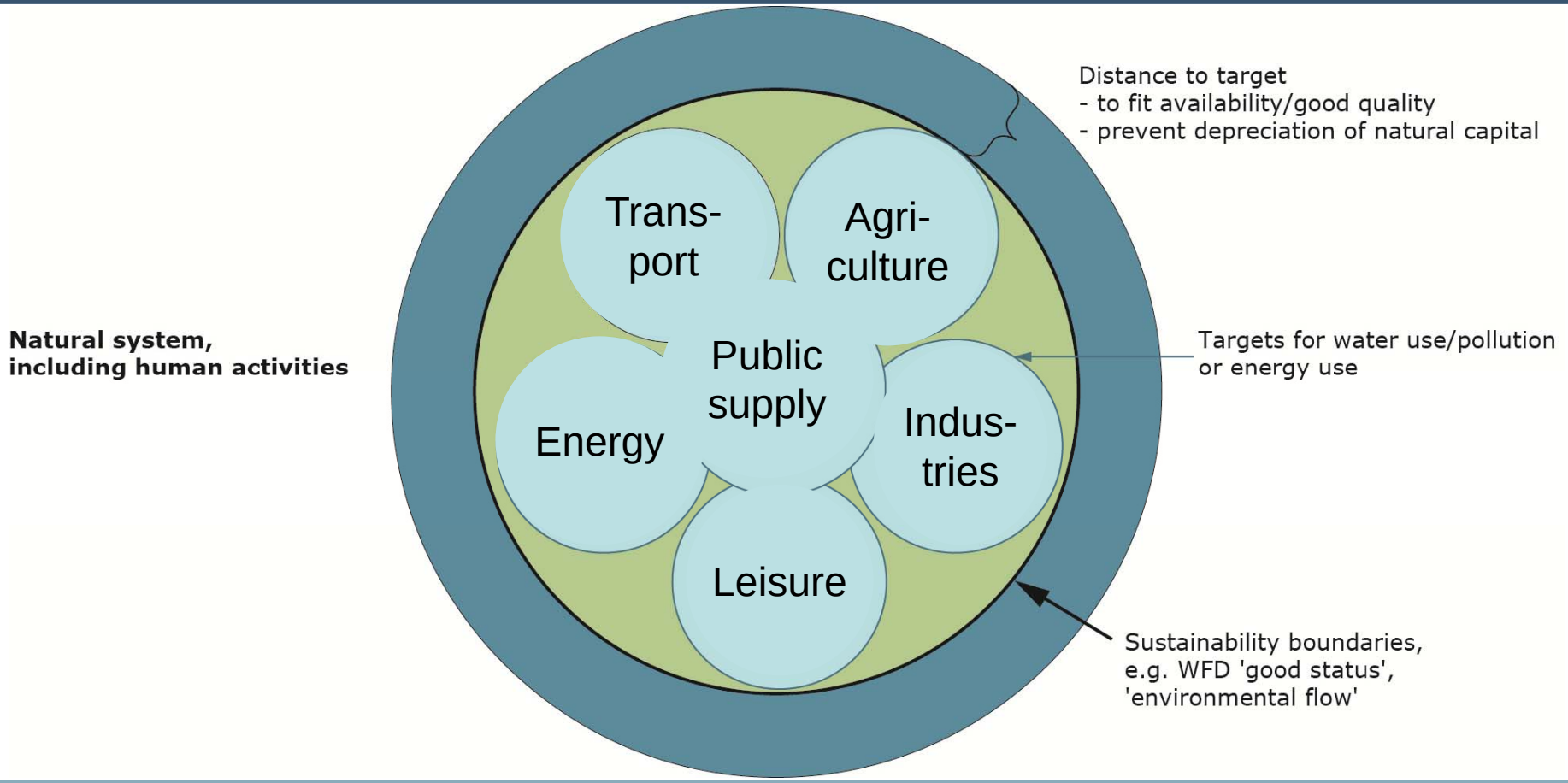
Key findings: Pressures

- Diffuse pollution (nutrient enrichment)

1. Despite improvements in some regions, diffuse pollution from agriculture remains a major cause of the poor water quality currently observed in parts of Europe.
2. The average nitrate concentration in European rivers has decreased slightly since 1992, reflecting improved wastewater treatment, reduced atmospheric inputs and, in some regions, lower agricultural emissions.

