The Rivers Trust Spring Conference & PROWATER Launch Event

Hosted by South East Rivers Trust

#2seasPROWATER #RTSpringConf

Tuesday, 5 March 2019

Canterbury Cathedral Lodge Hotel, Canterbury, Kent

the umbrella body of the rivers trust movement

where there's water, there's life

The Rivers Trust Spring Conference & PROWATER Launch Event

Welcome and Introduction
#2seasPROWATER #RTSpringConf

The Rivers Trust

the umbrella body of the rivers trust movement

where there's water, there's life

Patsy Wood Trust

south east rivers trust

Interreg 2 Seas Mers Zeeën PROWATER

Bella Davies

Trust Director – South East Rivers Trust

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POLL:

How much do you know about different approaches to protect and restore water resources in terms of climate change?

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Session 1
Creating Resilient Catchments – Measures to Protect and Restore Our Water Resources

the umbrella body of the rivers trust movement

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Barry Bendall

Director Water and Land – The Rivers Trust

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If you have a question for our speakers, please post online
slido.com | #R913 | WiFi: event1

Water Resources and the Catchment Based Approach

RT Spring conference, Canterbury, 5th March 2018

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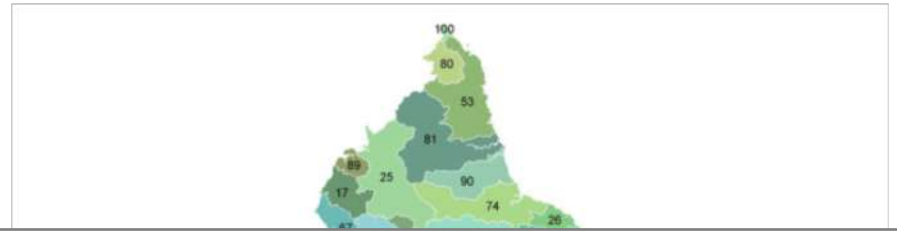
Catchment Based Approach

Interreg North Sea Region WaterCoG

European Regional Development Fund

EUROPEAN UNION



1 Introduction

Why are we proposing a Catchment Based Approach?

The water environment is affected by every activity that takes place on land as well as through our actions in abstracting, using and returning water to rivers, the sea and the ground. Catchments are the natural scale to consider this aspect of the environment. We firmly believe that better coordinated action is desirable at the catchment level by all those who use water or influence land management and that this requires greater engagement and delivery by stakeholders at the catchment as well as local level, supported by the Environment Agency and other organisations.

historical approach to water management

The Rivers Trust

SURFACE WATER

- 2% addressed by 2021
- 5% addressed by 2027
- 1% assigned alternative target due to costs/benefits

Flows confirmed as not supporting ecology

Flows may not be supporting ecology

- Need more information to confirm what (if any) action required

Flows supporting ecology

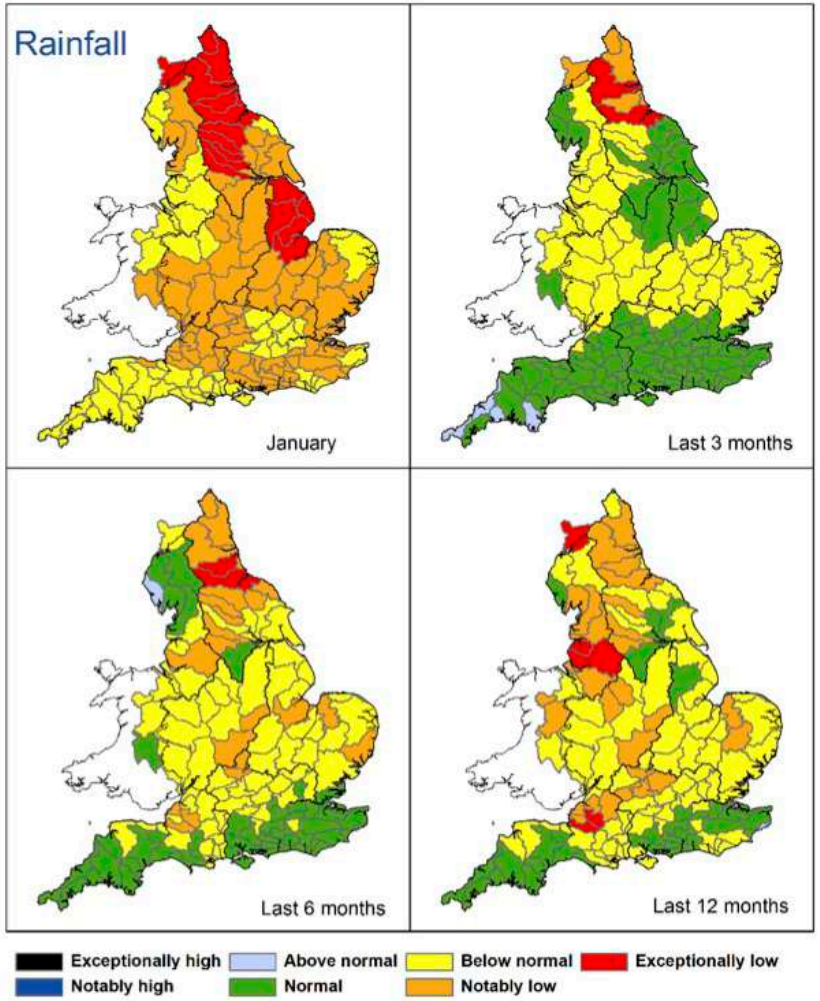
GROUNDWATER

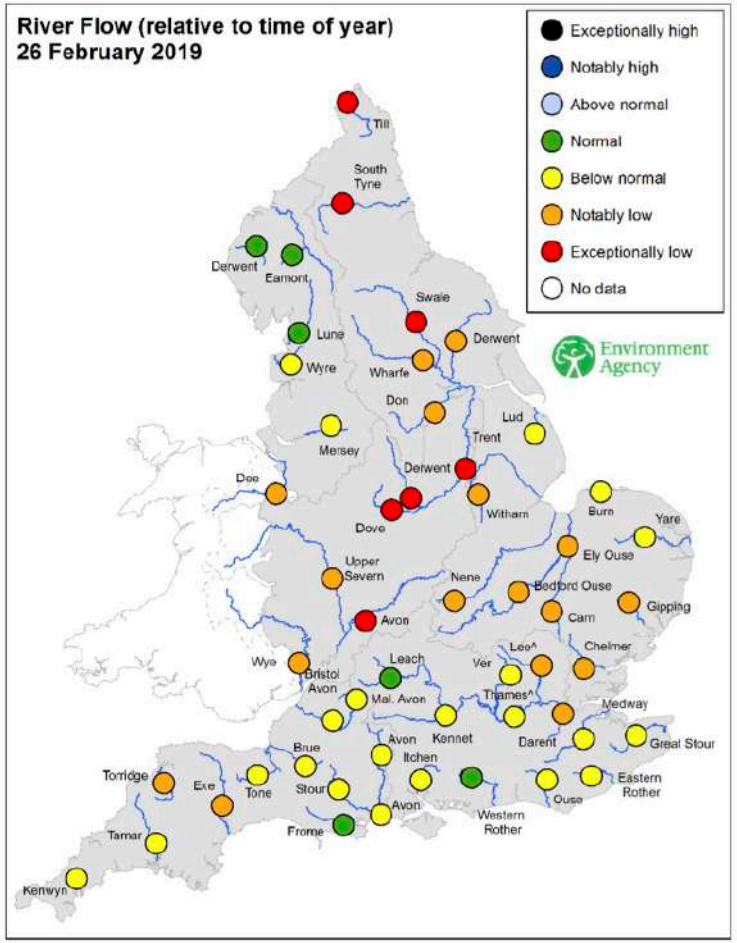
Too much groundwater is being taken

- 5% addressed by 2021
- 8% addressed by 2027
- 15% assigned alternative target due to costs/benefits

