The European Commission's science and knowledge service

Joint Research Centre

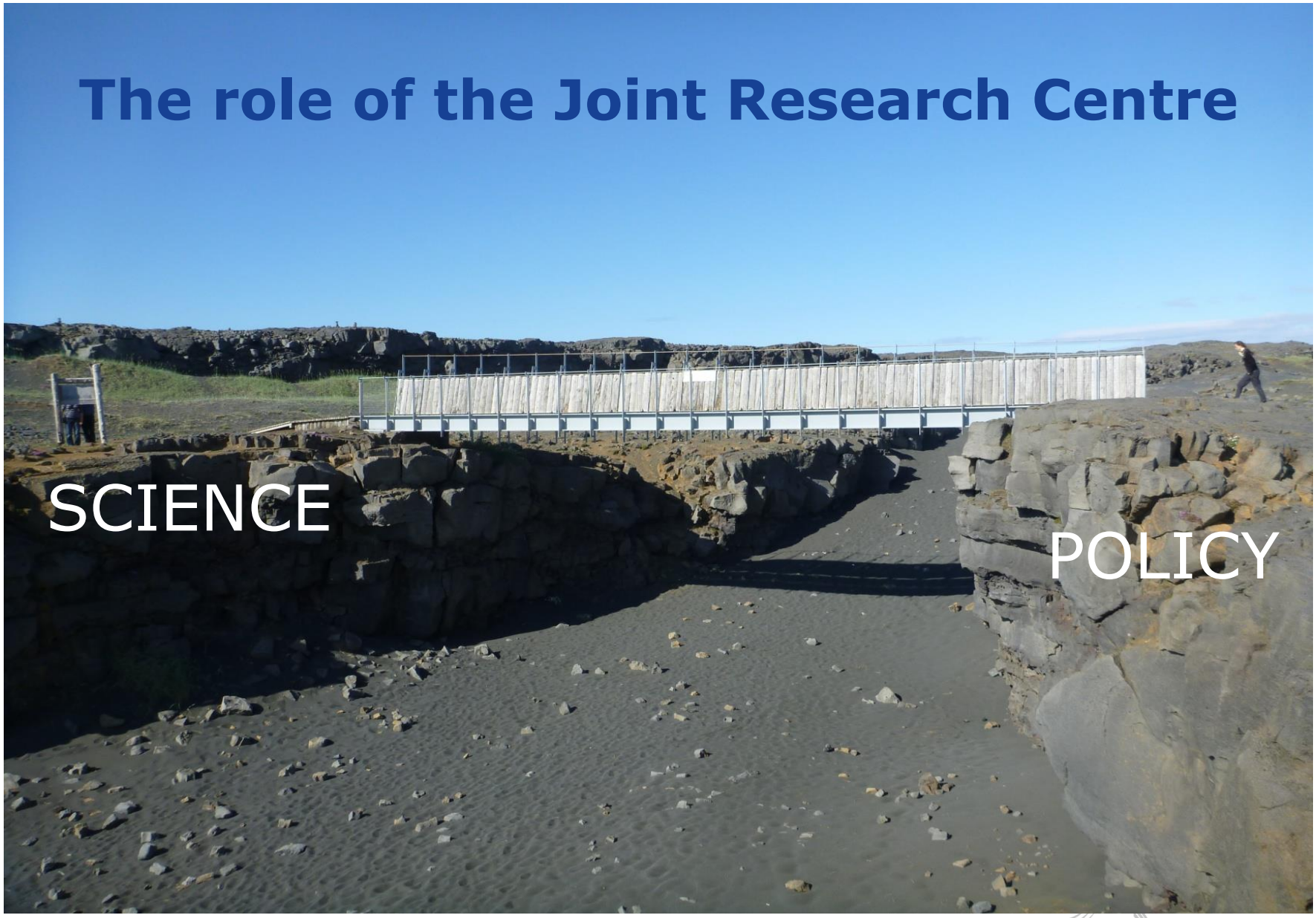
Water and agriculture

"The 2016 EU Agricultural Outlook Conference"

