EGU2020, May 4th, 2020
D493 EGU2020-8052

Water in the circular economy

Using recycled water for sub-irrigation purposes

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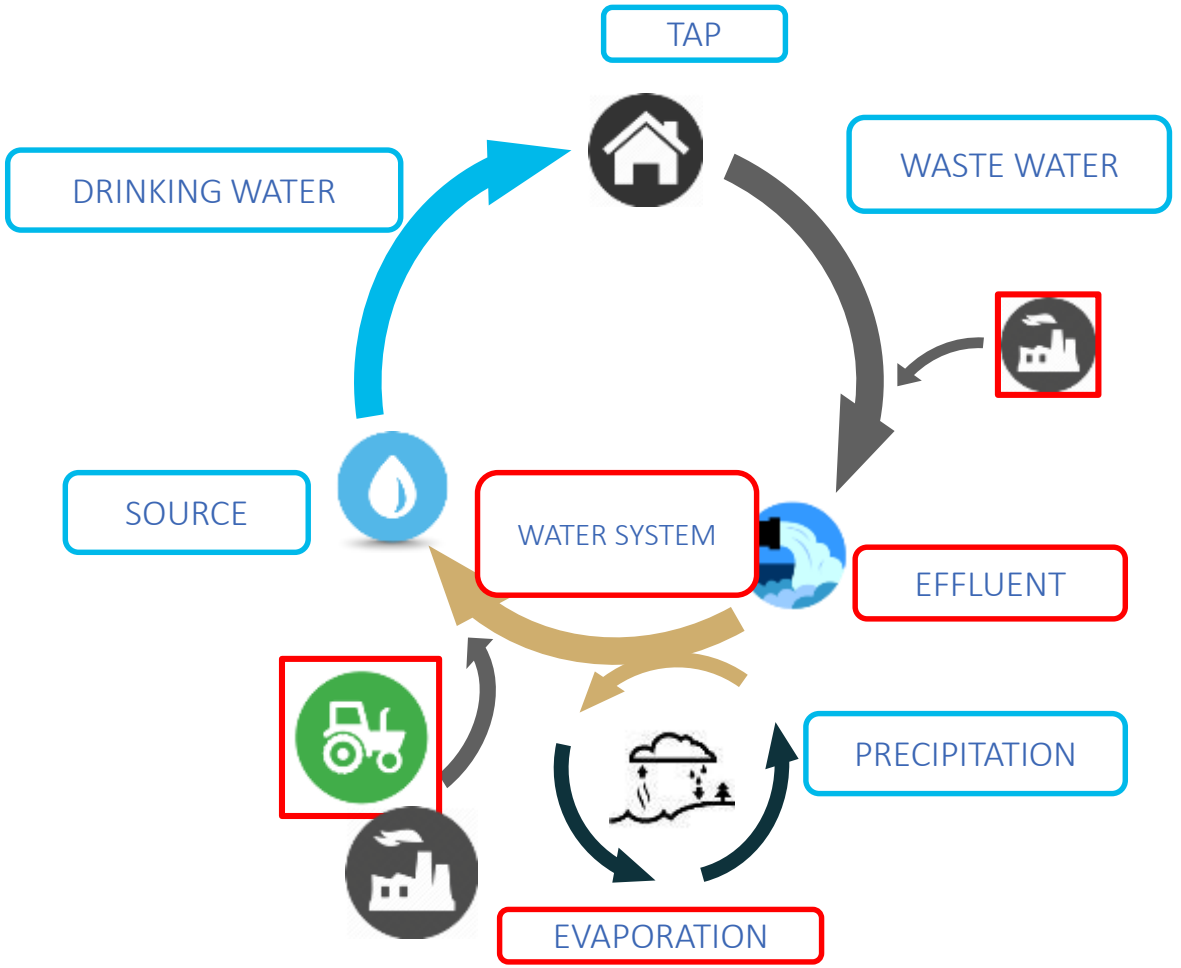
Bridging Science to Practice

Freshwater availability not sufficient to meet the demand

Make better use of available freshwater resources

- Wastewater quickly discharged via surface waters towards sea
- Farmers and water management authorities search for opportunities to manage risks of decreasing crop yields and decrease pressure on groundwater resources
- **Exploit treated wastewater to balance regional water supply and agricultural water demand**



