

**Low cost technologies supporting water resources management and planning in the climate-stressed Global South**

*Euro-Case Conference*  
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UCLouvain – Earth and Life Institute





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**What I'll try to adress in 15 minutes**

- World water challenges in a nutshell
- Facing the water data challenge: IoT, remote sensing and citizen science
- Facing the irrigation challenge: Pitcher irrigation
- Facing the sanitation challenge: Nature based solution supporting waste water treatment

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**The global water crisis: Drinking water and sanitation**

**WORLD WATER CRISIS**  
*Millions of us take clean water for granted, but for 768 million people around the world, it's a luxury.*

Most people without clean water live in sub-Saharan Africa and Oceania



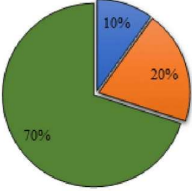
<b>2.5 BILLION</b> Estimated number of people lacking improved sanitation facilities around the world	<b>768 MILLION</b> Estimated number of people using unimproved drinking water sources	<b>1,400</b> Estimated number of children who have diarrhoeal diseases linked to poor water, sanitation and hygiene
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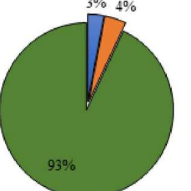
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**The global water crisis: Food production**

**Water Withdrawals**



**Water Consumption**

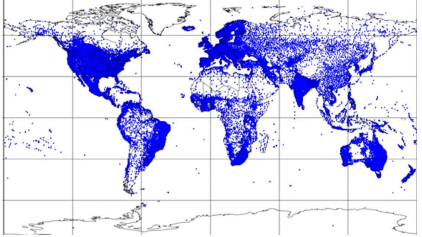


■ Municipal    ■ Industry    ■ Agriculture

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**Facing the water data challenge: Available rainfall gauges**

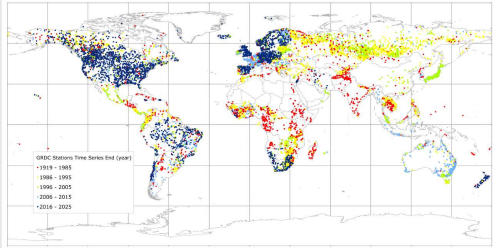


Source: Atmosphere 2017, 8(3), 52; <https://doi.org/10.3390/atmos8030052>

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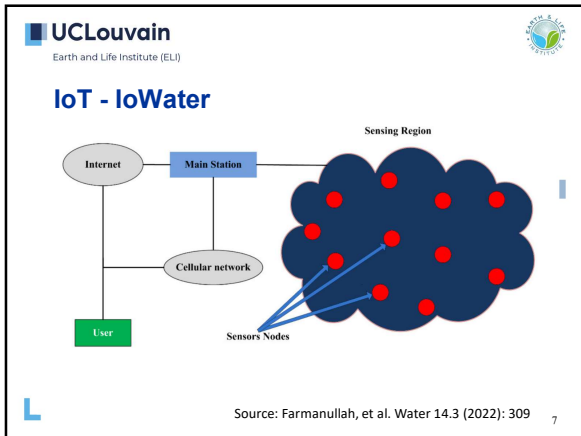
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**Facing the water data challenge: Available runoff data**



10 359 GRDC stations with monthly data, including data derived from daily data - Status: 1 October 2021  
(Koblenz: Global Runoff Data Centre, 2021)  
Source: GRDC 2021