Groundwater is taken at a sustainable rate

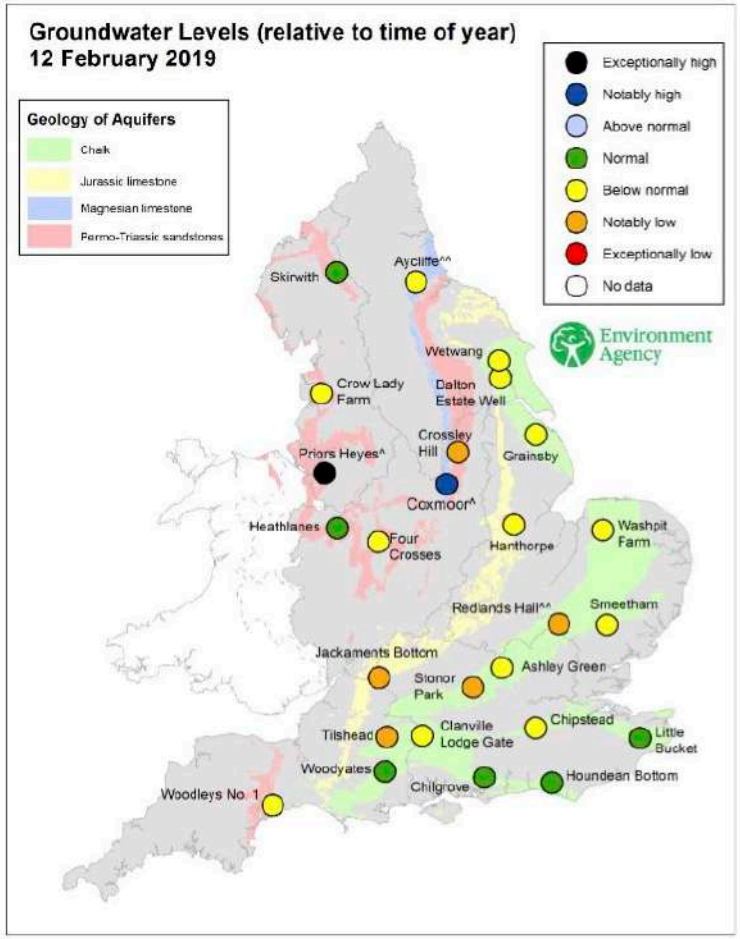
Rainfall and river flows

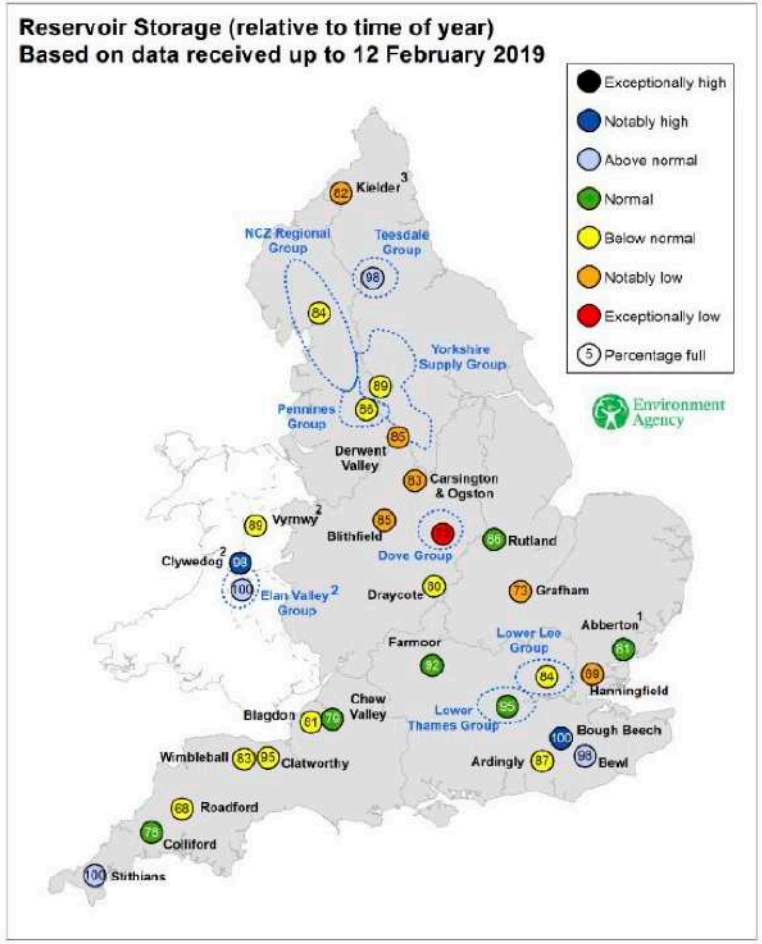




Source: Environment Agency 2019

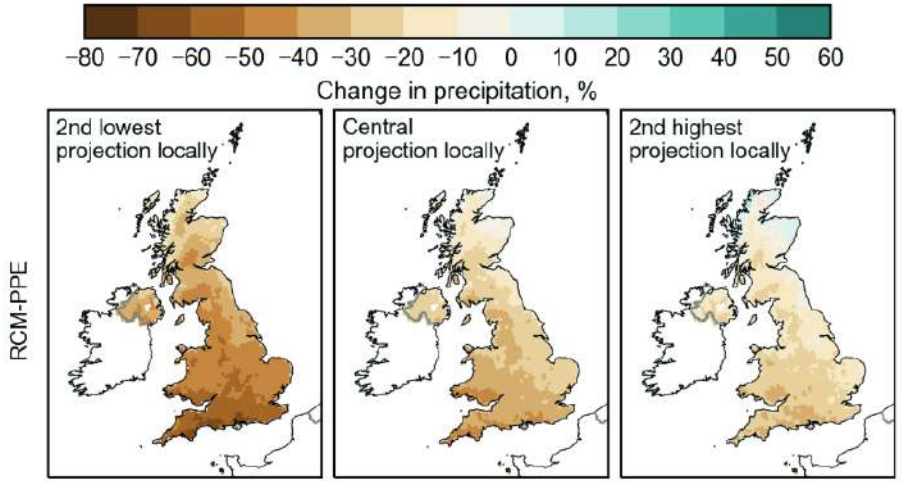
Groundwater and reservoirs



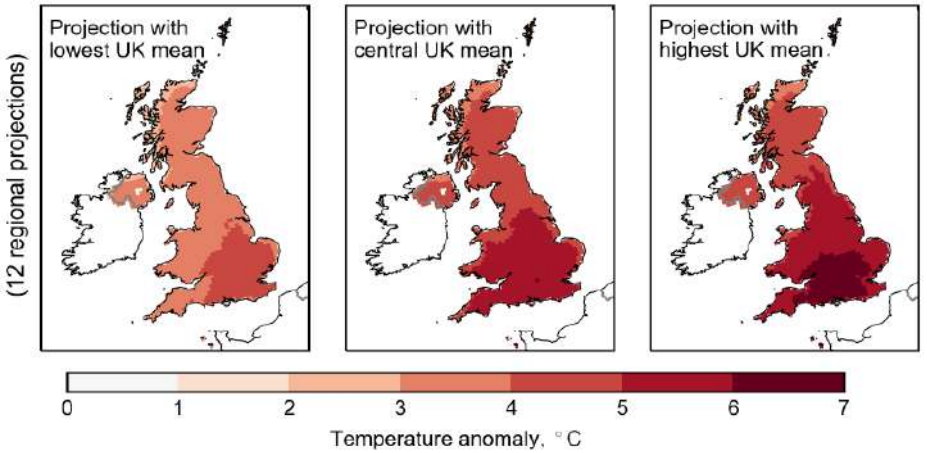


Source: Environment Agency 2019

Climate Projections



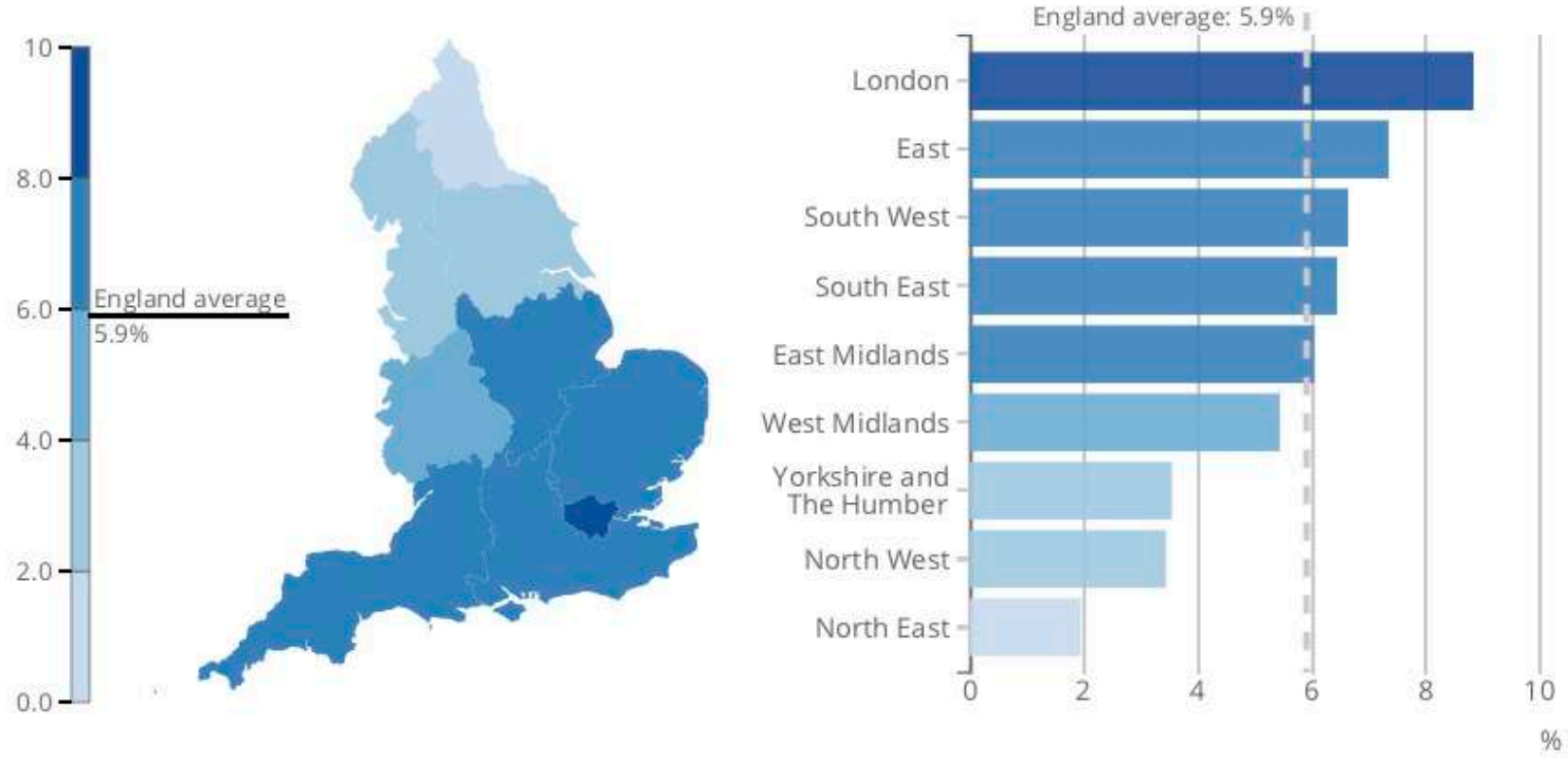
Drier summers



Warmer

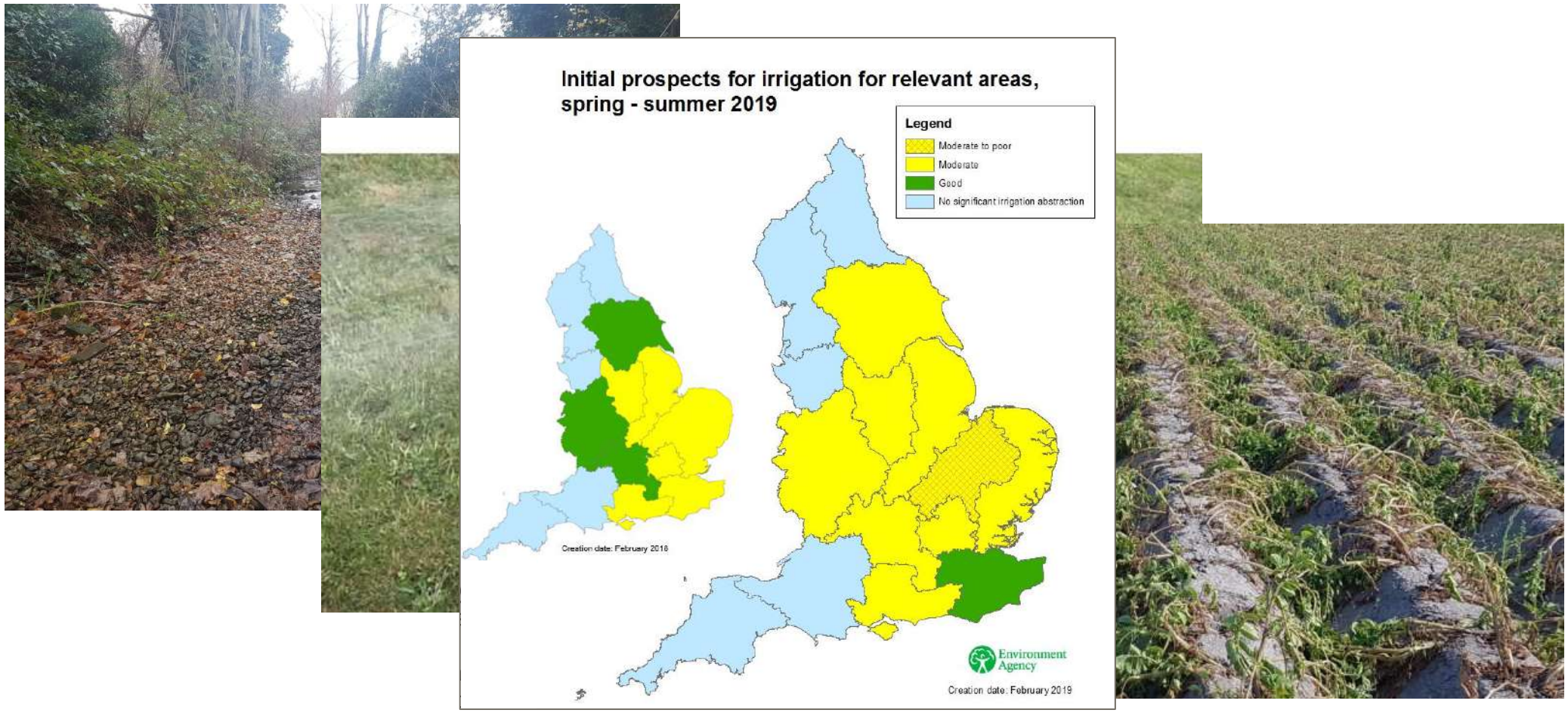
Source: UK Climate Change Projections 2018

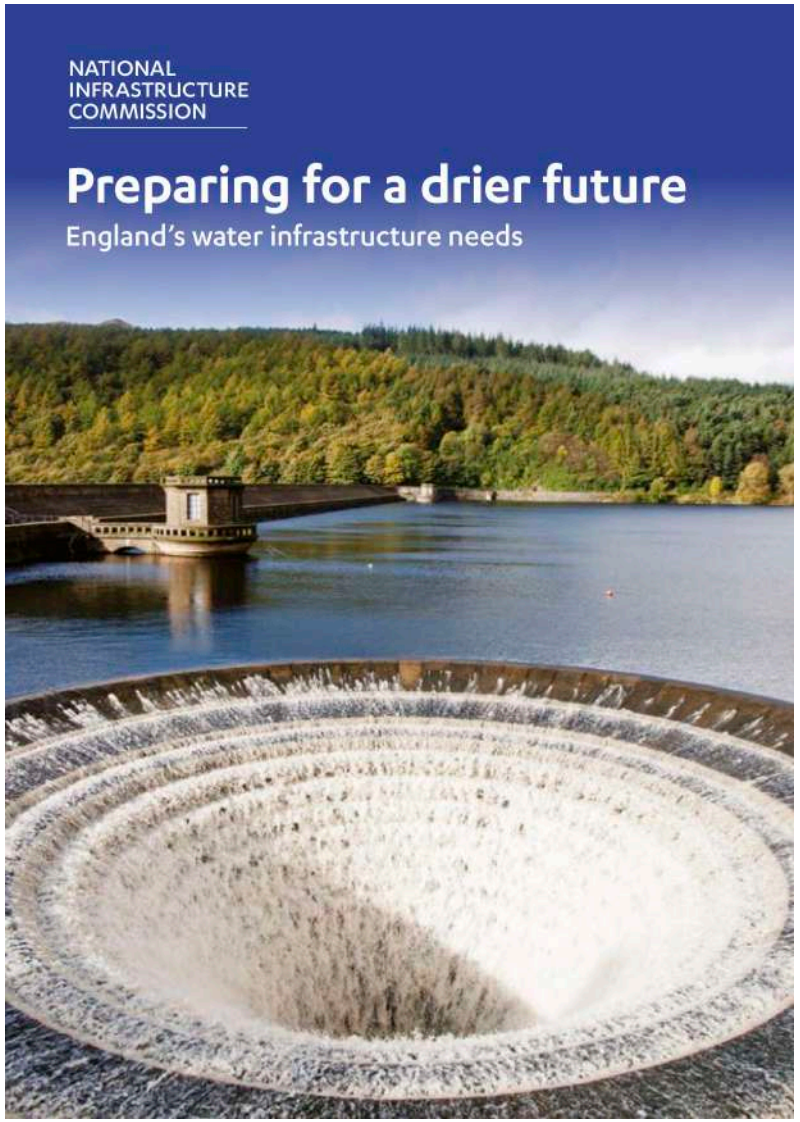
Population Growth (2016-2026)