Brussels, 6 December 2016

European Commission

The role of the Joint Research Centre



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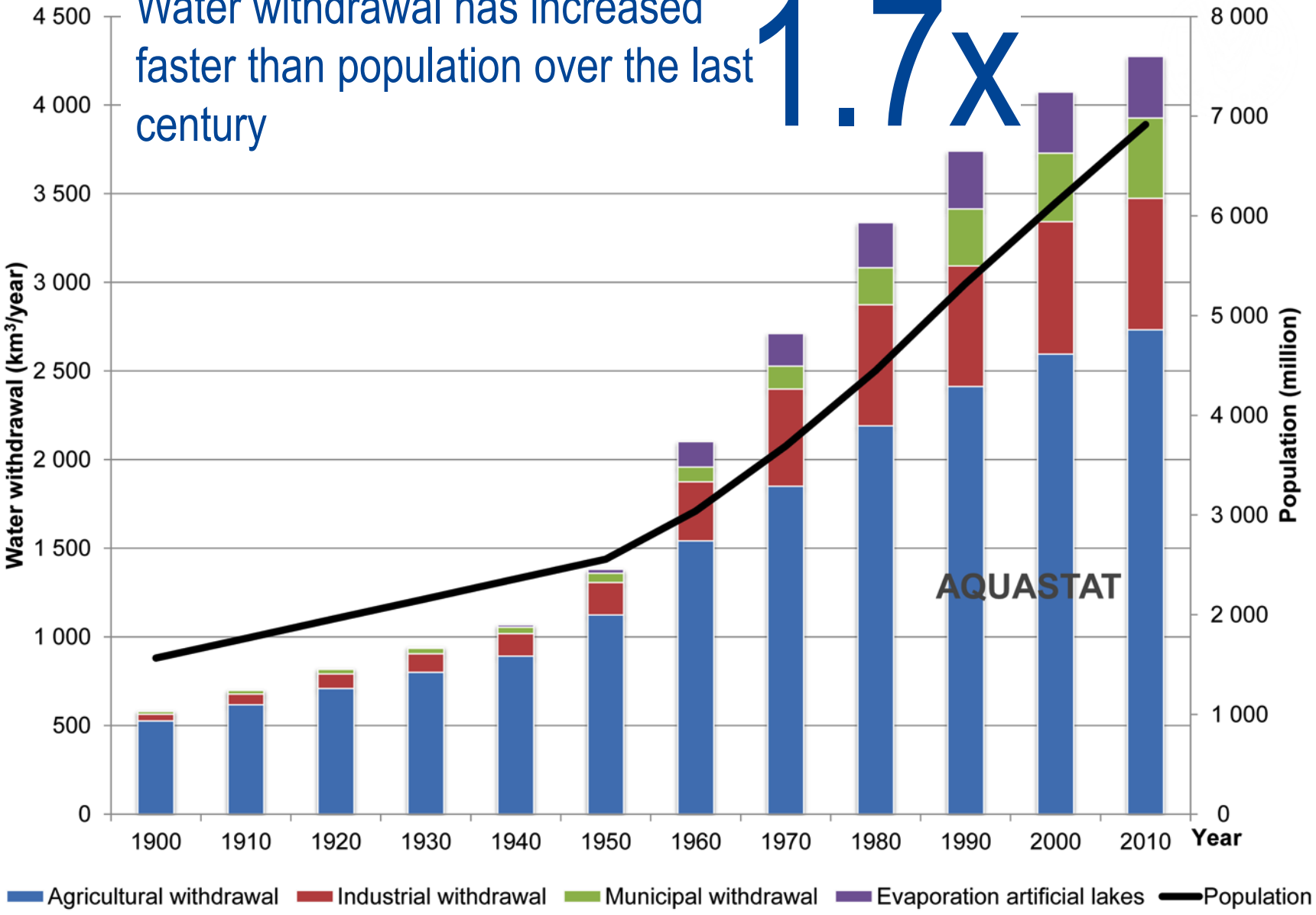
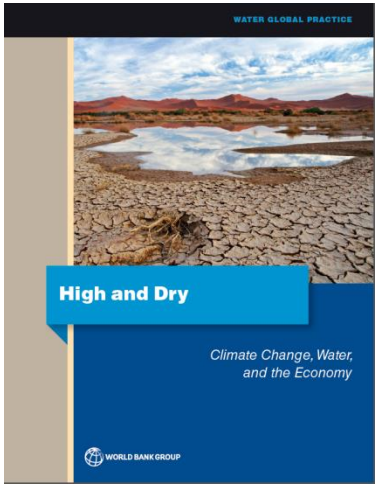
Water withdrawal has increased faster than population over the last century 1.7x



http://www.fao.org/nr/water/aquastat/water_use/index.stm

Date of preparation: September 2015

Economic growth is a thirsty business



Water

Cooling, hydro, extraction

needed to generate

needed to supply

Irrigation

needed to grow

pollution

Treatment
Distribution

Agricultural
Drainage

Fertilisers
Processing
Distribution

Energy

needed to produce

can be used to produce

Food

Bioenergy

Agri waste

European Commission

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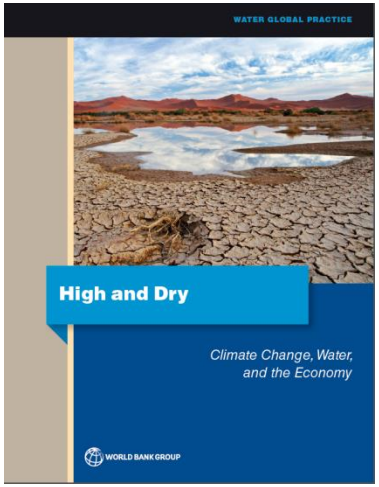