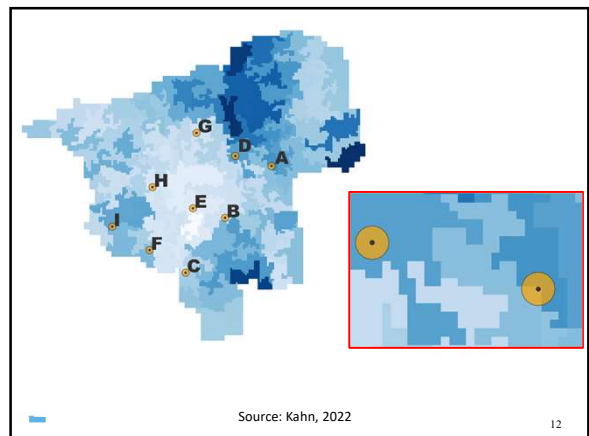
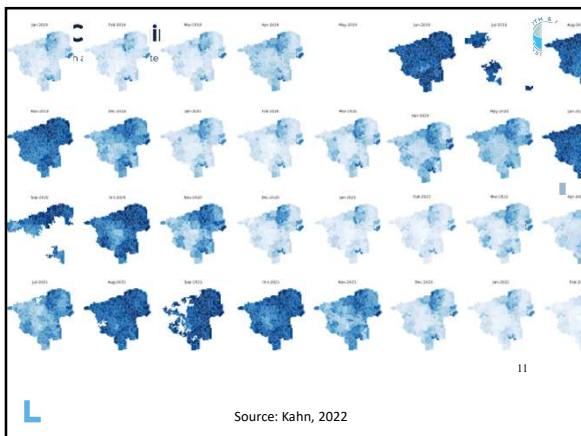
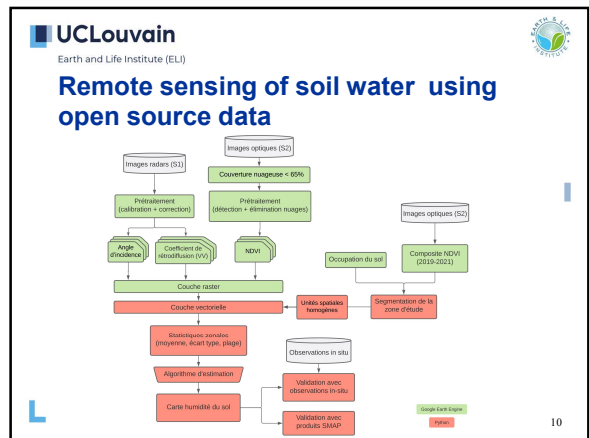
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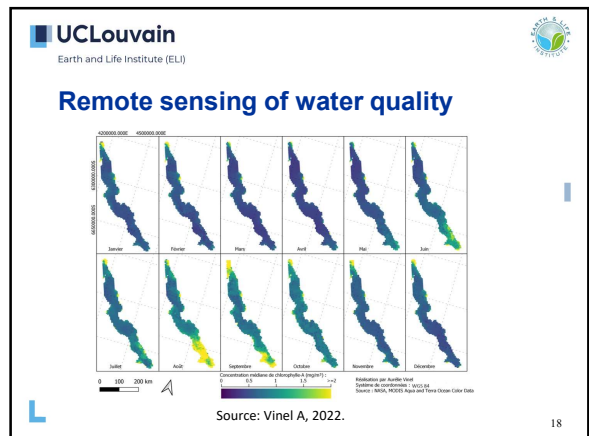