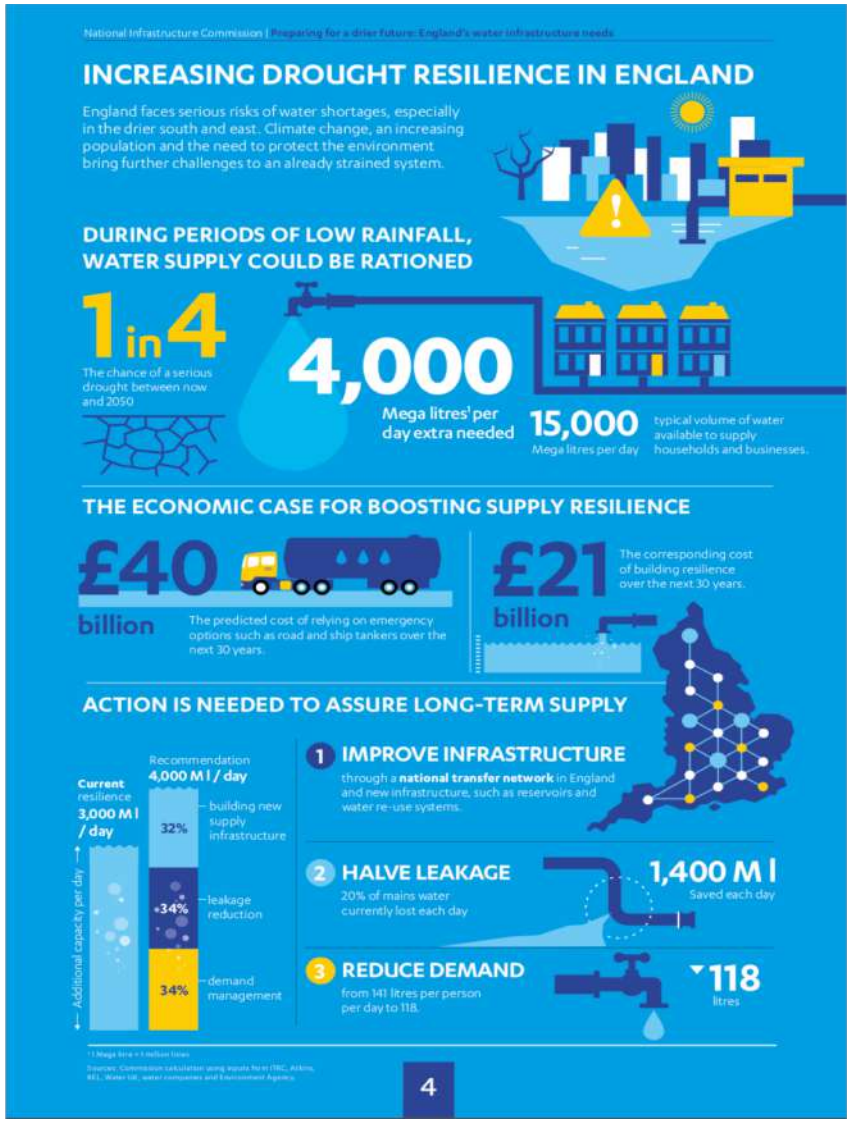


Source: Office for National Statistics

Implications of system failure

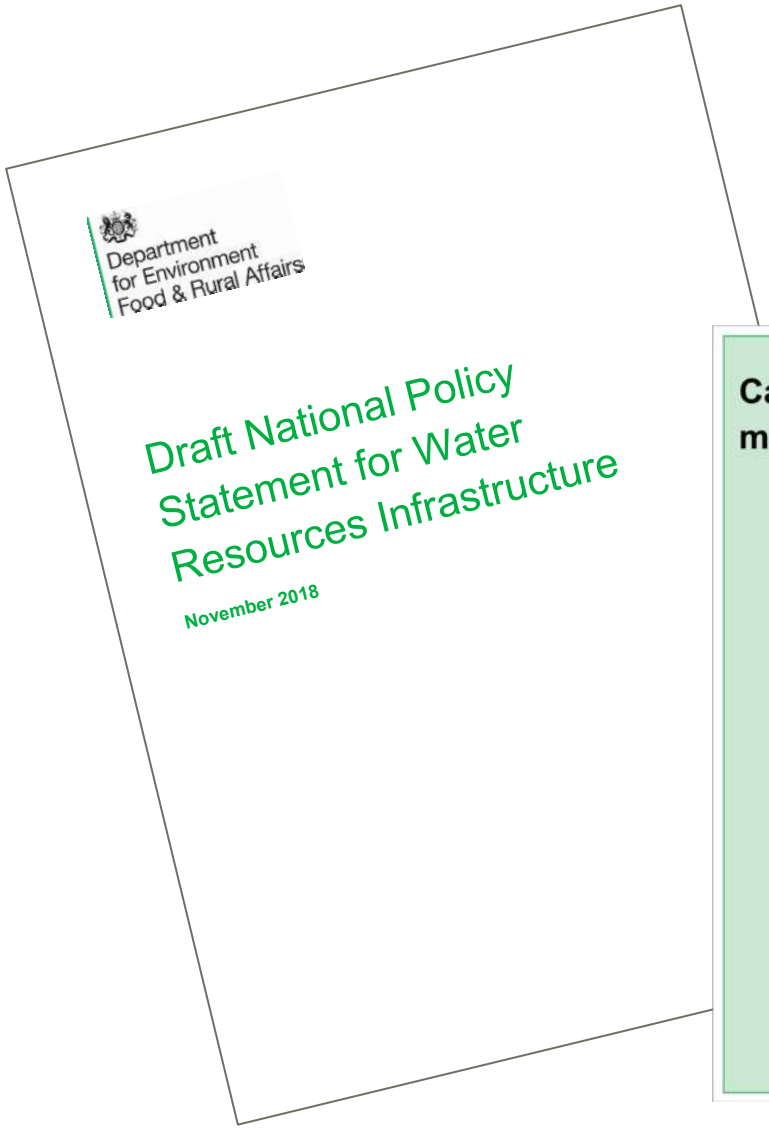






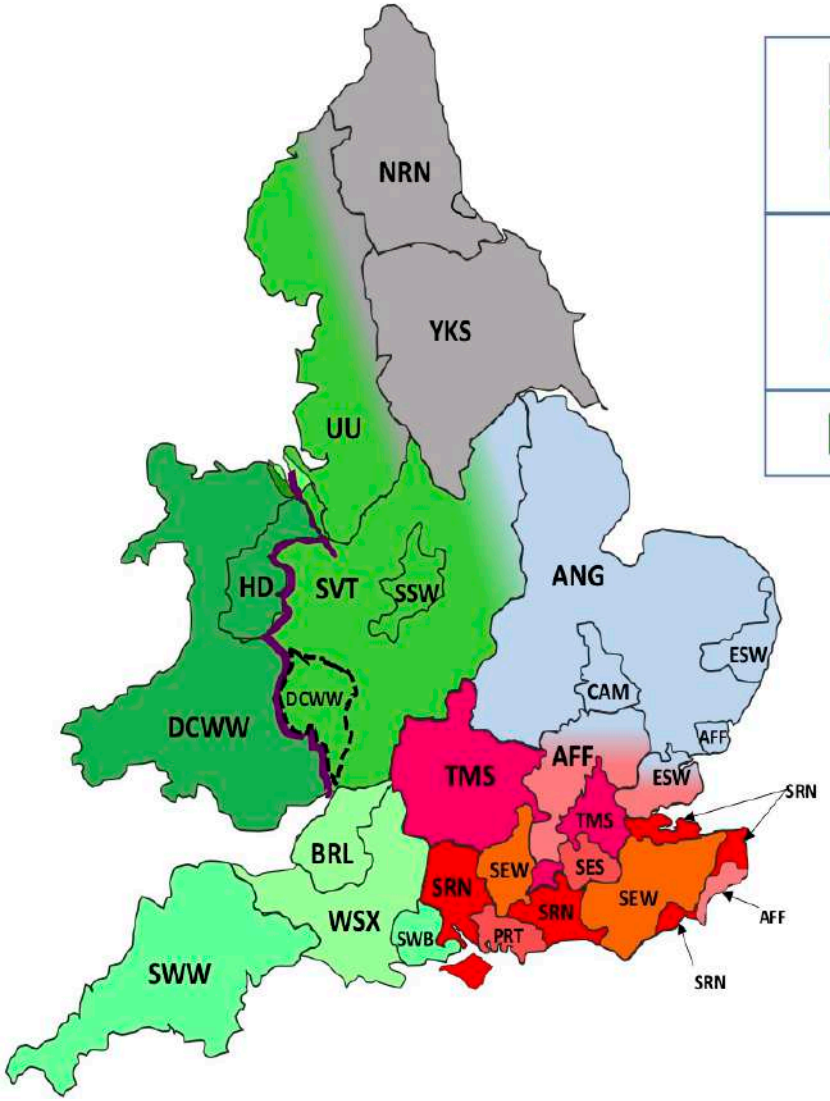
The Rivers Trust

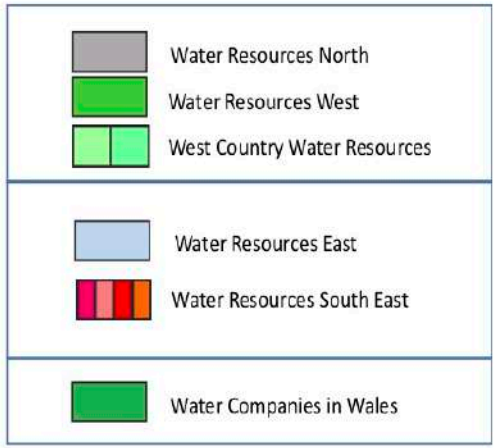
1,300 Ml/d of new transfer and supply capacity needed by the 2030s



Catchment management	The 25 Year Environment Plan acknowledges the important role of catchment management and investing in natural capital. It sets out how the government will support farmers and land managers in delivering outcomes and achieving benefits at a catchment level. This will help build resilience to climate change and drought and provide opportunities for species and ecosystem recovery. The Water Abstraction Plan[48] set out the need to develop a stronger catchment focus and bring together the Environment Agency, abstractors and catchment groups to develop local solutions to existing pressures and to prepare for the future. Our Strategic Policy Statement set the objective for Ofwat to challenge companies to further the resilience of ecosystems that underpin water and wastewater systems, by encouraging the sustainable use of natural capital in their plans.

National & Regional Water Resources Planning





Department for Environment Food & Rural Affairs

Date: 09 August 2018

Dear

Building resilient water supplies – a joint letter

We - Defra, the Environment Agency, the Drinking Water Inspectorate and Ofwat - are writing to you to set out what we are doing, and what you need to do, to put us on track to build resilience in water resources management in England.

Customers' water needs must be met in a safe, resilient and efficient way, while protecting the environment and respecting good supply practice and the needs of other water users. This is becoming ever more challenging as water resources face increasing pressures from climate change, population growth, societal expectations and increasing environmental aspirations.