- Hydromorphological changes (altered habitats)
- Water quantity (water scarcity and floods)

Boundaries of sustainability for competing water uses



Modified after S. Postel / Natural Resources Forum 27 (2003); 89-98

Towards efficient use of water resources in Europe, 2012

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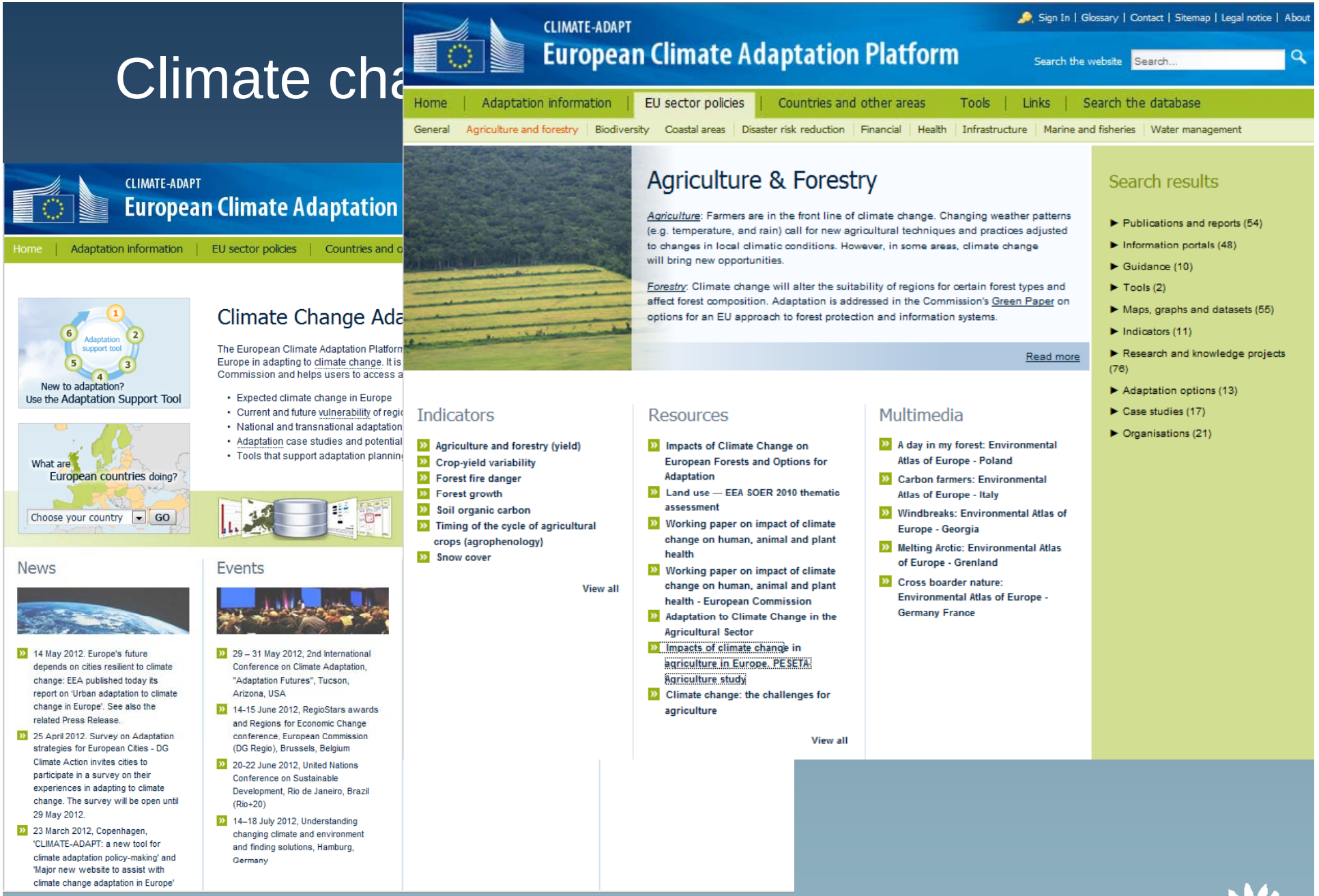
Climate cha