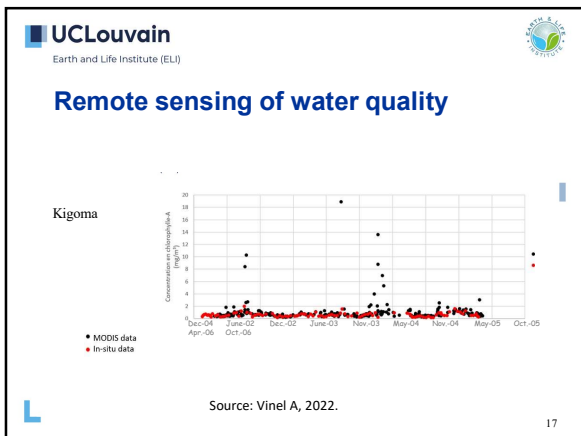
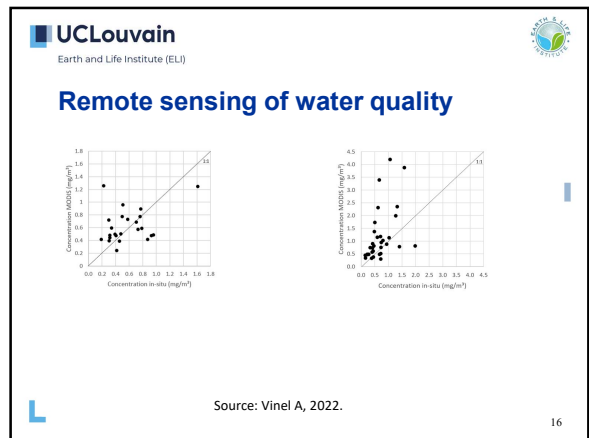
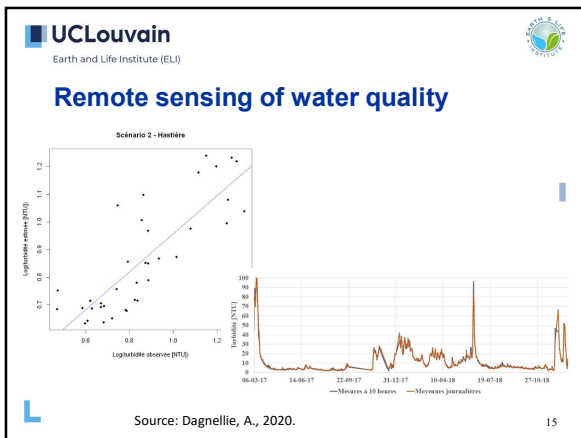
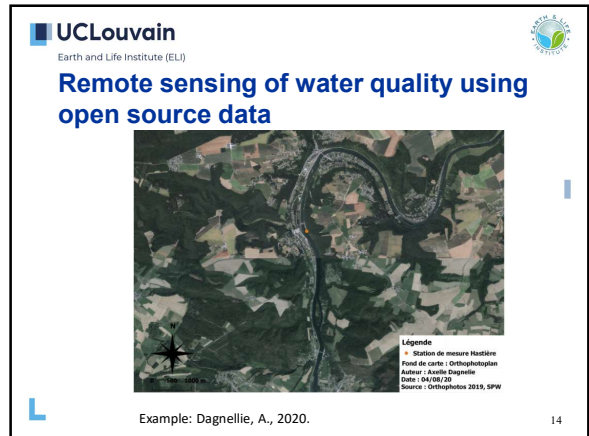
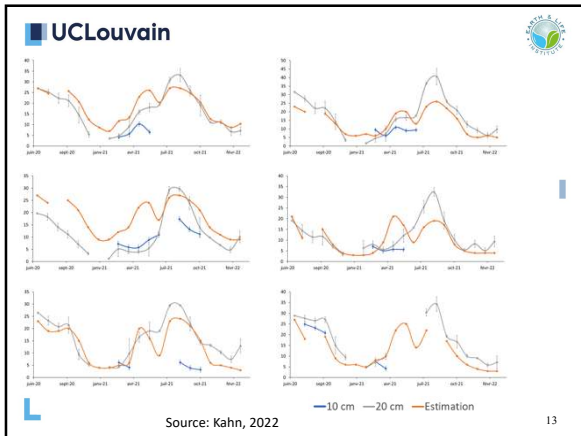