To meet this challenge we need ambitious and co-ordinated leadership across industry, government and regulatory bodies. While we think water companies need to own this challenge, we will work jointly to support and facilitate your efforts. We think there is a need for:

1. **Increased ambition in the forthcoming company business plans for the 2020 to 2025 period.**
2. **Regional water resource planning that transcends company boundaries and identifies optimum solutions for the region, and the nation as a whole.**
3. **Greater use of markets and competition to ensure solutions are delivered efficiently.**
4. **Clear, joined up direction from government and regulators.**
5. **A responsive regulatory approach to deal with issues as they arise.**

Increased ambition in forthcoming business plans: Following discussions on draft water resource management plans, water companies should begin work now on projects

Develop regional strategies to

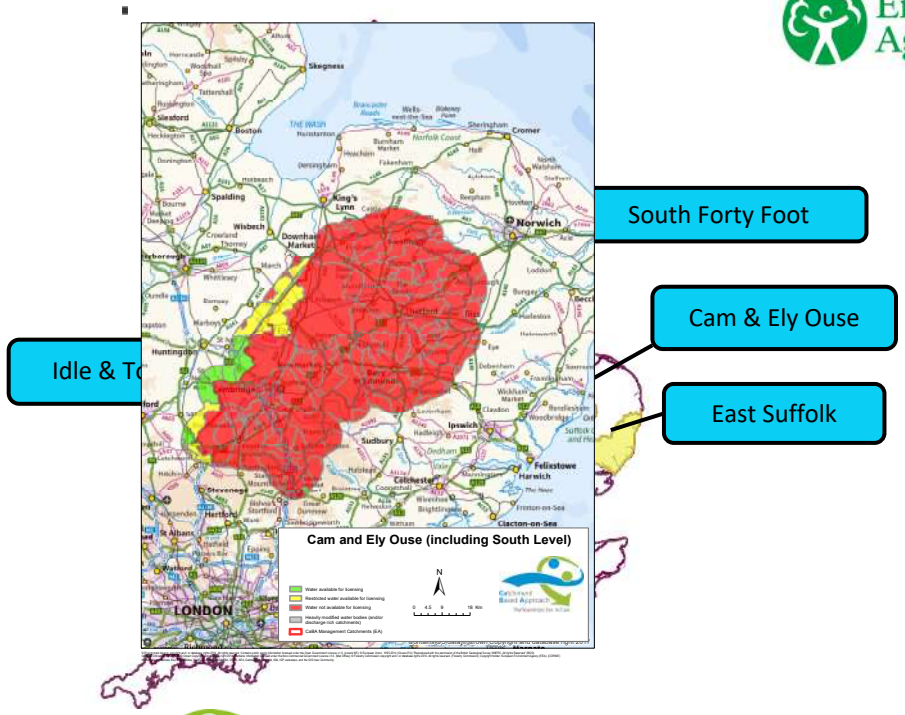
- Work across companies & across sectors
- Building resilience to drought
- Provide cost-effective regional and inter-regional solutions
- Taking account of wider needs
- Actively embed environmental improvement
- Develop and strengthen links to catchment planning

Abstraction Plan 2017

- Move to Environmental Permitting Regs (EPR)
- Ending significant exemptions
- Revoke unused licenses
- Modernise the system – online
- Catchment Focus
  - Additional water availability
  - Resilience and sustainability

CaBA Abstraction & Water Resources Support Group

- Support delivery in initial Priority Catchments
- Facilitate wider CaBA engagement (data & evidence is key)
- Identify and overcome barriers
- Sharing best practice
- Provide link to regional and national planning frameworks



Catchment Based Approach

The Rivers Trust

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Bronwyn Buntine

Sustainable Drainage Team Leader
Flood & Water Management, Kent County Council

the umbrella body of the rivers trust movement

where there's water, there's life

SuDS for Groundwater Recharge

Southeast Rivers Trust Spring Conference
5 March 2019

Bronwyn Buntine

Sustainable Drainage Team Leader

Kent County Council
kent.gov.uk

Topics

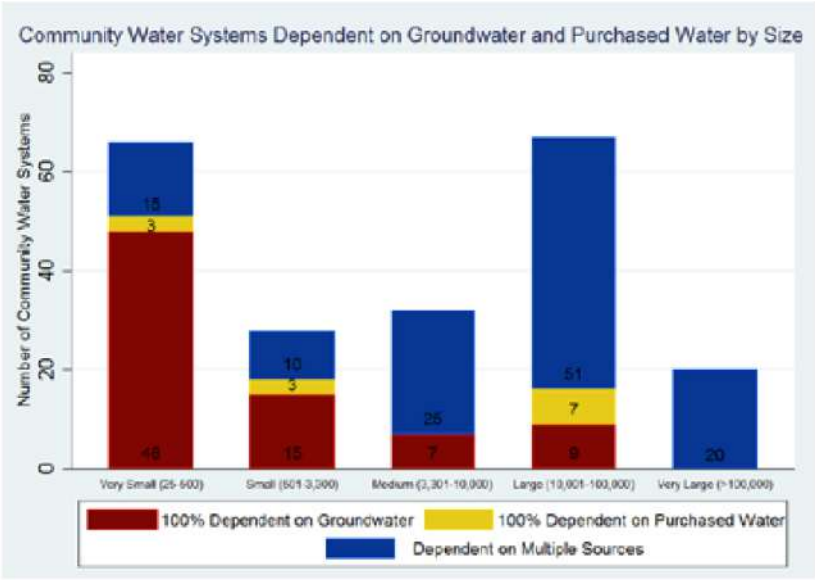
- Los Angeles Case Study
  - Stormwater Capture Master Plan
- Application to Kent
  - Strategically
  - On-small scale

Orientation to Los Angeles

- Population
  - 10.16 million within Los Angeles County
  - 4 million within City of Los Angeles
- County area includes 88 incorporated cities & many unincorporated areas

Water Supply in Los Angeles

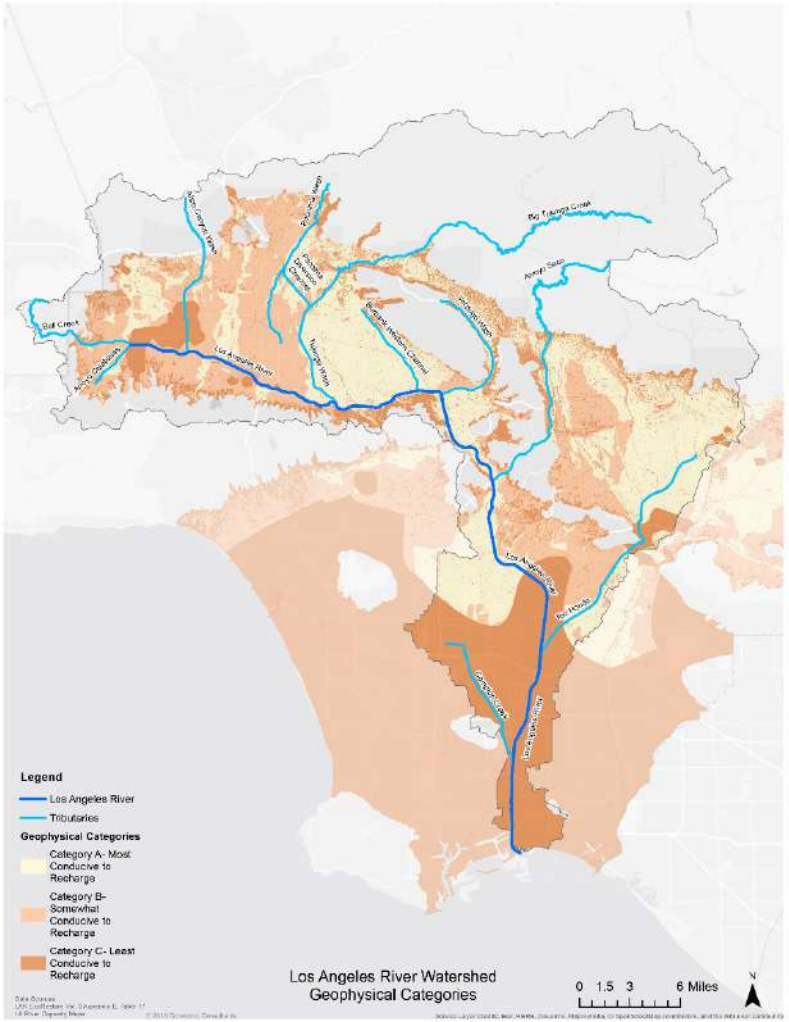
- Three sources of public water
  - imported water from State Water Project and Colorado River Aqueduct; and groundwater.
- Water is supplied by 288 community water systems
  - 70 are 100% dependent upon groundwater for drinking water
- Reliability very difficult to predict and can vary greatly year to year



- Groundwater supplies have been over-extracted
  - water levels declined, groundwater was lost from storage, and seawater intruded into the coastal aquifers.

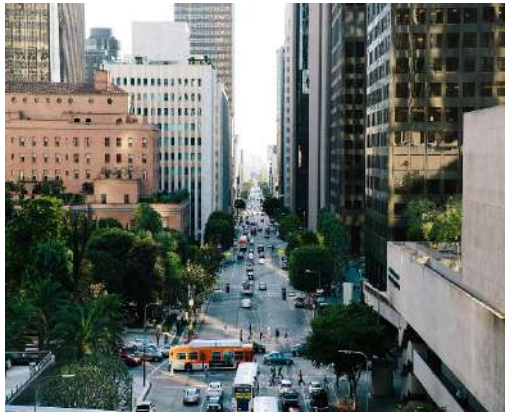
Regional Strategy

- Los Angeles Department of Water and Power's Stormwater Capture Master Plan
  - Decrease imported water by 50% by 2024
  - all areas within the Los Angeles River watershed were categorized by how well stormwater could infiltrate into underlying potable groundwater aquifers
  - Distributed & Centralised



Improving groundwater supply

- Groundwater supplies are augmented by:
  - Distributed recharge where private and public development projects construct “best management practices”
  - Centralized recharge usually through surface spreading or injection directly into the potable aquifers.



LA LID & green streets

Ballona Wetlands

Mill Creek Wetlands

Tujunga Spreading Grounds

Application to Kent strategically

- Change of thinking
- Constraint mapping
- Variety of solutions
  - Project based
  - Also programs, policies, incentives, and ordinances
- Recognition of multi-benefits
  - Groundwater recharge, increased water conservation, potential open space alternatives, improved downstream water quality, and peak flow attenuation
- Community Partnerships & diverse stakeholders

" … in large part due to urbanization, the majority of precipitation that falls onto the City flows into storm drains and out to the ocean. In light of these conditions, stormwater is an increasingly viable supply …"

Application to Kent on the small scale

"… LADWP is also contributing to the implementation of distributed capture projects. LADWP understands that the opportunities for centralized capture projects are limited due to their space requirements, and acknowledges the important benefits provided by distributed capture projects … "

"…modeling performed for the SCMP showed that 63,000 acre-feet per year of distributed infiltration is currently occurring incidentally via pervious surfaces throughout the City. However, only 35,000 acre-feet per year of this infiltrated water is being recharged into water supply aquifers…"

Green Street Programs	Commercial Streets	ROW Bulb-outs, Permeable Pavement with Tributary Area, Simple On-site Rain Garden, Dry Wells	Green streets program in commercial corridors
	Residential Streets		Parkway bioretention program
	Rio Vistas		Green streets retrofits along street ends adjacent to major streams and rivers

Green streets represent another substantial opportunity with 48,000 impervious acres potentially contributing to green street program areas

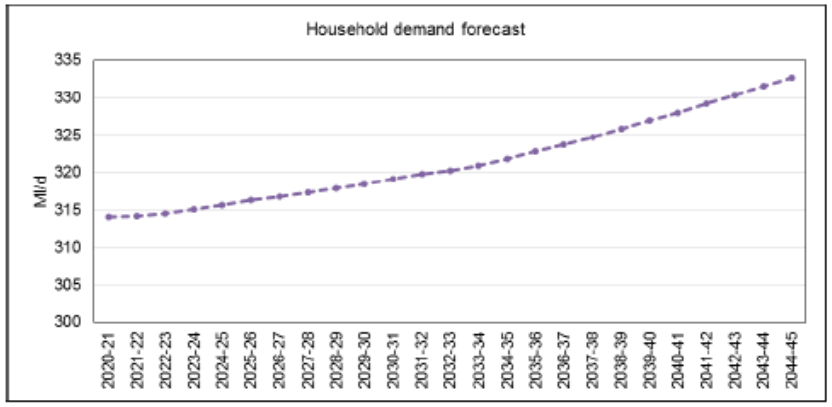
Kent County Council kent.gov.uk

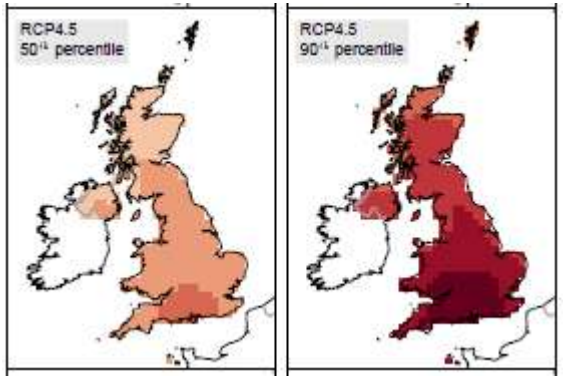
Final Thoughts ….