http://climate-adapt.eea.europa.eu/

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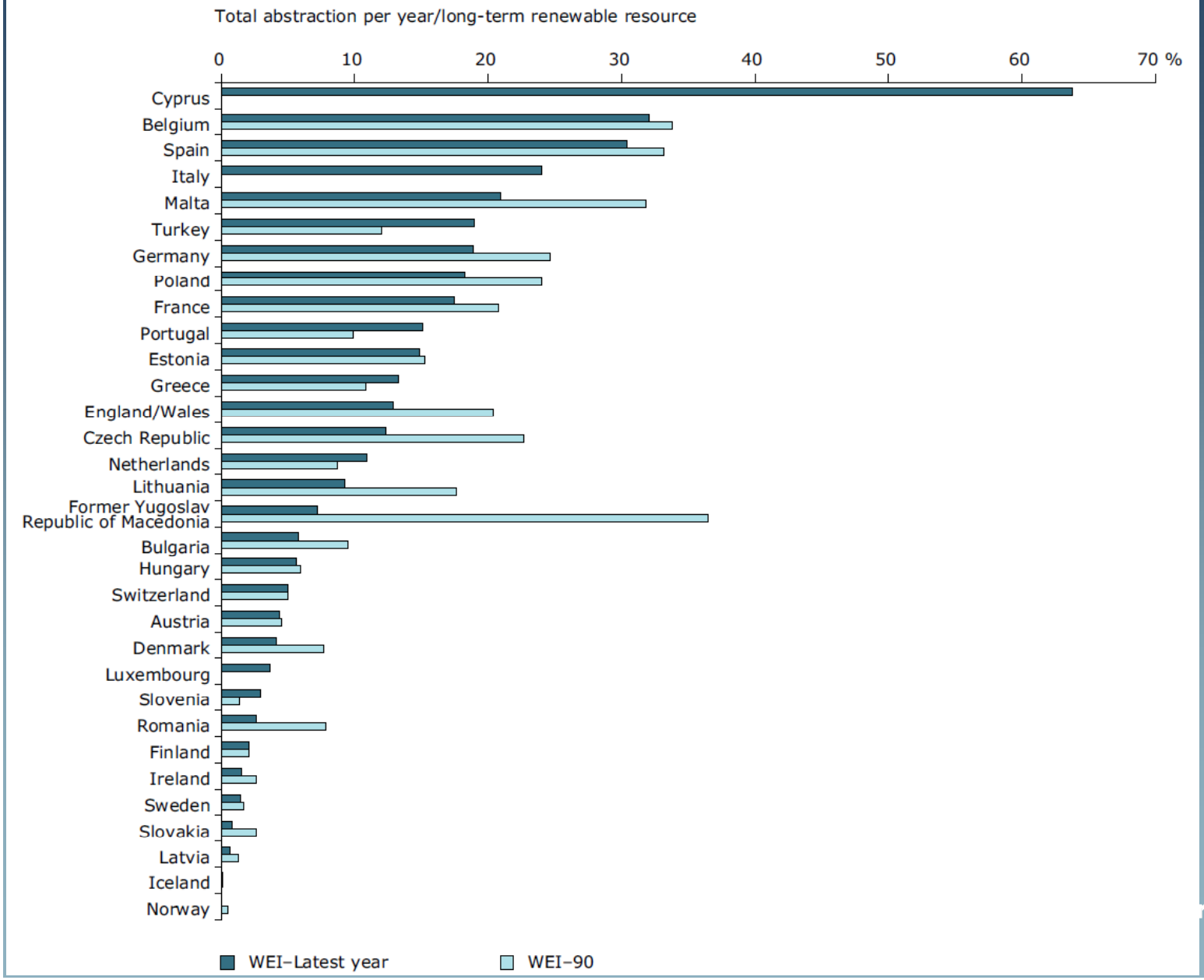
Key messages: The climate signal

- Water availability
- Long-term trends in river flows are often masked by inter-annual and decadal variability, coupled with modifications to natural flow arising from water abstractions, man-made reservoirs and land-use changes. However, increased river flows during winter and lower river flows during summer have been recorded since the 1960s in Europe.
- Climate change is projected to result in strong changes in the seasonality of river flows across Europe. Summer flows are projected to decrease in most of Europe, also in regions where annual flows will increase.
- Nowadays water stress occurs in several river basin districts and will become – in case of unchanged management – more severe due to increased variability of water availability over time, and where maximum demand goes together with minimum availability during summer.

Key messages: The climate signal (2)

- Drought
- Europe has been affected by several major droughts in recent decades, such as the catastrophic drought associated with the 2003 summer heat wave in central parts of the continent and the 2005 drought in the Iberian Peninsula.
- Regions most prone to an increase in drought hazard are southern and south-eastern Europe, but minimum river flows will also decrease significantly in many other parts of the continent, especially in summer.
- Severity and frequency of droughts may already have been exacerbated. Climate change is projected to further increase the frequency and intensity of droughts in many regions of Europe as a result of higher temperatures, decreased summer precipitation, and more and longer dry spells.