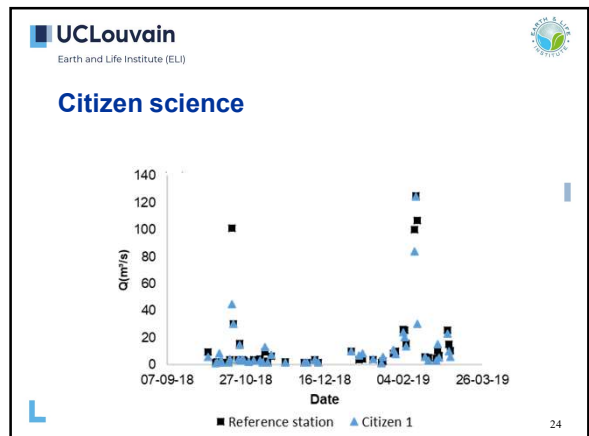
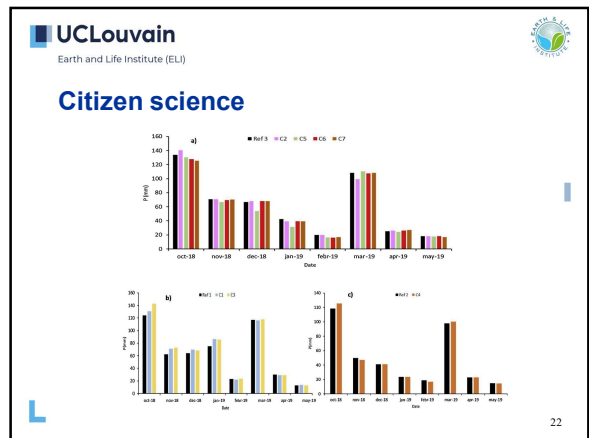
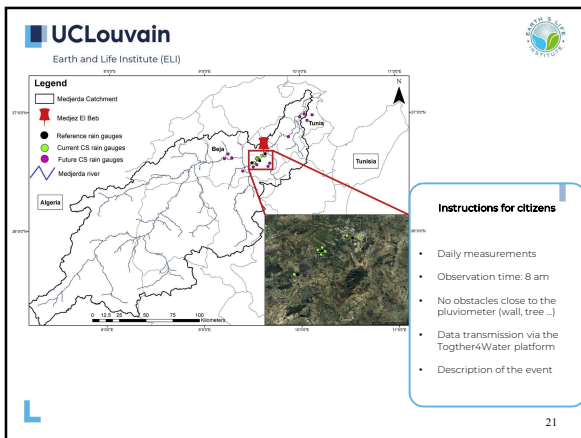
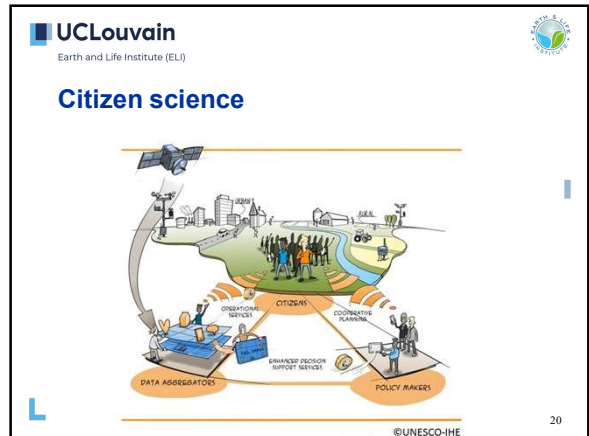
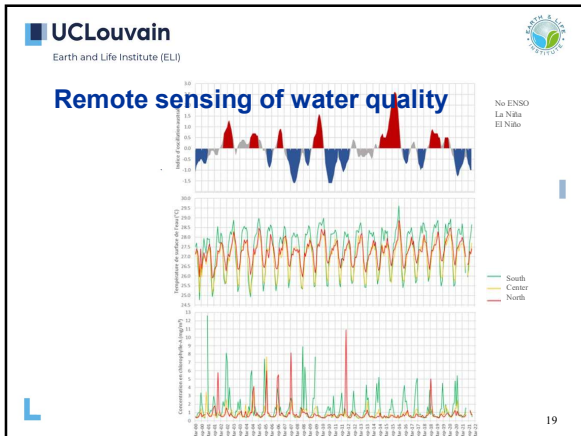
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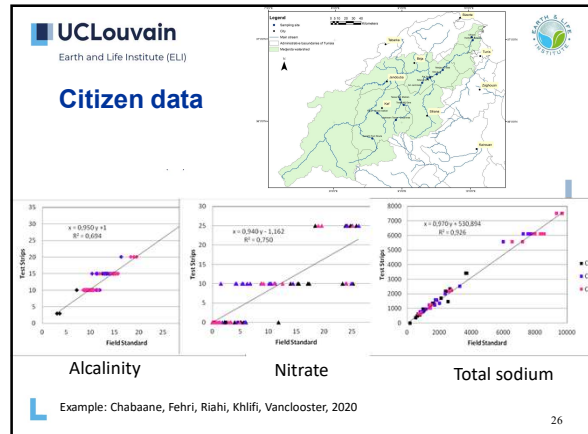
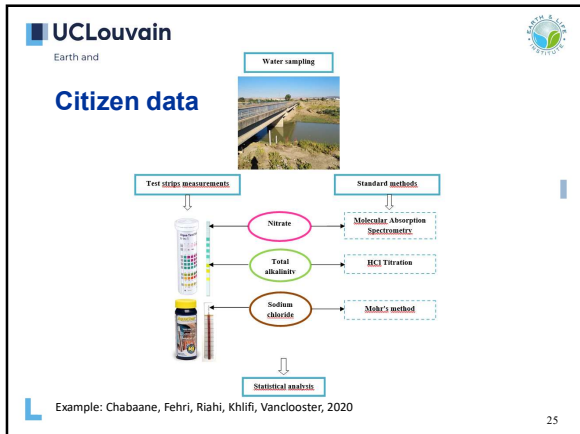
### Remote sensing of soil water using open source data