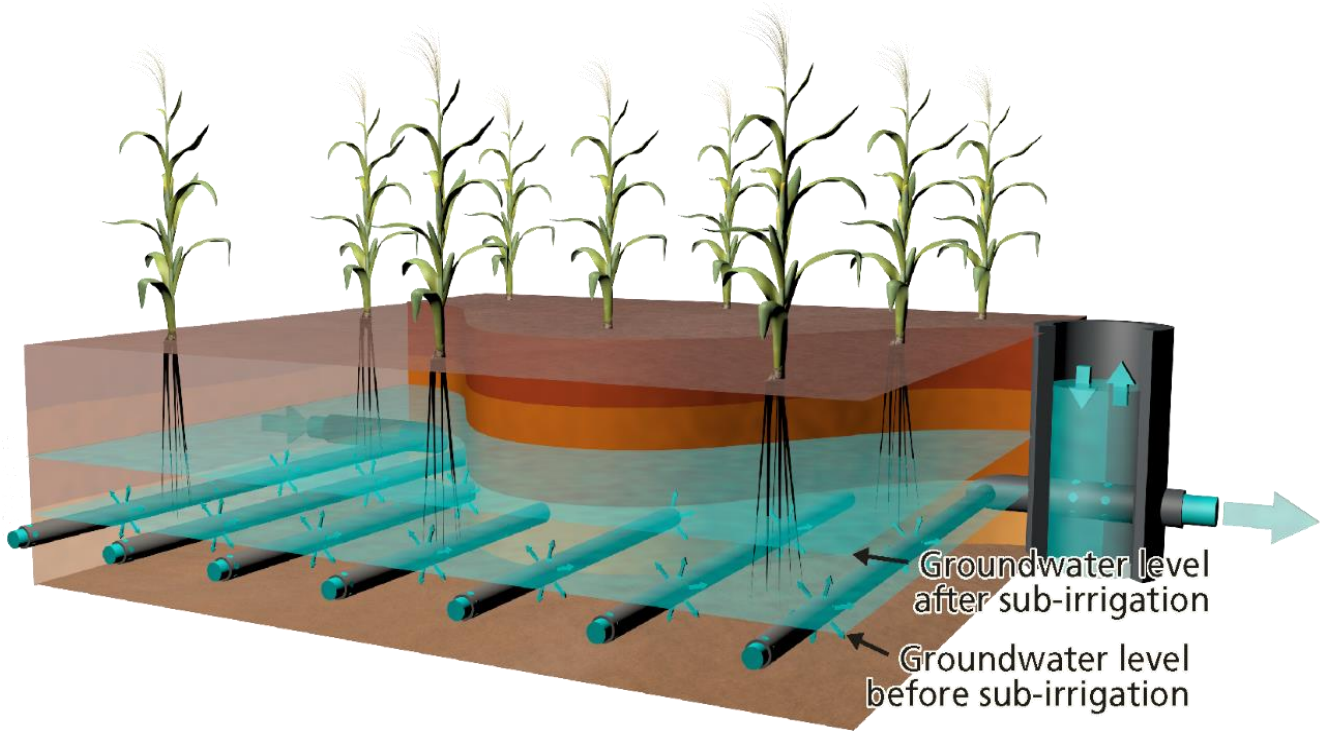
Water in the Circular Economy (WiCE)

Agricultural water supply

Active supply through subsurface irrigation

- Water supply through controlled drainage system
- Goal: raise groundwater level for optimal soil moisture availability
- Success depends on continuous water supply:

→ next slides, example: use industrial wastewater as source



Narain, D.M.; Bartholomeus, R.P.; Dekker, S.C.; Van Wezel, A.P. Natural purification through soils: Risks and opportunities of sewage effluent reuse in sub-surface irrigation. Rev. Environ. Contam. Toxicol. ***2020****, in press.*

Testing sub-irrigation with industrial wastewater on dry field

- Groundwater use brewery: 2.5 Mm^3/y
- Located in agricultural area: drought
- Treated wastewater: 1.5 Mm^3/y discharged via surface water
- Reuse wastewater for agricultural water supply
  → reduce pressure on groundwater resources