Water exploitation index data



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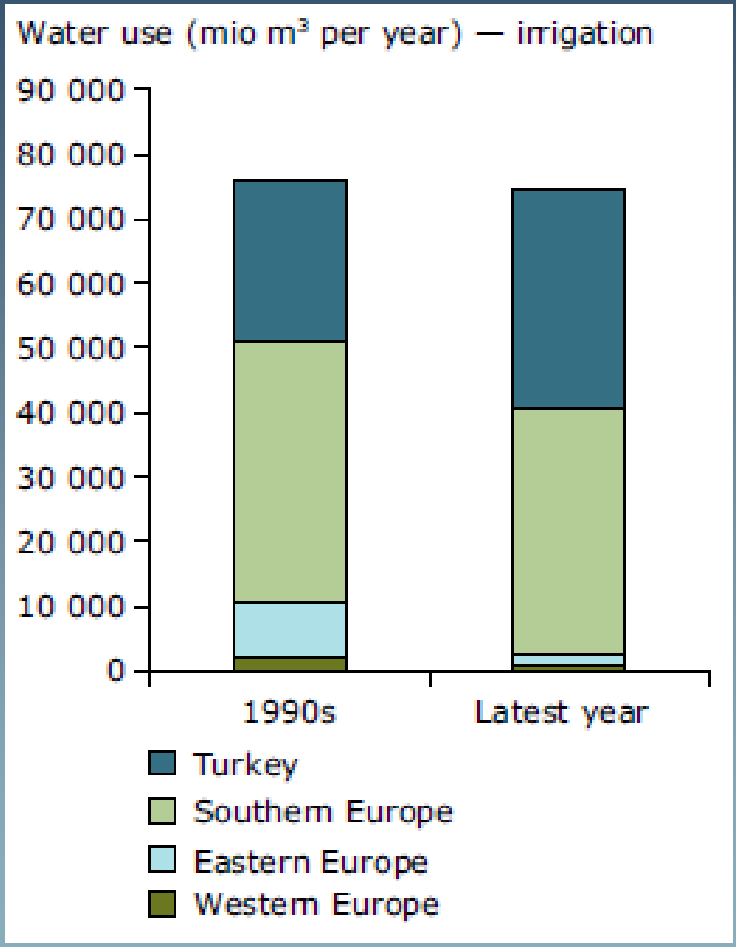