Kent faces similar pressures

- Growth
  - Increase in developed area of the order of 6,400 ha
  - 20% to 25% expansion of on existing urban areas
- Climate change rise 2º to 4º
- Water demand > exceed supply

Figure 24 Total household demand forecast at the company level





References

- Los Angeles Department of Water and Power, Stormwater Capture Master Plan, 2015
- Los Angeles County Community Water Systems, Water Atlas and Policy Guide, UCLA Luskin Centre for Innovation
- Green Infrastructure for Los Angeles: Addressing Urban Runoff and Water Supply Through Low Impact Development, City of Los Angeles, 2009
- Water Replenishment District of Southern California, Groundwater Basin Master Plan, 2016

Tom Ormesher

Environment and Land Use Adviser

National Farmers Union

the umbrella body of the rivers trust movement

where there's water, there's life

BRITISH FARMERS
ARE PROUD TO
PRODUCE YOUR FOOD

Adapting Agriculture to Climate Change and Water Scarcity

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NFU

Avoidance and Adaptation

Productivity

Environment*

Volatility

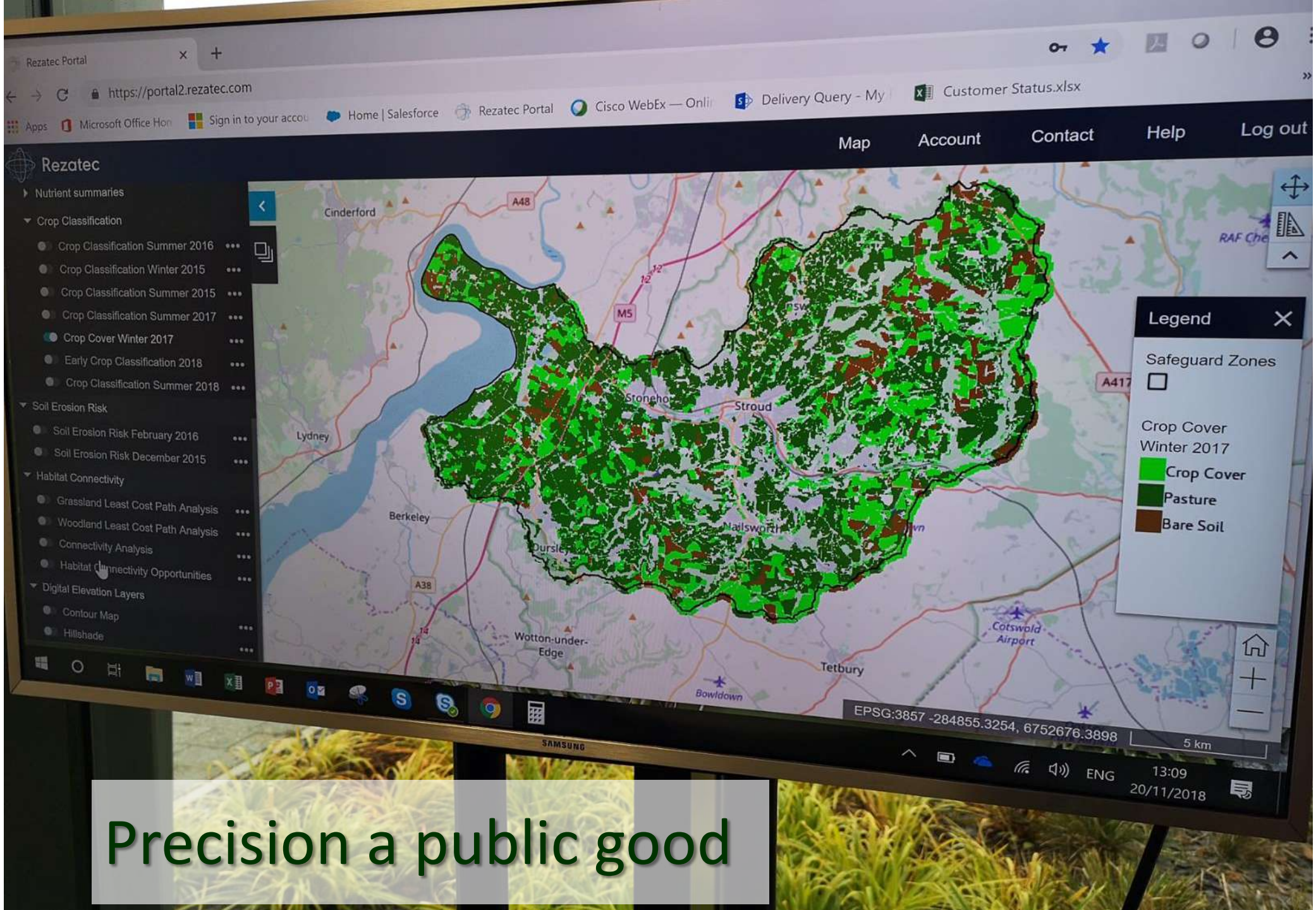
Business Sustainability

GHG Reduction*

Resilience Adaptation

*Net Zero**

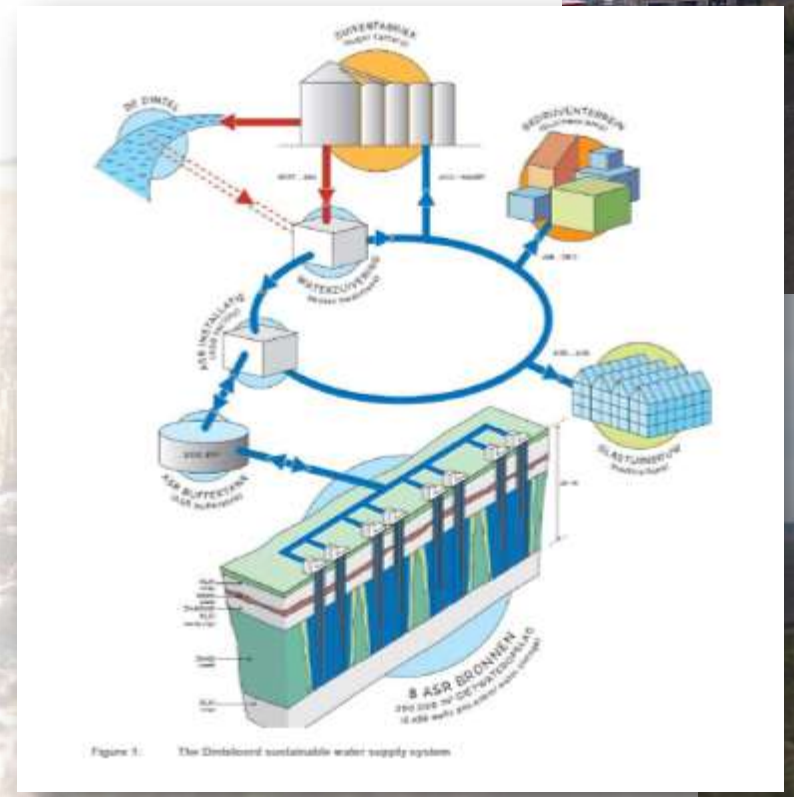
- Nutrient efficiency
- Feed conversion
- Manure emissions
- Carbon stores
- Renewable energy



Precision a public good

Resilience Measures

Aquifer Storage and Recovery



BRITISH FARMERS ARE PROUD TO PRODUCE YOUR FOOD

Take Home Messages

- Precision Farming for Resilience
- Resilience a business driver and public good… *so how do we incentivise more?*
- Transformational change?

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Shaun Dowman

Agricultural Advisor – Affinity Water

the umbrella body of the rivers trust movement

where there's water, there's life

Creating resilient catchments: The role of a water company

Shaun Dowman
Agricultural Advisor

Affinity Water

- Supply 3.6 million people
- 60% from groundwater chalk aquifers
- 40% abstracted direct from the River Thames

Some of the challenges we face

Catchment Management:
Investigating the problem and finding solutions

Find out how the land is used in the catchment

↓

Find out where the problem is coming from

↓

Identify and engage with key stakeholders in the catchment

↓

Catchment intervention schemes

A ‘typical’ Affinity Water catchment

Working with farmers to help us protect and enhance raw water

- **Pesticides** – e.g. metaldehyde, propyzamide and carbetamide lost to water

- **Nitrate leaching** – mainly in groundwater but also some rivers

- **Turbidity** – soil lost to water

…and

- **Water Resources** – Impact of land management on water resources e.g. soil health

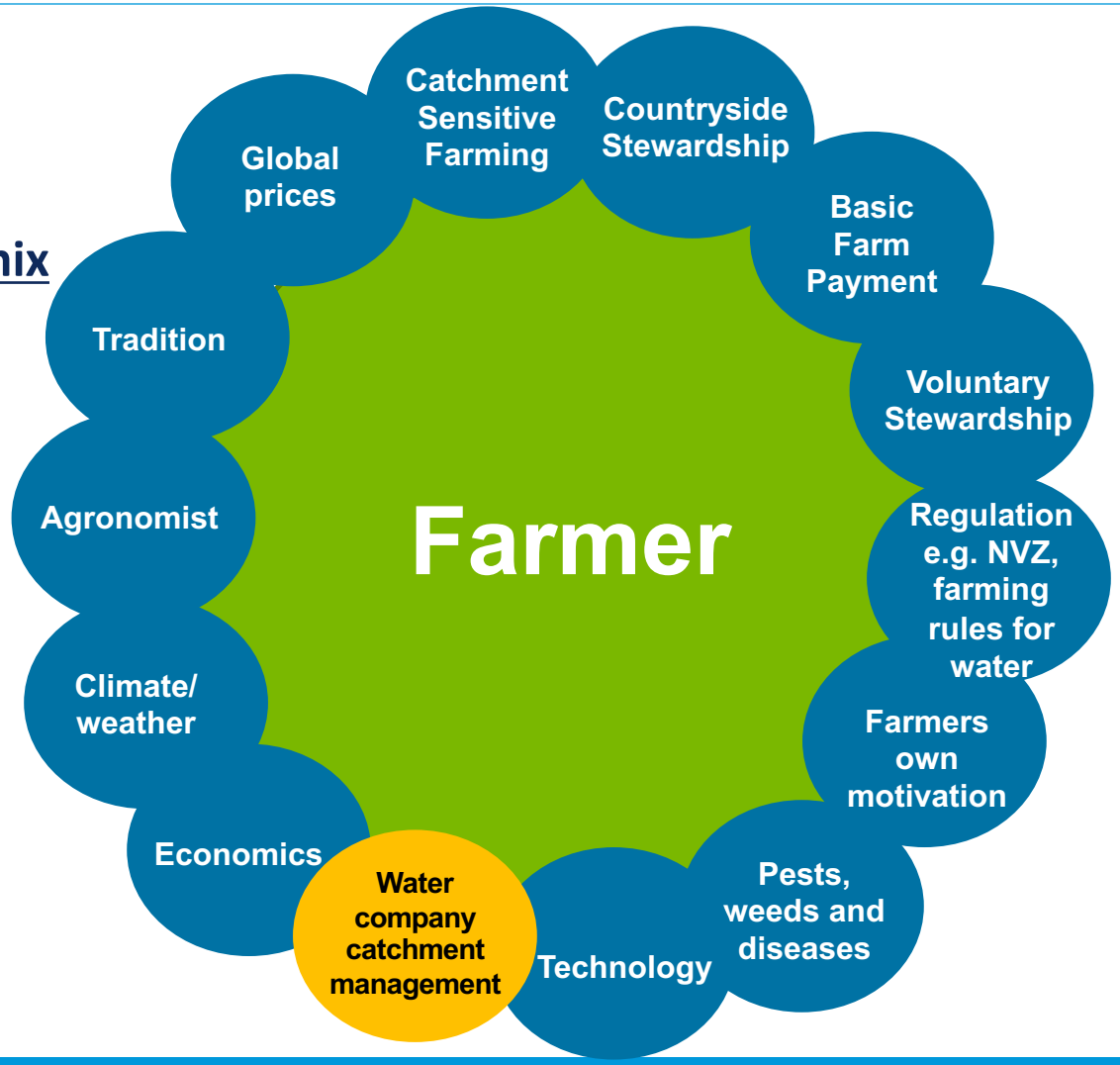
(some of) The factors that influence the decisions a farmer makes that may affect the wider environment