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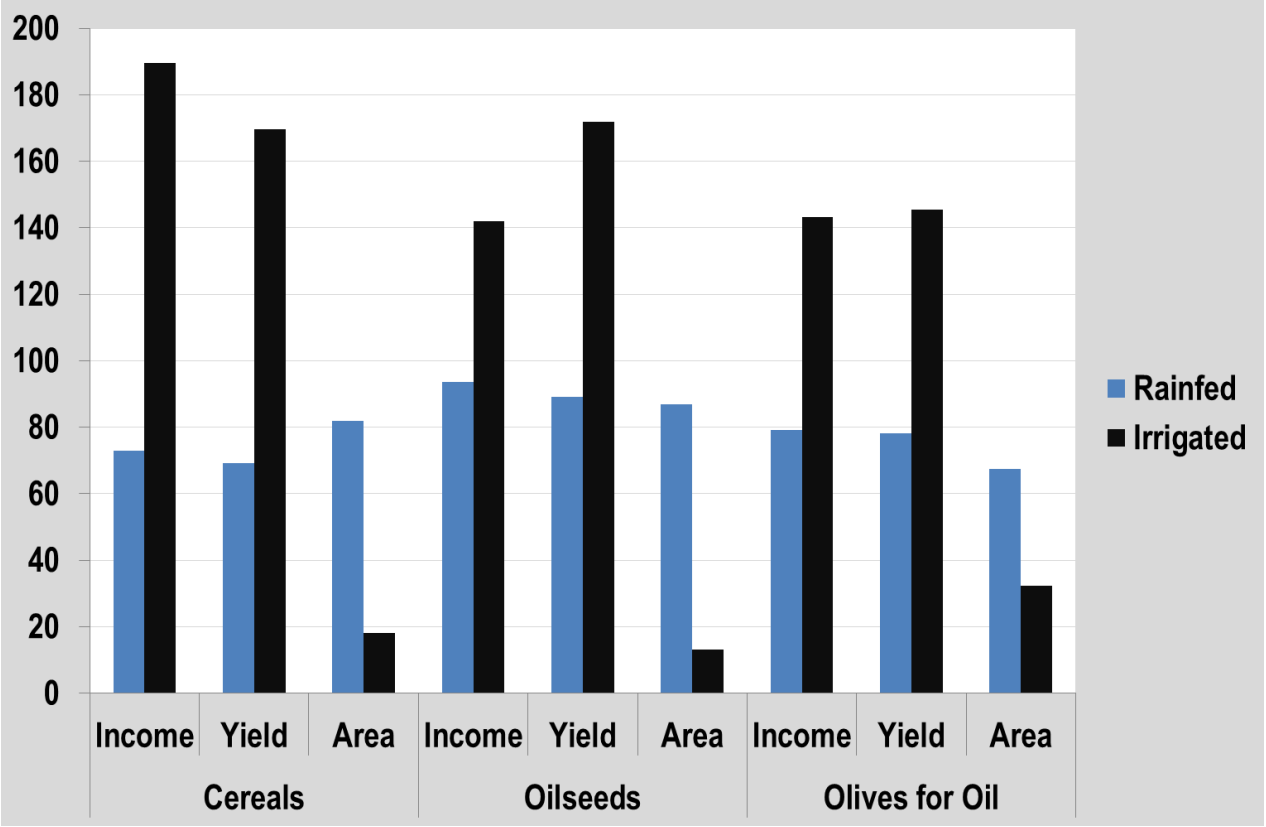
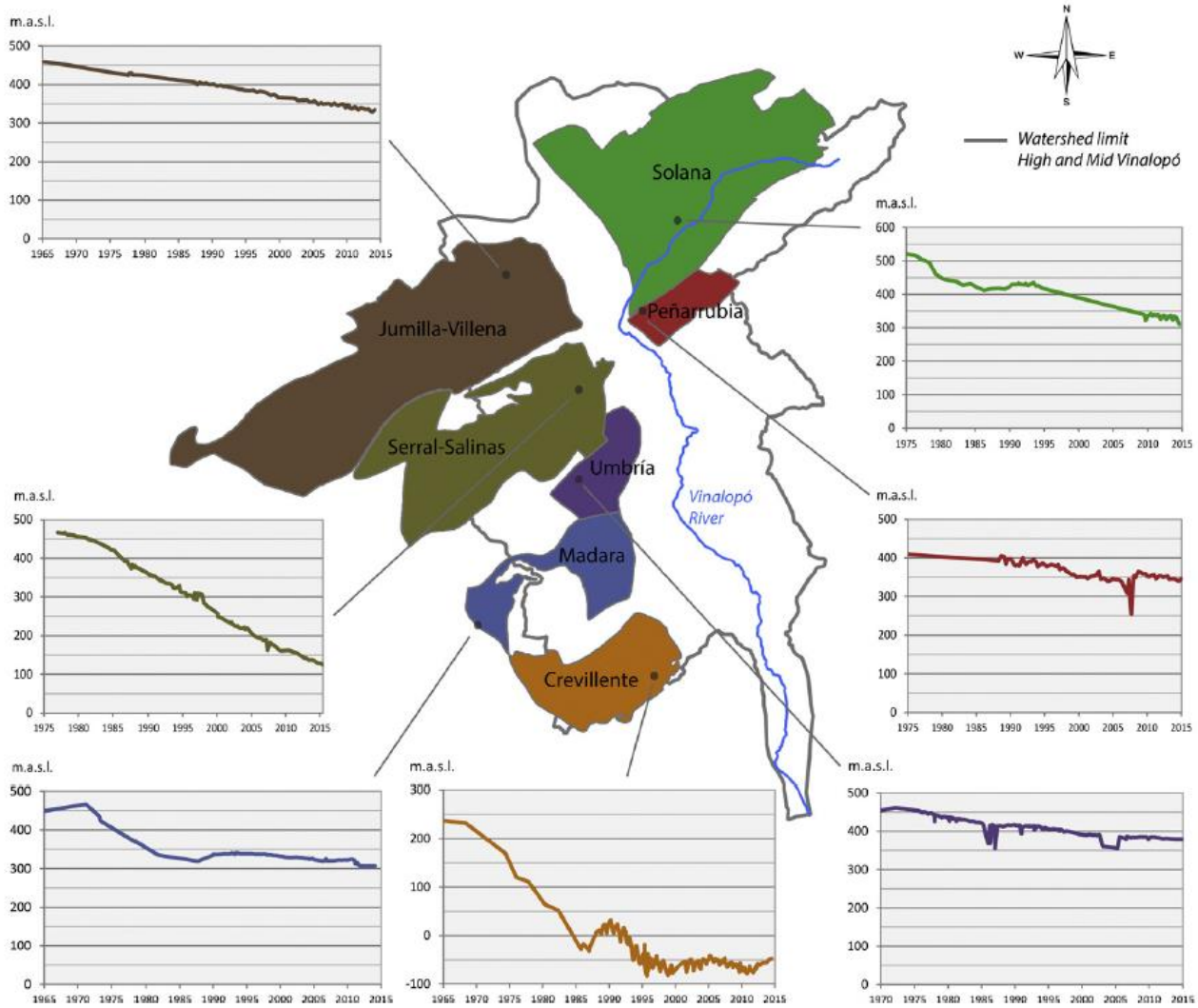
Irrigation can make a great difference for farmers, e.g. Andalusia