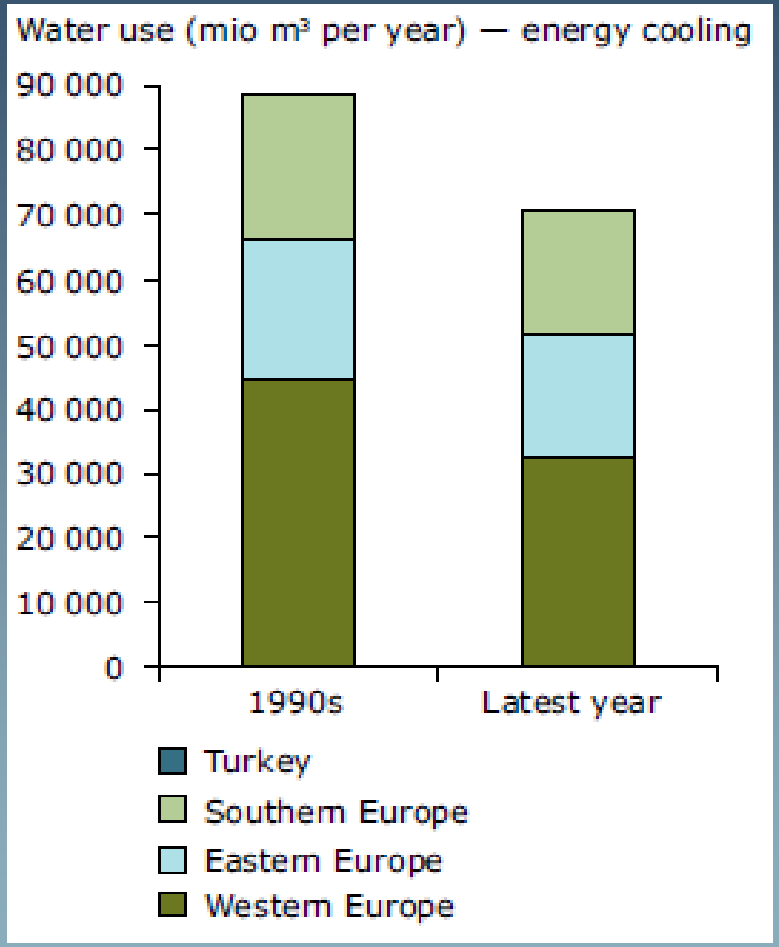
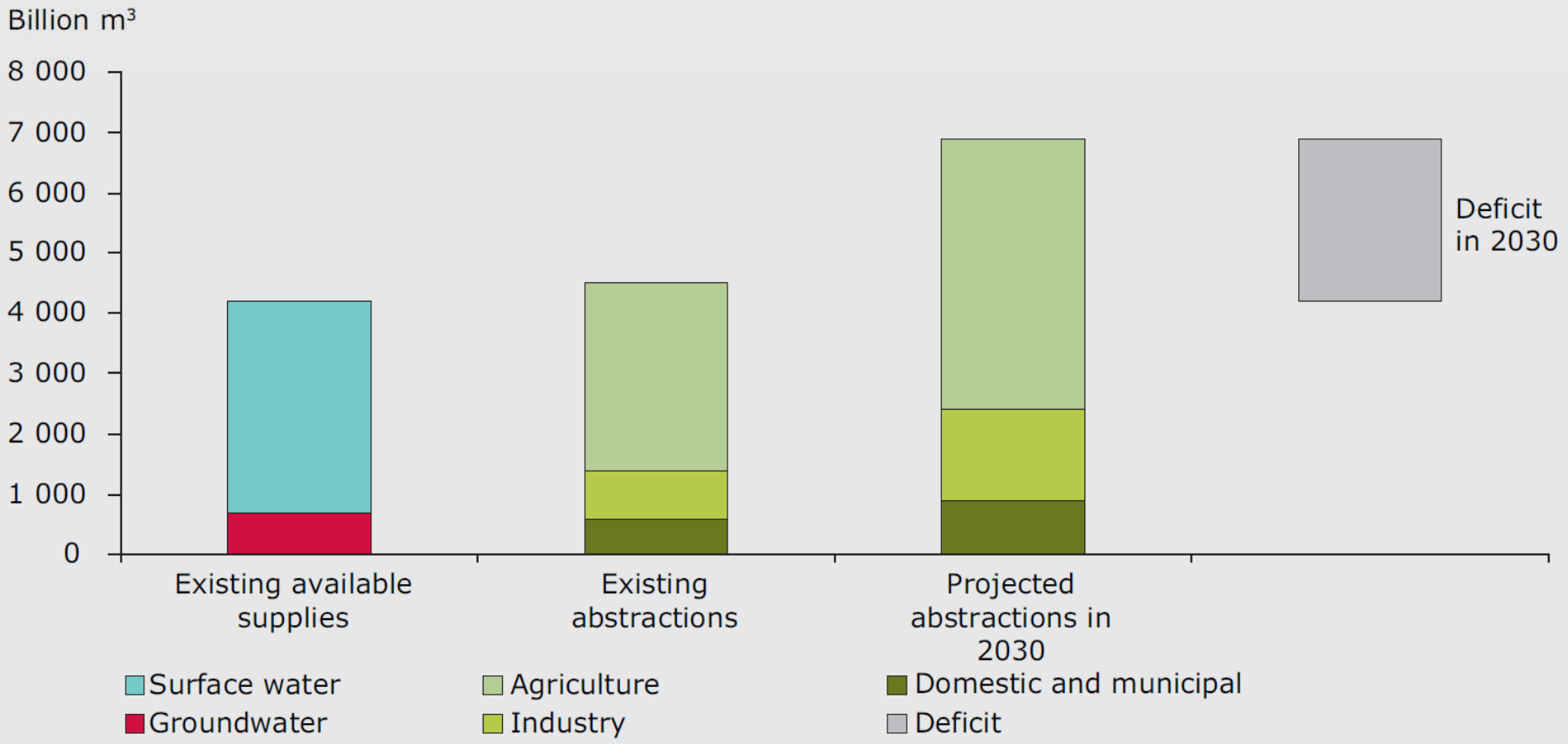
Water abstractions by water use sector in the 1990s and the period 1997–2009