- Area : 150 hectares
- Culture : rainfed rice cultivation
- Equipped with **different sensors** :
  - Piezometers
  - Rain gauges
  - Frequency Domain Reflectometry (FDR)

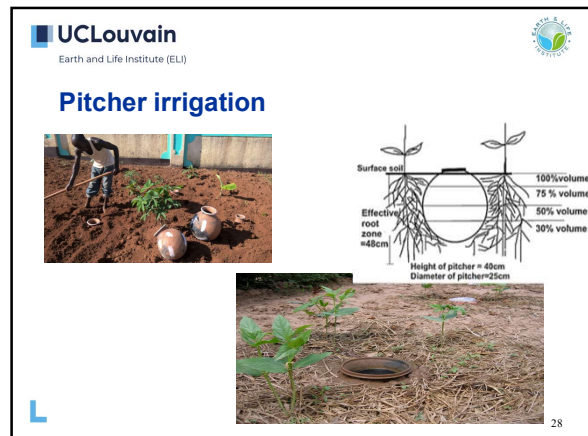








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- ### Facing the irrigation challenge
- 80 % of freshwater consumption is in agriculture
  - 40 % of global food production is in irrigated perimeters
  - 60 % of cereal production is in irrigated perimeter
  - Water use efficiency is very variable
    - Surface irrigation: 30 %
    - Sprinkler : 50 %
    - Drip irrigation: 70 % (in theory!!!)
  - Need for more crop per drop
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### Pitcher irrigation

Method	Water (kg/m)
Closed furrow (basin)	0.7
Sprinkler	0.9
Drip	1–2.5
Porous capsule (pressure)	1.9+
Porous capsule (no pressure)	2.5+
Buried clay pot	2.5–7

Source: Bainbridge, 2001

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- ### Facing the sanitation problem
- 2.5 billion people lack improved sanitation
  - 718 million lack approved drinking water
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## Nature based solutions: Artificial wetlands



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## Nature based solutions: Artificial wetlands

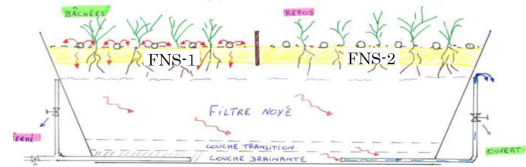


Figure 1 : Schéma de principe du procédé FILTRAN

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## Nature based solutions: Artificial wetlands

Phase Io -11(+1)°C	Filtran 1		Filtran 2	
C <sub>o</sub> (m/jour) - actif	0,07		0,08	
Nombre de Lits	2		2	
Non saturé	90 cm 2/4		60 cm 2/6	
HRT saturé (jours)	~12		~12	
Saison	27 mars - 25 avril		27 mars - 25 avril	
C <sub>0,5</sub> (g DCO/m <sup>3</sup> ·jour)	78		81	
Concentration (mg/L)	IN	OUT	IN	OUT
DCO	1039 (77)	264 (71)	1047 (85)	220 (37)
MES	417 (72)	42 (21)	410 (41)	20 (4)
TN	103 (2)	59 (4)	106 (5)	51 (7)
N-NH <sub>4</sub>	75 (3)	46 (7)	78 (3)	45 (10)
N-NO <sub>3</sub>	0 (0)	0,2 (0,2)	0 (0)	0,1 (0,1)
Rendement (%)				
DCO	75	(6)	79	(5)
MES	90	(6)	95	(1)
TKN	44	(4)	52	(8)
TN	43	(4)	52	(8)

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## Keypoints

- Is water a key in the sustainable development agenda
  - Yes it is!
- Can we face the water data challenge?
  - Yes we can with IoT, open science remote sensing data platforms and citizen science
- Can we face the irrigation challenge?
  - Yes we can with local low cost traditional irrigation techniques
- Can we face the sanitation challenge?
  - Yes we can with low cost nature based solutions.

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