Water company catchment management

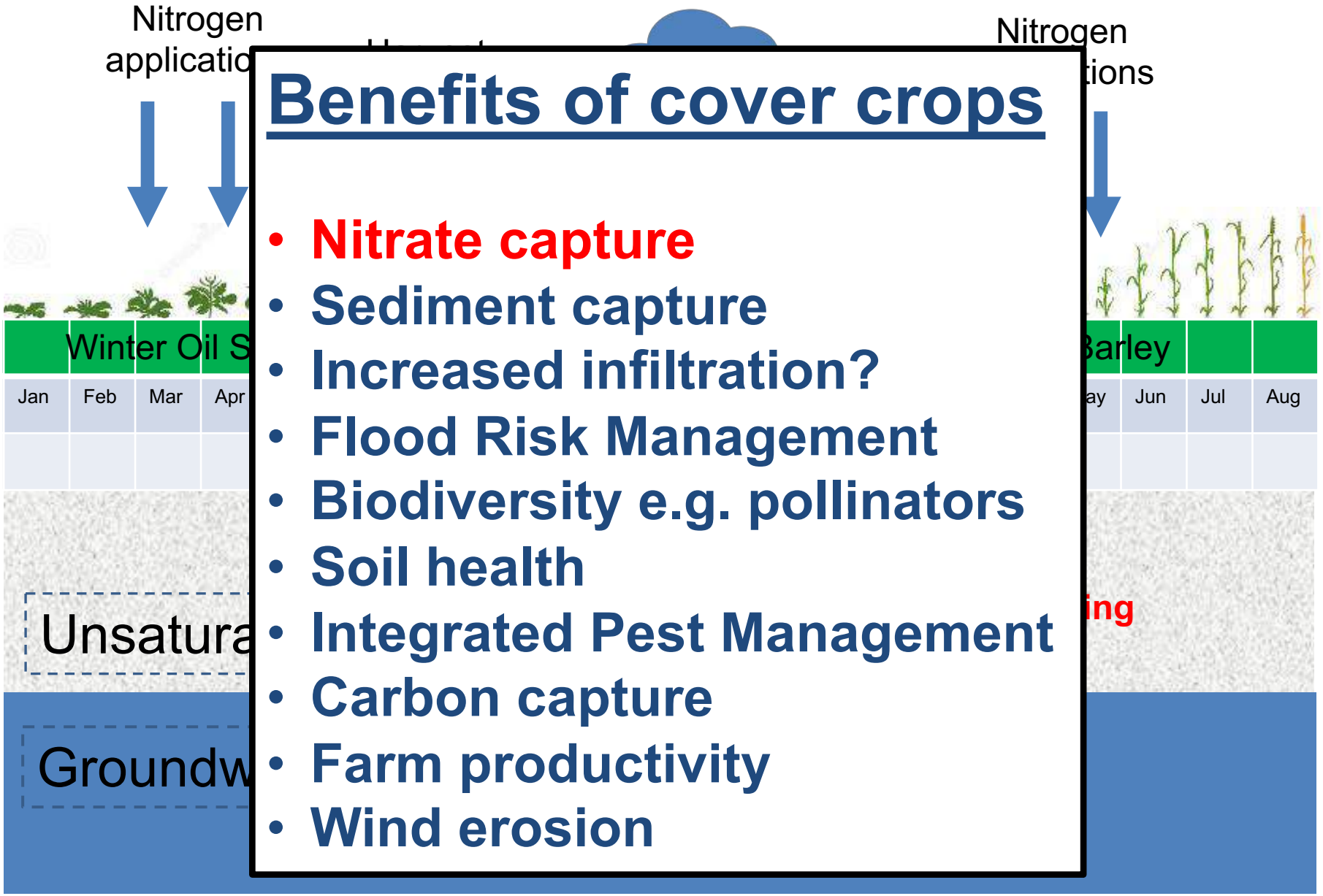
What Affinity Water add to the mix

Aiming for above best practice

- BASIS/FACTS qualified advisors
- Running events/workshops
- Pesticide reduction schemes
- Pesticide amnesty
- Training e.g PA certification
- Payments for cover cropping
- Funding for pesticide handling improvements
- Spreader/sprayer calibrations
- Innovation
- Precision farming



Cover Crops



Benefits of cover crops

- **Nitrate capture**
- **Sediment capture**
- **Increased infiltration?**
- **Flood Risk Management**
- **Biodiversity e.g. pollinators**
- **Soil health**
- **Integrated Pest Management**
- **Carbon capture**
- **Farm productivity**
- **Wind erosion**

AMP7 Plans and beyond: Schemes focussed around soil health for holistic catchment management

Groundswell
The No-Till Show and Conference

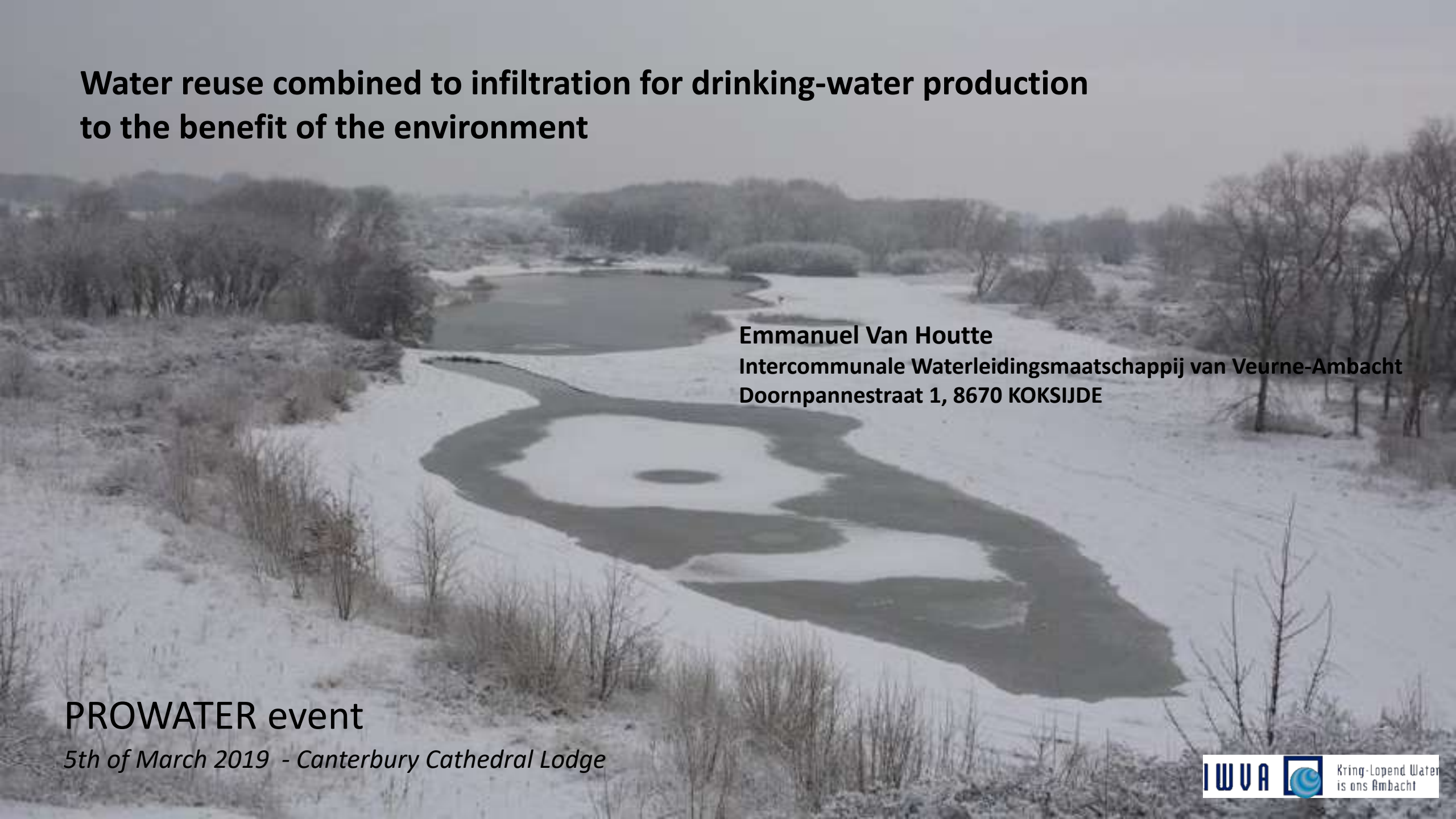

Thanks
for
Listening

Emmanuel Van Houtte

Geologist

Intermunicipal Water Company of the Veurne Region

Water reuse combined to infiltration for drinking-water production to the benefit of the environment



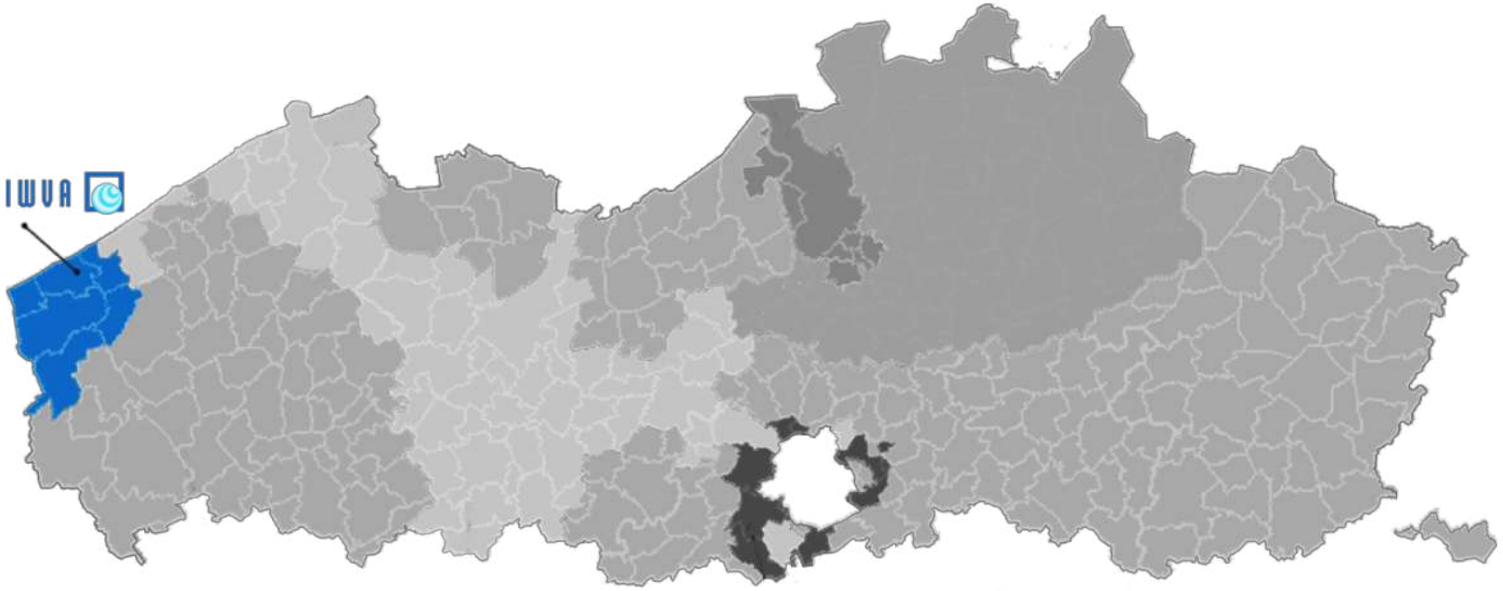
Emmanuel Van Houtte
Intercommunale Waterleidingsmaatschappij van Veurne-Ambacht
Doornpannestraat 1, 8670 KOKSIJDE