Interreg
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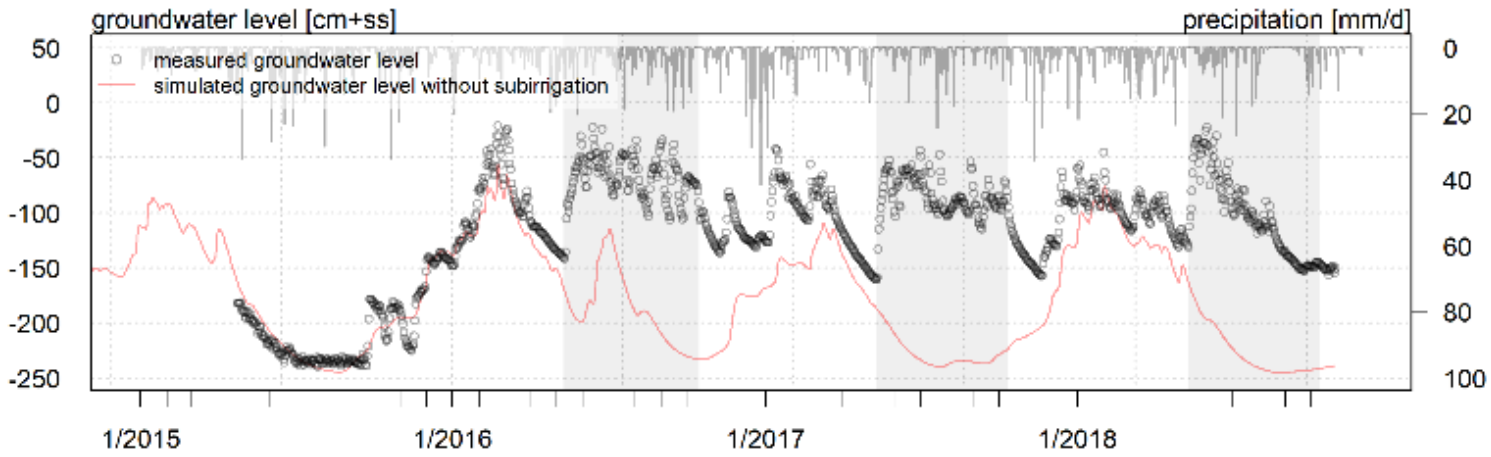
Monitoring sub-irrigation experiment

Effect sub-irrigation on groundwater level

Measurements (selection):

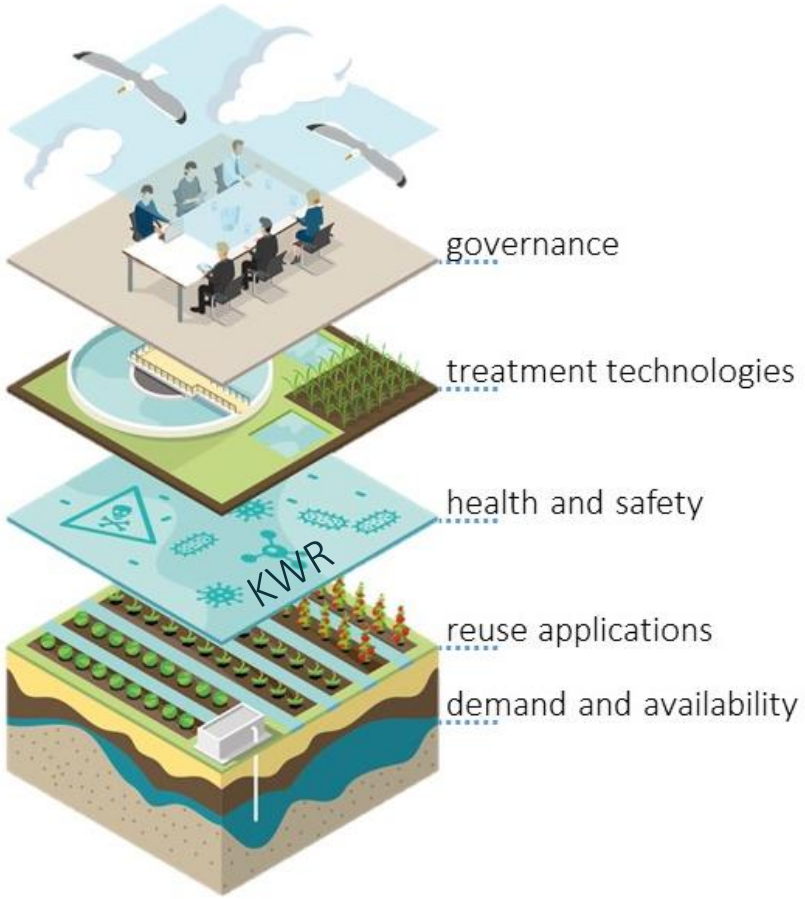
- Groundwater level: raised >1m due to sub-irrigation (grey bands)
- Soil moisture content: increased