Main indicators for selected commodities between irrigated and rainfed options (regional average = 100) *CAPRI-Water*

Source JRC, 2016

Groundwater level evolution in some exploited aquifers in South-East Spain



Source: Custodio et al., 2016

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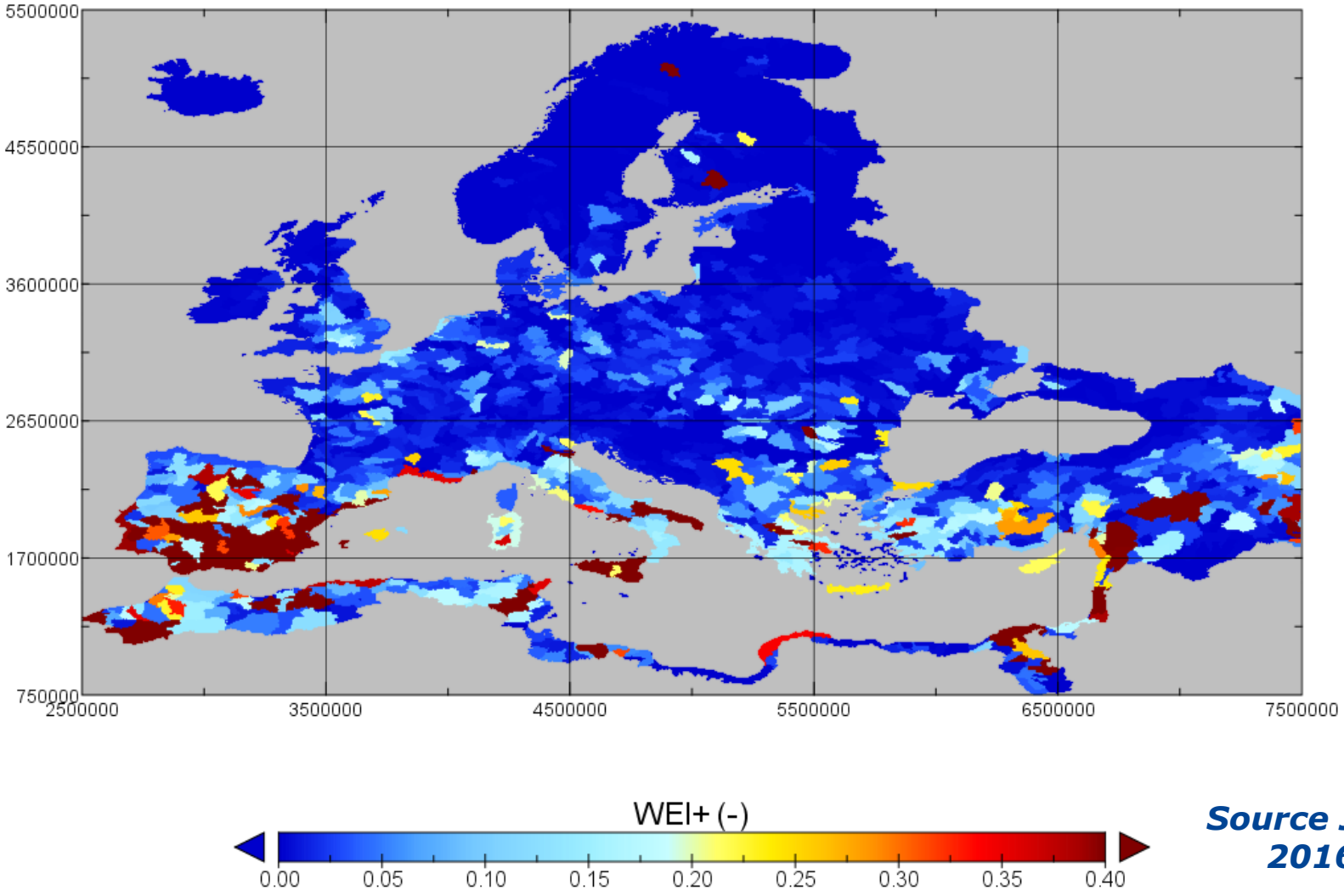
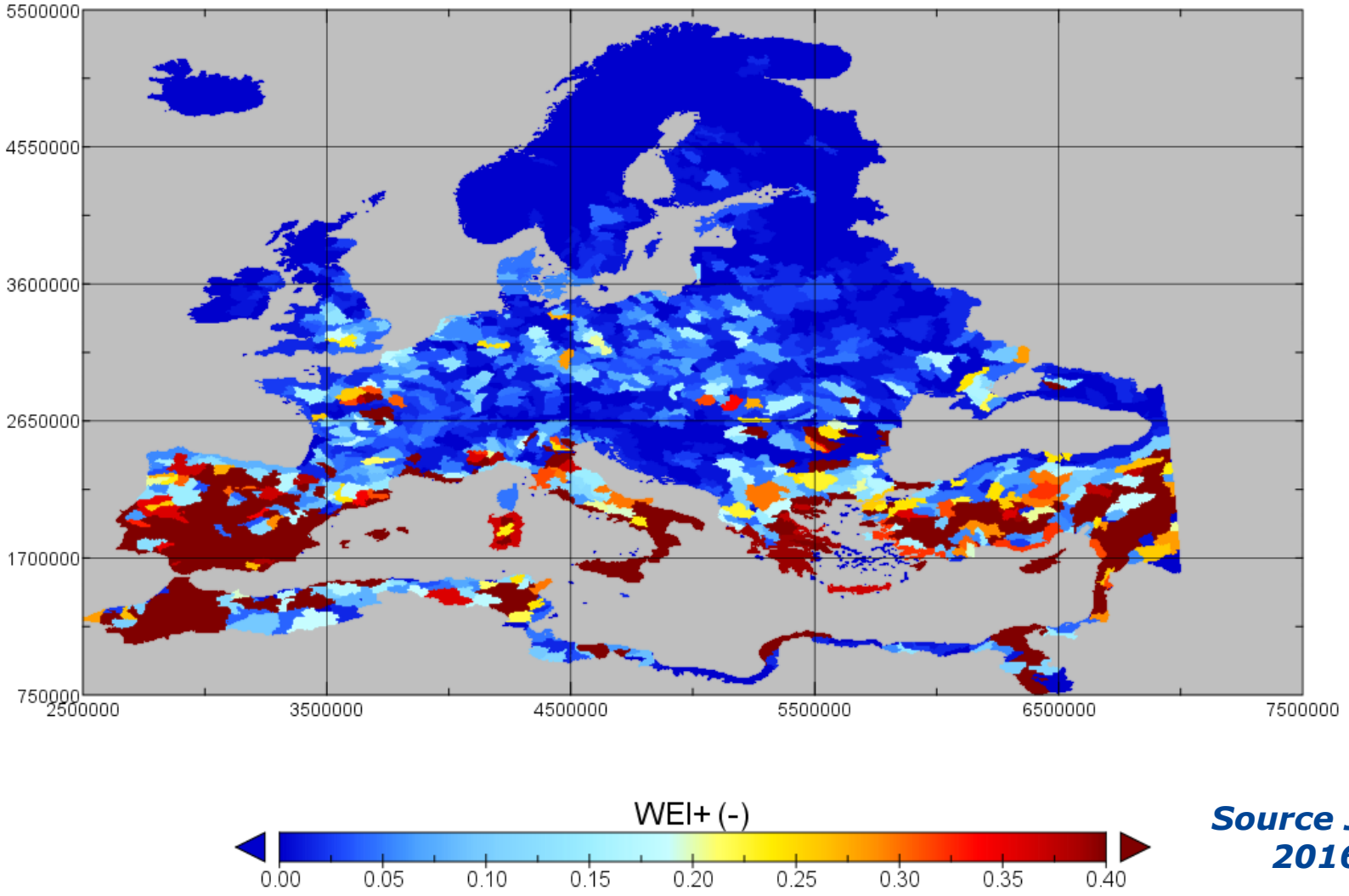
Average Water Exploitation Index (WEI+) 1990-2014



Source JRC, 2016

Average Water Exploitation Index (WEI+) under 2 degree global temperature increase