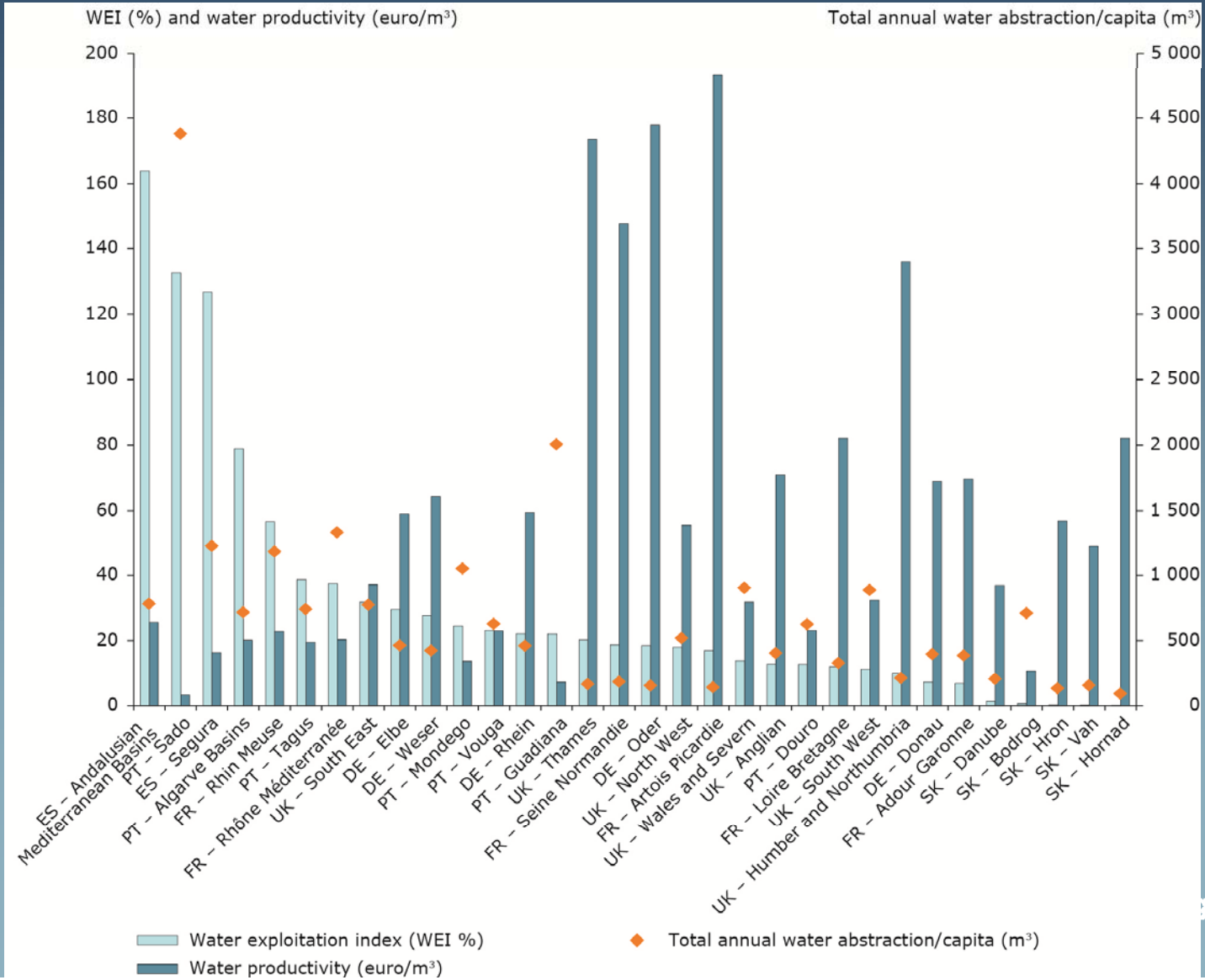
Global demand for water



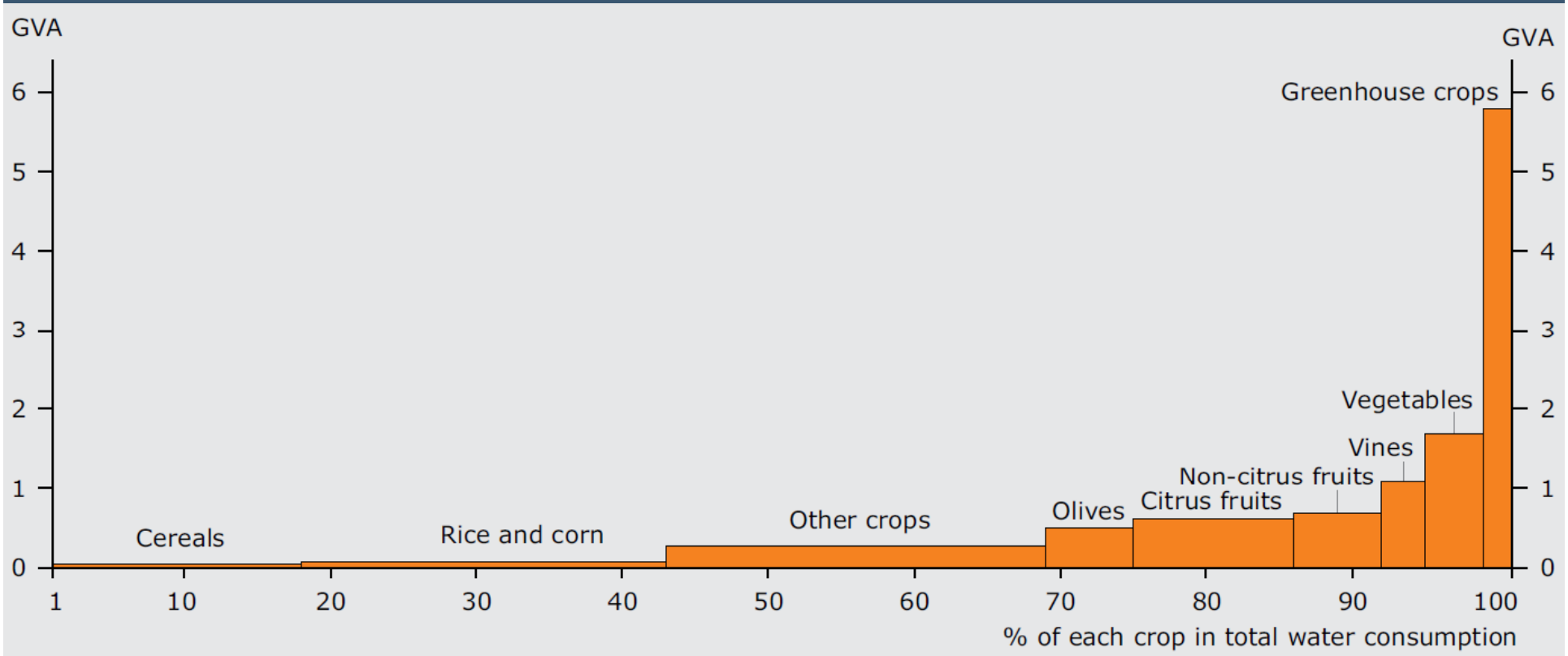
Charting our water future, 2009, 2030 Water Resource Group