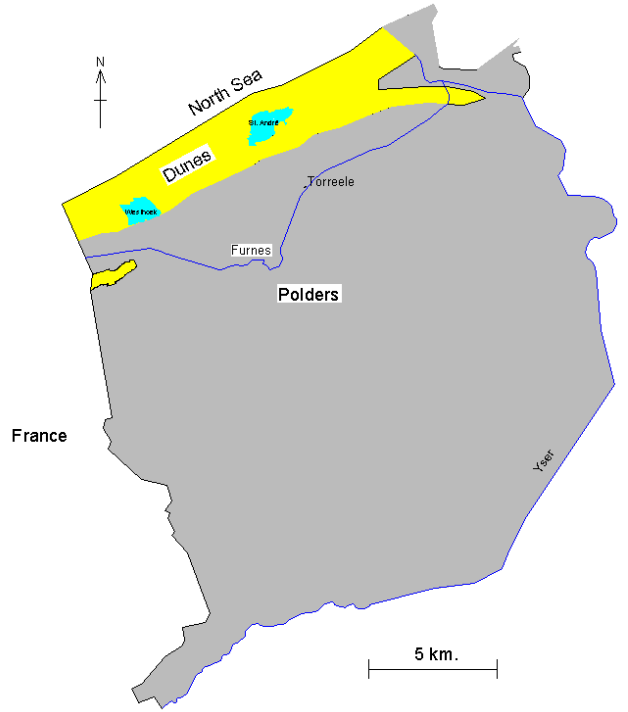
PROWATER event

5th of March 2019 - Canterbury Cathedral Lodge

IWVA Kring-Lopend Water is ons Ambacht

- IWVA produces and distributes drinking-water in 6 communities in the western part of the Flemish coast
- IWVA collects wastewater in 4 of these communities
- Drinking-water production based in the dune belt
- Varying demand according to touristical activity

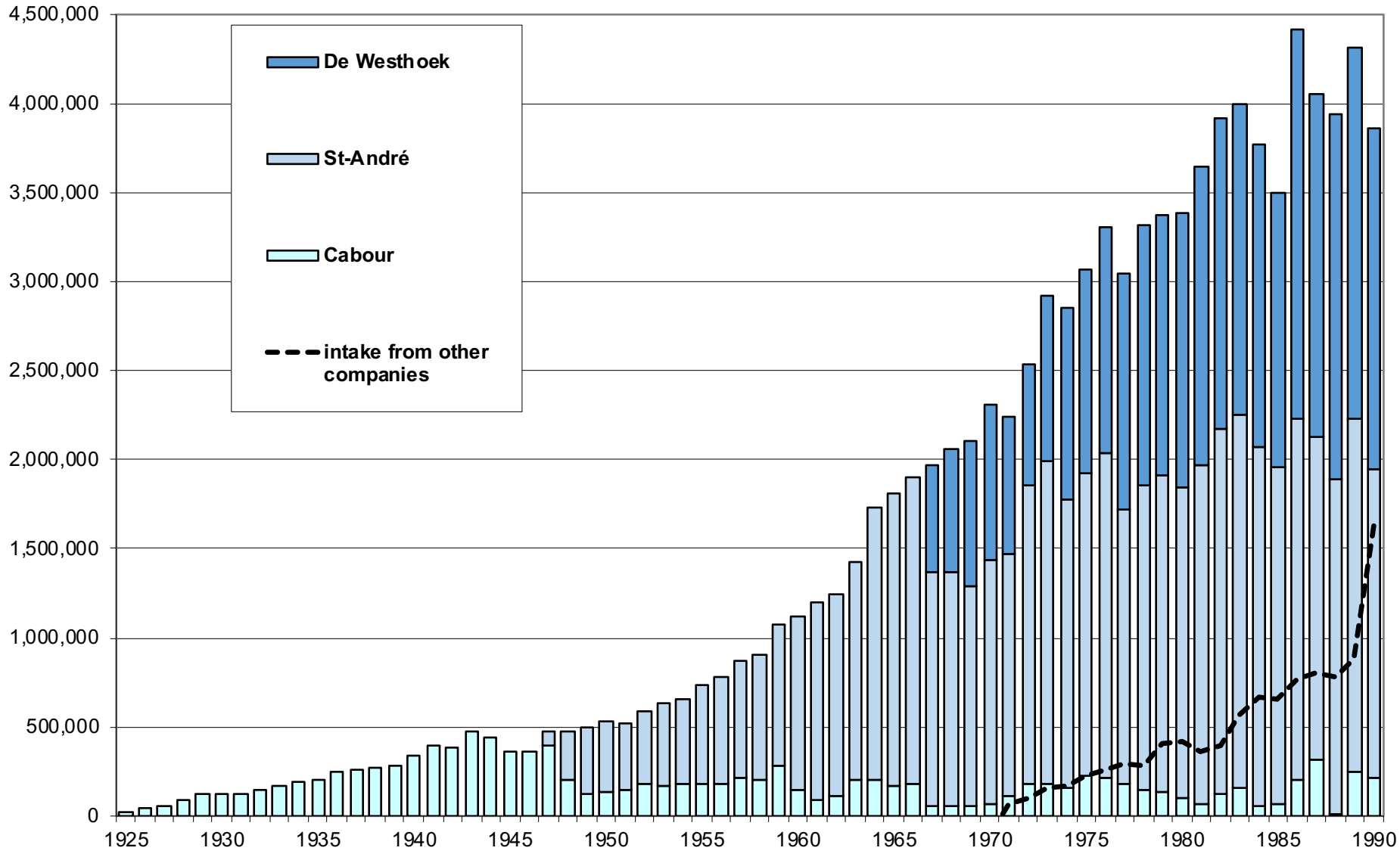




- Increasing demand since Word War Two caused by more connections, more comfort and development of tourism

- Reduced capacity caused by presence of salt water north and south of the dunes

- Demand for ecological management of dune areas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1970
1975
1980
1985
1990
De Westhoek
St-André
Cabour
intake from other companies

Looking for alternatives

Start of ecological management of the dunes in 1994

Looking for infiltration water

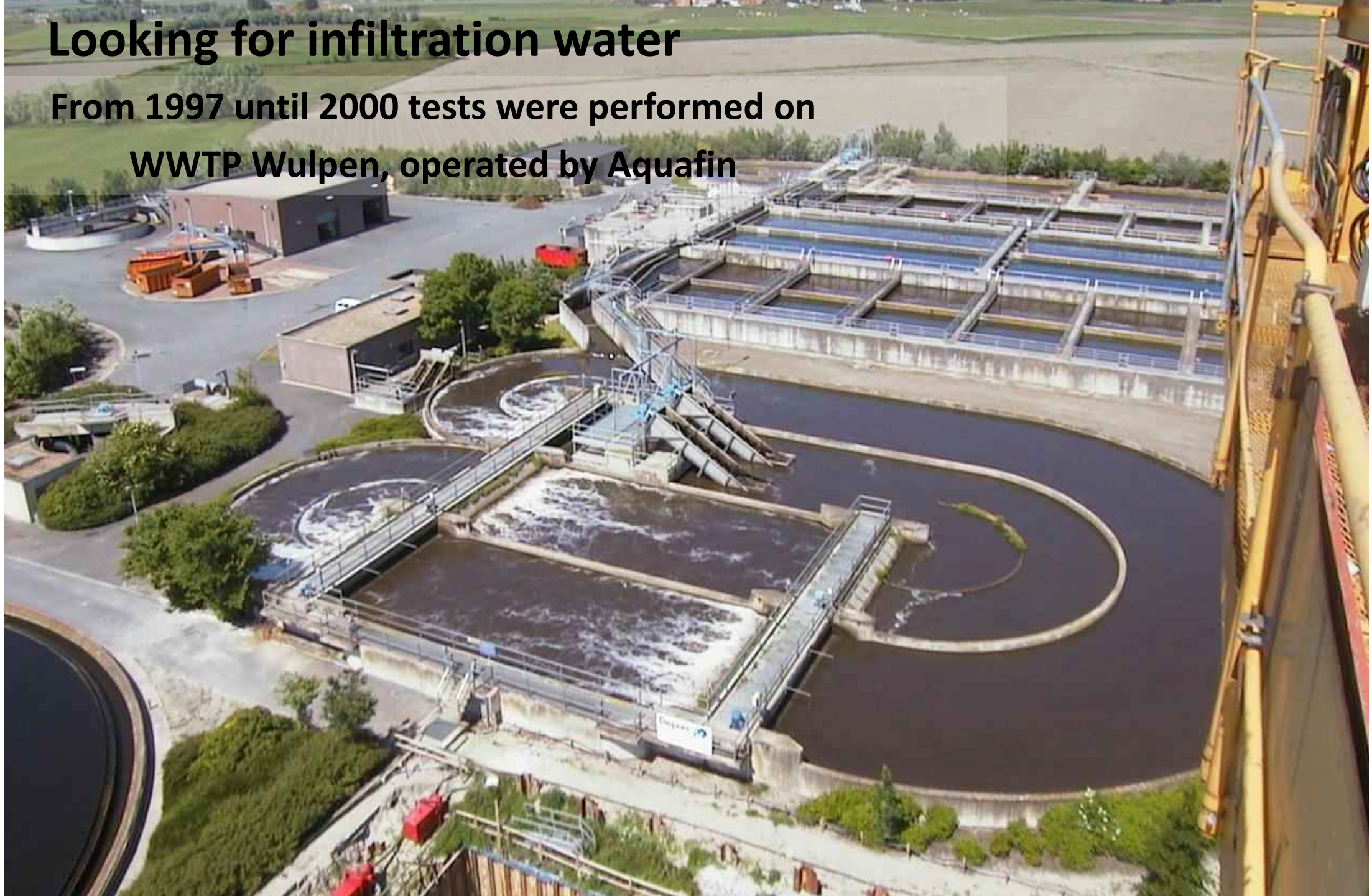
1996

The first test using membranes in the polder area (Avekapelle)

Looking for infiltration water

From 1997 until 2000 tests were performed on

WWTP Wulpen, operated by Aquafin

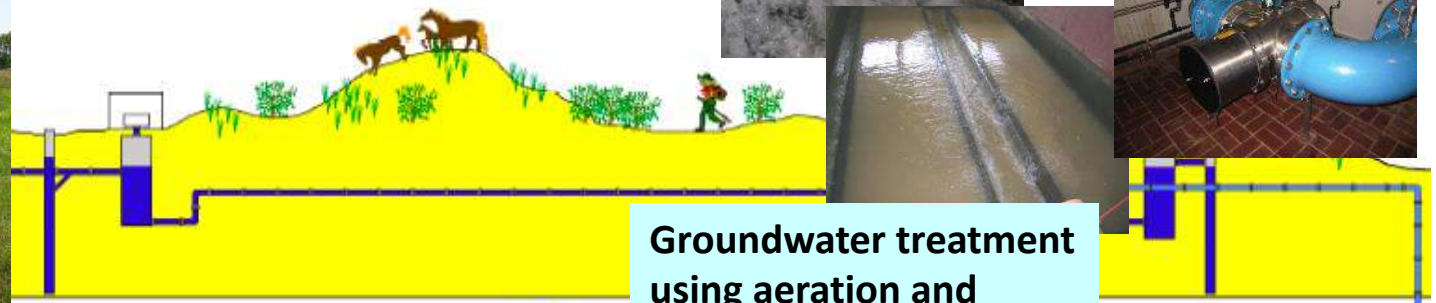


SELECTED ALTERNATIVE

Groundwater recharge combined to water reuse

- Natural groundwater extraction reduced
- Implemented into ecological management of dunes
- Maximum use of existing infrastructure
- Wastewater treatment plant nearby
- Effluent available all year and of acceptable quality