Source JRC, 2016

Improving on-farm water management

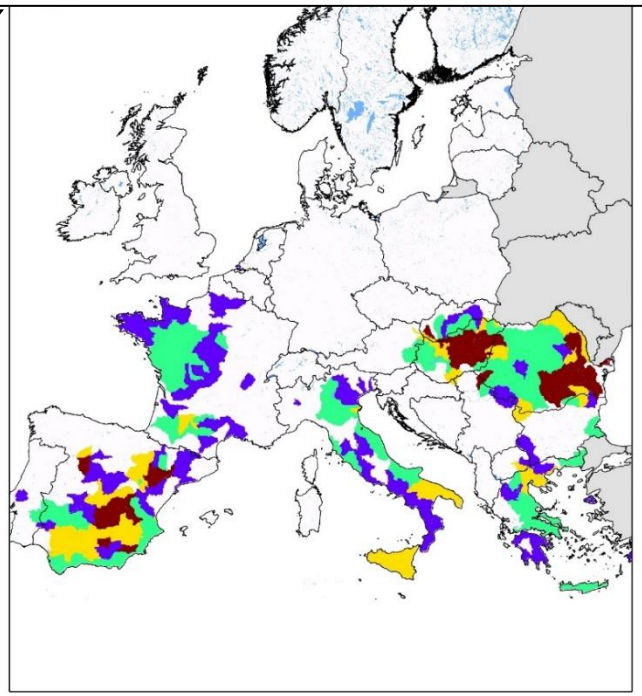
Management strategies to increase crop water productivity must be tailored to local contexts
(maximize yield per unit of water as well as per unit of land)

- Improved irrigation techniques: choice of technology, irrigation scheduling, deficit irrigation, use of sensors, etc.
- Use of alternative water sources such as wastewater, brackish water, increase rainwater harvesting
- Development of drought resistant crops: switch to less water consumptive crops that still deliver good economic return
- Improved land and soil management: cropping, mulching, tillage practices.
- …….

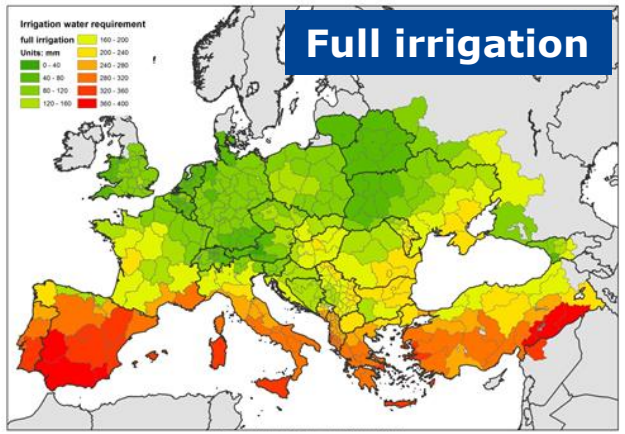
Identifying efficient water reduction strategies

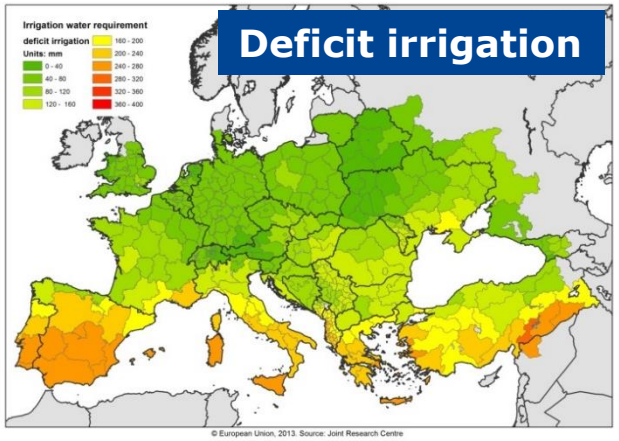
Improvement

- <0.01 decrease in WEI_{abs}
- 0.01 – 0.02
- 0.02 – 0.05
- 0.05 – 0.10
- > 0.10 decrease in WEI_{abs}



Showing changes if all irrigation is transformed to **drip irrigation**, increasing water efficiency from 83% to 93%





Irrigation water requirement for maize with no difference in yield

Source JRC

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Water reuse in agricultural irrigation and aquifer recharge

Europe at present:

- Reuse of 1 000 000 000 m^3 of treated wastewater annually
- This is only 2.4% of the treated wastewater effluent
- Less than 0.5% of annual EU freshwater withdrawal
- Potential is estimated to be at least 6 times higher
- Cyprus and Malta have already made significant progress

EU Circular Economy package

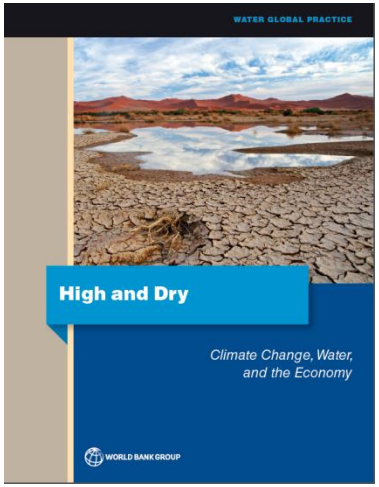
- The Commission will take a series of actions to facilitate water reuse; this will include a legislative proposal on minimum requirements for reused water, e.g. for irrigation and groundwater recharge: 2017

1. Food crops consumed raw

2. Processed and other food crops

3. Non-food crops

Economic growth is a thirsty business



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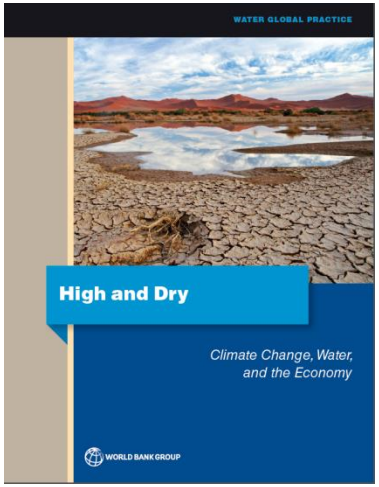

