The European Commission’s science and knowledge service
Joint Research Centre

Water and agriculture

"The 2016 EU Agricultural Outlook Conference"

Brussels, 6 December 2016
The role of the Joint Research Centre
Water withdrawal has increased faster than population over the last century. 

1.7x


Date of preparation: September 2015
Economic growth is a thirsty business

Water

Cooling, hydro, extraction

needed to generate

needed to supply

Treatment Distribution

Agricultural Drainage

Fertilisers Processing Distribution

Irrigation

needed to grow

pollution

Energy

needed to produce

can be used to produce

Bioenergy

Agri waste

Food
Economic growth is a thirsty business

- **Water**
  - Cooling, hydro, extraction
  - Treatment Distribution
  - Agricultural Drainage
  - Fertilisers Processing Distribution
  - Irrigation

- **Energy**
  - Needed to generate
  - Needed to supply
  - Pollution

- **Food**
  - Needed to produce
  - Can be used to produce
  - Bioenergy
  - Agri waste
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
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 $\text{WEI}_{\text{abs}}$
  - 0.01 – 0.02
  - 0.02 – 0.05
  - 0.05 – 0.10
  - > 0.10 decrease in $\text{WEI}_{\text{abs}}$

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

Source: JRC
Water reuse in agricultural irrigation and aquifer recharge

Europe at present:

- Reuse of 1 000 000 000 m³ 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
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

Water
- Cooling, hydro, extraction
- Treatment Distribution
- Agricultural Drainage
- Fertilisers Processing Distribution

Energy
- needed to generate
- needed to supply
- needed to produce
- can be used to produce
- Bioenergy

Food
- needed to grow
- pollution
- Irrigation
- Agri waste

Bioenergy
Agri waste
Economic growth is a thirsty business

Water

- Cooling, hydro, extraction
- Treatment Distribution
- Agricultural Drainage
- Fertilisers Processing Distribution

Energy

- needed to generate
- needed to supply

Food

- can be used to produce

- Bioenergy
- Agri waste

Irrigation

needed to grow pollution
Nitrates in European groundwaters

Average nitrates concentrations at NUTS3 level

Source JRC, 2016
Scenarios for nitrogen sources in 2020

Diffuse emissions of nitrogen to waters in 1000 tons/year

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

*Source JRC, 2014*
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
Economic growth is a thirsty business

- Energy
- Water
- Food

- Water needed to produce:
  - Bioenergy
  - Agri waste

- Water can be used to produce:
  - Energy

- Water needed to generate:
  - Cooling, hydro, extraction

- Water needed to supply:
  - Treatment Distribution
  - Agricultural Drainage

- Water needed to grow:
  - Irrigation

- Fertilisers Processing Distribution
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