European Environment Agency

Water stressed River basins are not having the highest water productivity



Monitoring efficient use of water



Gross value added of water consumed in irrigated agriculture in Spain, 2001-2002

European Environment Agency

Water use efficiency in agriculture

- Agriculture is significant water user (1/3rd of total use in Europe, up to 80% in parts of Southern Europe)
- Irrigation enables crop production where water would otherwise be limiting factor and regulates seasonal availability (match with agricultural needs) reducing risks of crop failure
- Detrimental effects of excessive agricultural water use are exacerbated by relatively high consumptive use (+/- 70%)
- Supply-oriented approaches are not sustainable in the longer term and exacerbate the adverse impacts of water use upon freshwater ecosystems
- Technological and management measures exist to improve efficiency and sustainability of water use

Improving irrigation efficiency

- Conveyance efficiency and field efficiency
- Comparing efficiency of:
  - Furrows: +/- 55%
  - Sprinklers: +/- 75%
  - Drip systems: +/- 90%
- Increased efficiency can result in no change or even increased water use if the efficiency gains simply drive expansion of the irrigated area

Modification of agricultural practices

- Crops vary in
  - resistance to drought and water requirements
  - timing of peak water demand
- Timing of cropping calendar (e.g. early sowing)
- Deficit irrigation (maximum production >< maximum profitability)
- Improved timing in irrigation
  - Training: temporal changes in demand, soil moisture estimation)
  - Water savings of 9-20% in Crete
- Success is highly dependent on market prices

Reusing wastewater

- Quality of reclaimed water (chemical, bacterial loads) must be considered and properly managed (incl. storage)
- More unified guidance on regulation and implementing water recycling would support further uptake of the practice
- Examples:
  - Cyprus target: 28% of water use in 2014
  - Gran Canaria: for tomatoes and banana plantations

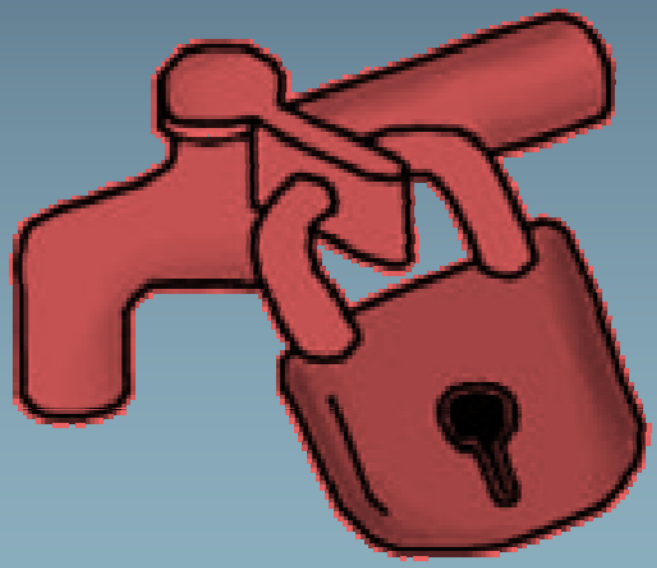
Reusing wastewater (2)

- Recovery of nutrients in wastewater treatment
  - Nitrogen
  - Phosporus (phosphate rock is non-renewable resource)
    - Technological breaktrough (recovery rate up to 90% from ash of incinerated sewage sludge
    - Struvite recovery

- EU-27: yearly 10 million tonnes of dry solids of sewage sludge
  - 40% is recycled to agriculture
  - Less than 5% of total amount of organic manure
  - Applied on less than 5% of agricultural land

Tackling illegal water use

- Drilling unlicensed well or exceeding licensed volume
- Mobile pumping devices
- Metering/monitoring
- Fines and penalties