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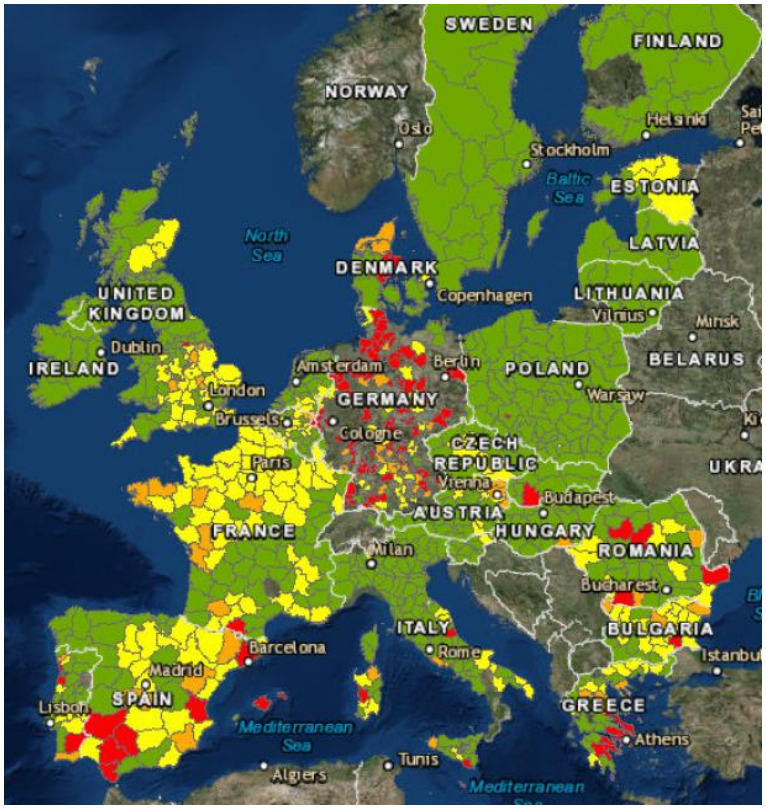
Nitrates in European groundwaters

Average nitrates concentrations at NUTS3 level



Nuts3 - Nitrates Concentration [mg/l]

- < 25 mg NO3- / l
- 26 - 40 mg NO3- / l
- 41 - 50 mg NO3- / l
- > 50 mg NO3- / l

Source JRC, 2016

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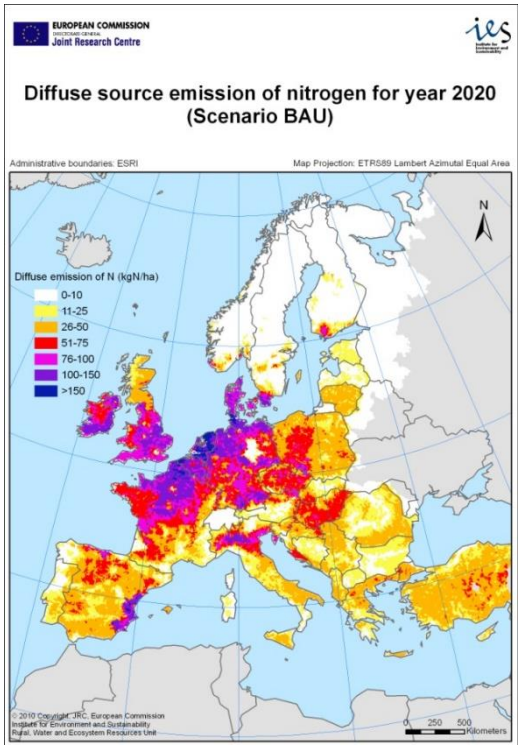
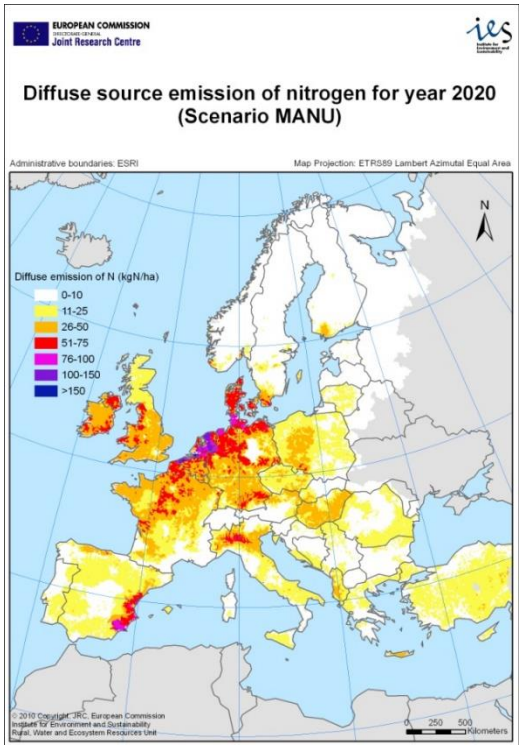
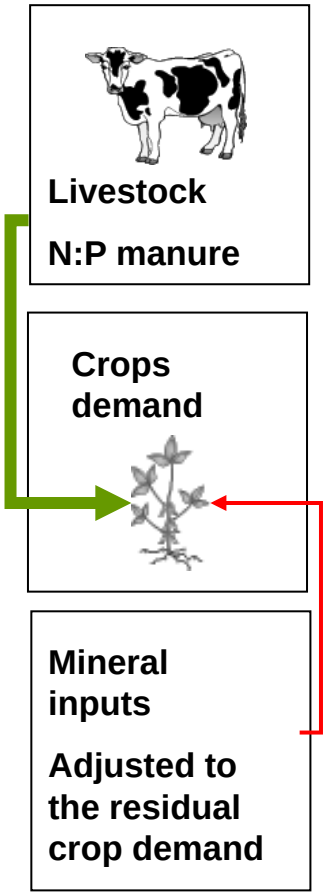
Scenarios for nitrogen sources in 2020