Water reuse, a multi-layered approach

Agriculture will be confronted more and more with yield losses due to drought

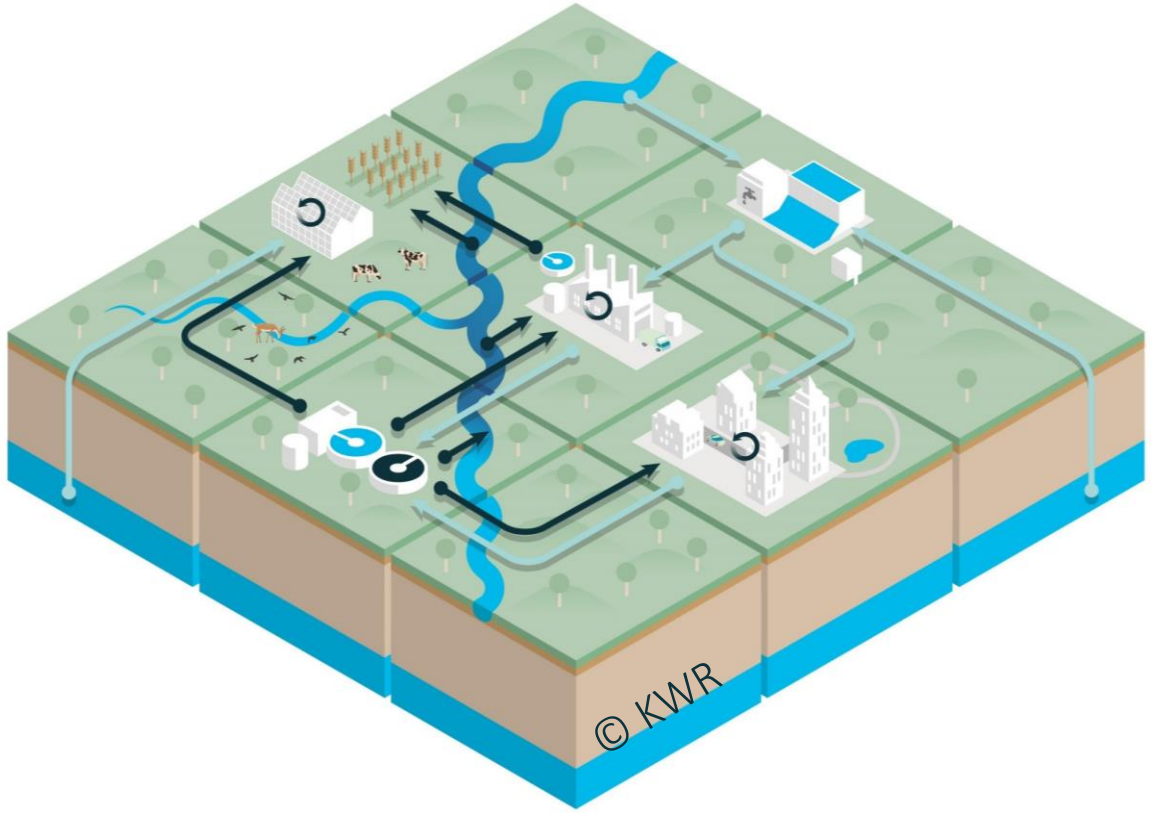
The use of alternative freshwater sources, such as treated wastewater, can reduce drought damage. But is it safe?



Dingemans, M.M.; Smeets, P.W.; Medema, G.; Frijns, J.; Raat, K.J.; Wezel, A.P.; Bartholomeus, R.P. Responsible Water Reuse Needs an Interdisciplinary Approach to Balance Risks and Benefits. Water ***2020****, 12, 1264.* https://www.mdpi.com/2073-4441/12/5/1264

Outlook: matching water supply and demand

- Water is connected in the landscape
- This includes both the ‘natural’ water system of rivers, surface water, groundwater and precipitation, and the ‘human’ water system of water used in agriculture, industry and urban environments, drinking water production and wastewater effluent.
- *How can a shift in water (re-)use decrease the pressure on groundwater resources?*



https://www.kwrwater.nl/en/actueel/how-can-water-reuse-contribute-to-a-more-robust-freshwater-system/

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