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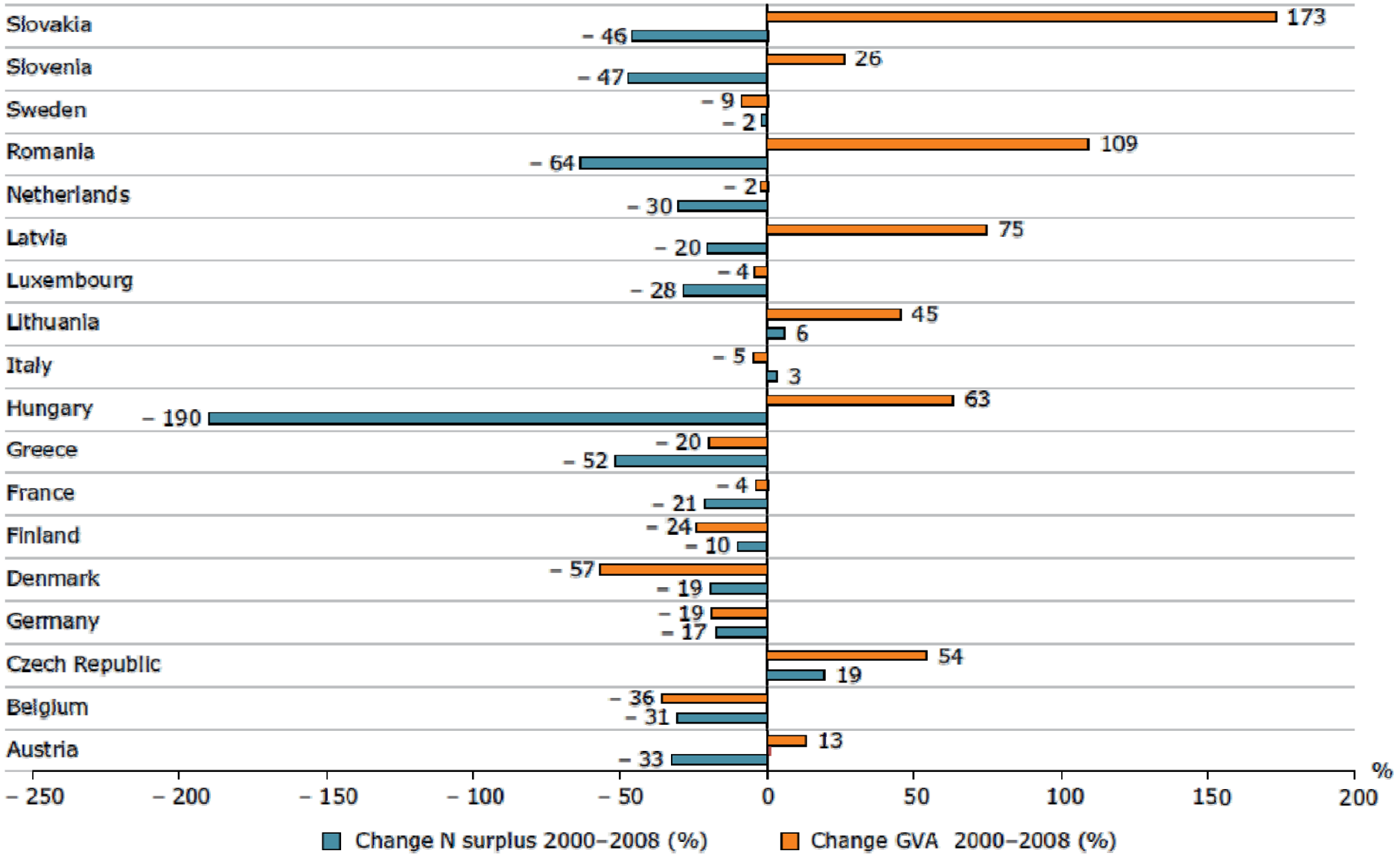
Efficient use of fertilisers and pesticides –
decoupling the nitrogen surplus from economic output



Using markets to enhance water-resource efficiency?

- Society normally benefits most when resources are allocated to their most productive use;
- Market allocation undesirable because of water's fundamental importance in sustaining biological, social and economic system;
- No fully assigned, exclusively held, transferable and enforceable property rights
  - You cannot loan, save, transfer it like money
  - It has the characteristics of a public good, a private good, a common pool resource or a club good

Water pricing in agriculture

- Providing society's basic needs vs. detrimental effect on environment
- Largest share of water use is irrigation
  - (mostly) tariffs typically cover only operational and maintenance costs
    - Flat rate charges (fixed fees) vs. volumetric pricing
  - Cost recovery is very complex given diversity and magnitude of production, and social considerations pose practical limitations

Water pricing in agriculture (2)

At this moment:

- No clear signal and transparency in water price
    - Absence of environmental impacts and opportunity costs (resource costs)

➢ Difficult to promote sustainable use of a scarce resource under current CAP

➢ (general) Governance failure: state interventions as subsidies, taxes, price controls and regulations exacerbating rather than correcting the market failures

EEA Aim: maintaining the long term functionality of the ecosystem / environment

- Need to reduce pressures
- Only increasing the efficiency won't make it (rebound effect)
- Several additional pressures:
  - Land use changes
  - Energy crops

How can CAP support to:

- reduce pressures (e.g. water stress)?
- a more productive agriculture without external inputs?

Thank you!

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