Business As Usual		*Manure management*
18493		***8170* (- 55 %)**

Diffuse emissions of nitrogen to waters in 1000 tons/year

Source JRC, 2014

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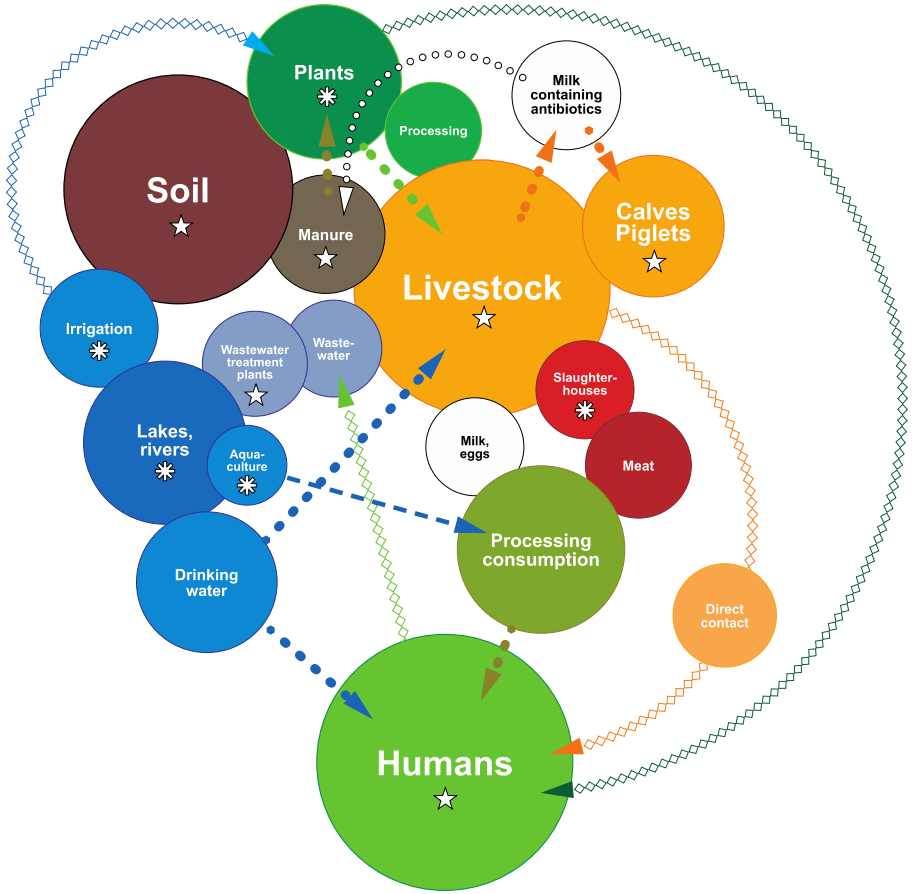
Antimicrobial resistances in agriculture

- Potential human health risks posed by the agricultural release of antimicrobial agents into the environment

- Need to develop risk assessments of antimicrobial resistance in agriculture linked mainly to the use of veterinary medicines



Source: Thanner et al., 2016

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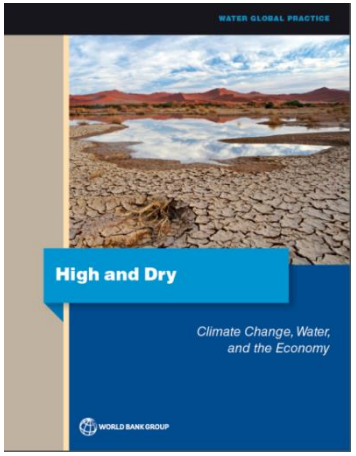

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Concluding observations

- The Water Energy Food Nexus both at EU and global level requires a cross-policy approach
- Sustainable agriculture across the EU will need us to work towards targeted strategies for e.g. smart irrigation, water-reuse and nutrient management
- Improved fresh water management will be a pre-requisite for stabilising food security and economic development in Africa and EU neighbouring countries

The European Commission's science and knowledge service

Joint Research Centre

Thank you for your attention

European Commission