Recharge of dune aquifer
Minimum residence time 30 days



UV prior to distribution

Groundwater treatment using aeration and sand filtration

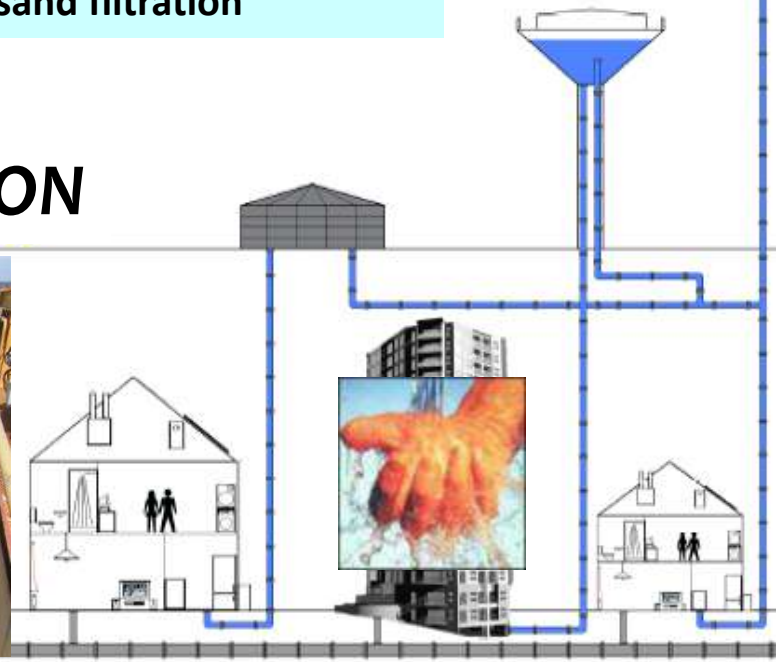
SUSTAINABLE

DRINKING-WATER PRODUCTION

UF

RO

WWTP Wulpen
Conventional treatment of domestic ww

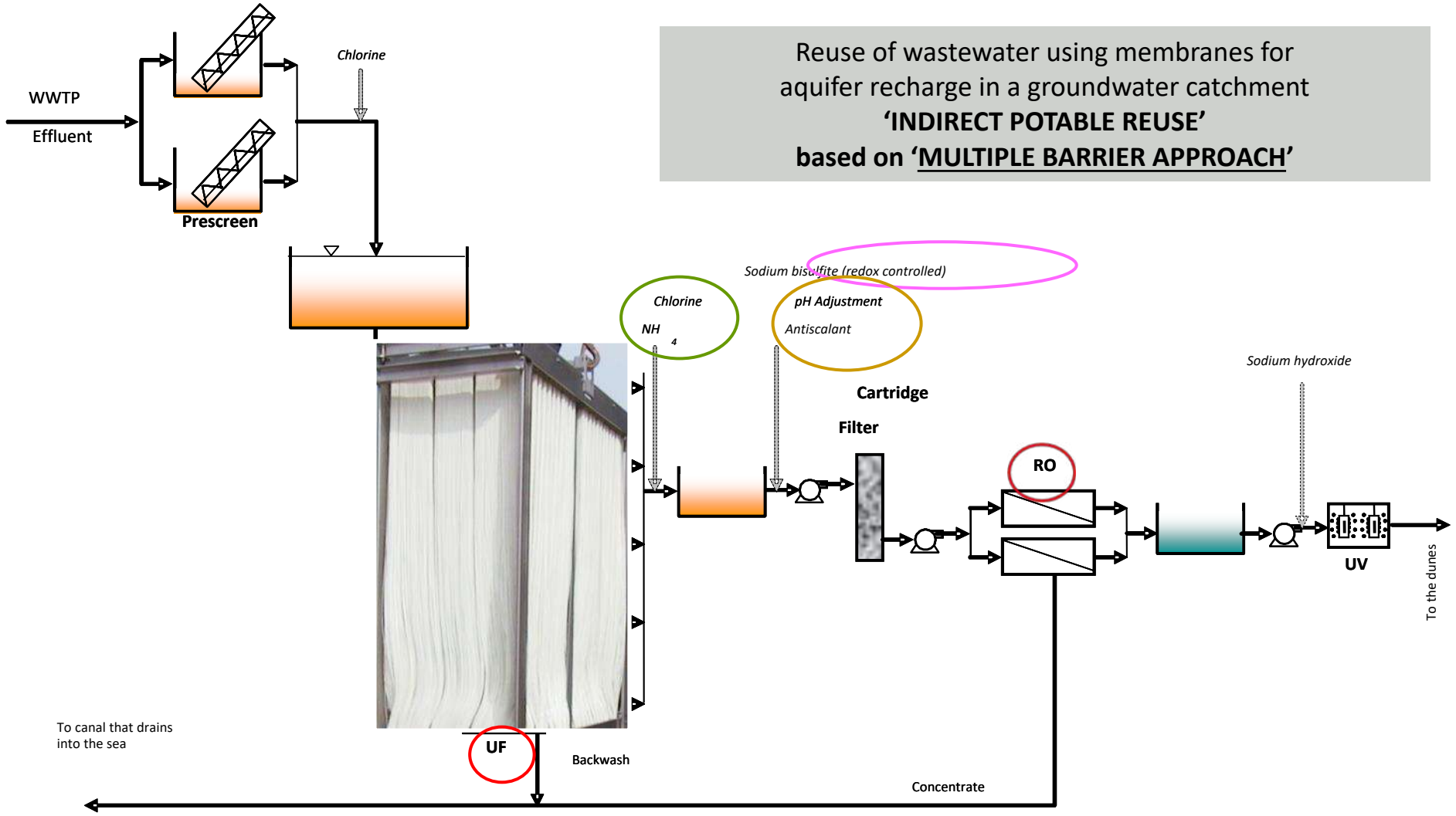


After use or consumption the water is collected and flows back to WWTP

Reuse of wastewater using membranes for aquifer recharge in a groundwater catchment

'INDIRECT POTABLE REUSE'

based on 'MULTIPLE BARRIER APPROACH'



Multiple barrier approach for microbiological safety

+ biofouling prevention by dosing of monochloramines

+ redox controlled dosing of bisulfite to protect membranes against chlorine

+ scaling prevention dosing sulfuric acid (pH correction) and anti-scalant


What did we learn so far ?

Torreele – experience

- **UF proves to be a good pretreatement for RO**
as bacteria and suspended solids are totally removed

quality can be controlled by turbidity

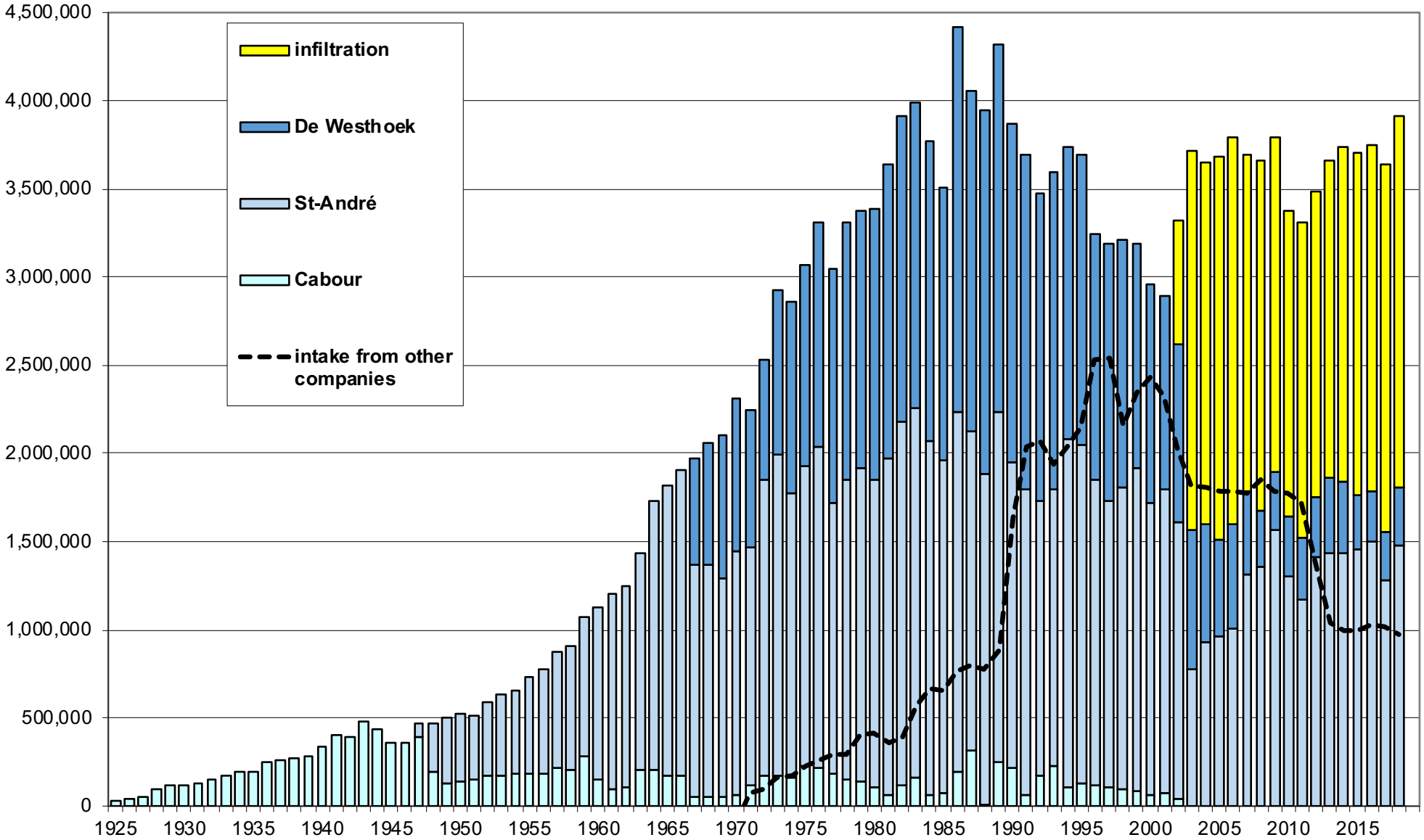
- **RO removes salt, nutrients, hardness, bacteria, viruses, small organic substances (pesticides, pharmaceuticals)**

performance/quality easy to control with conductivity

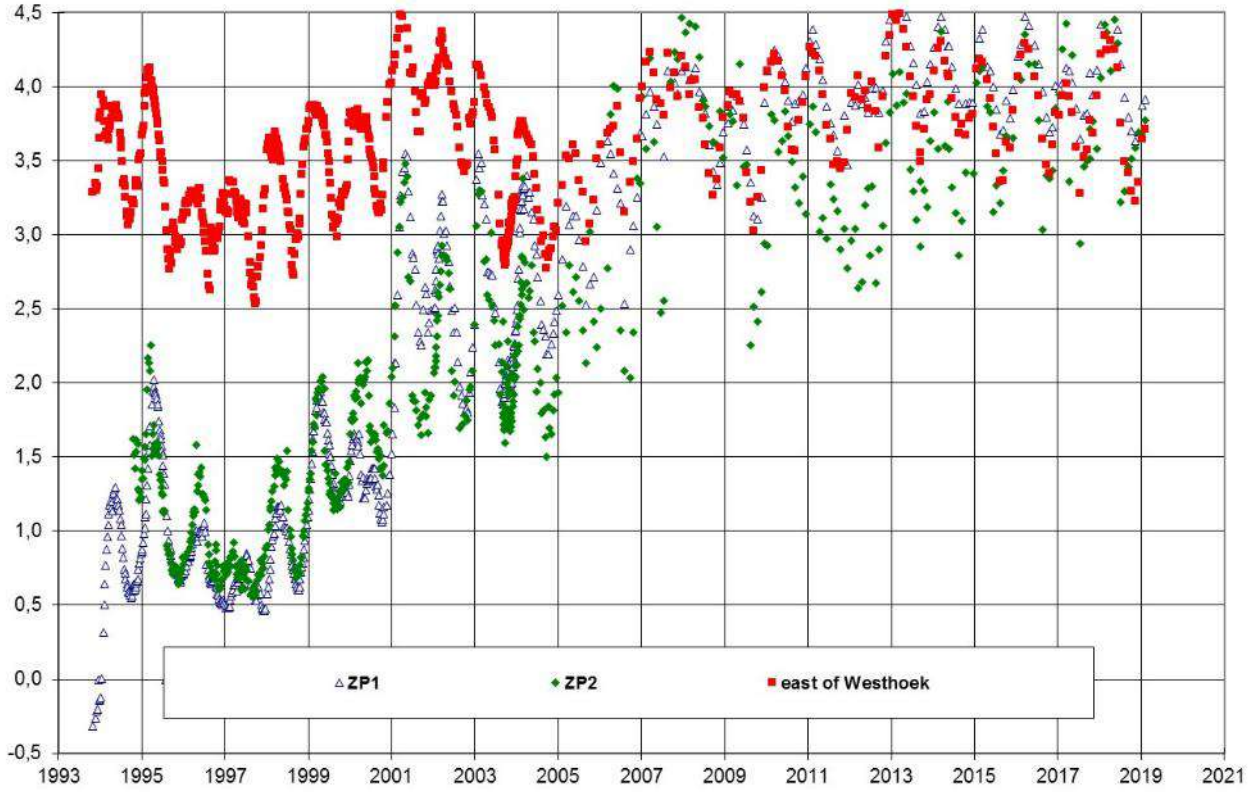
Infiltration water is of excellent quality

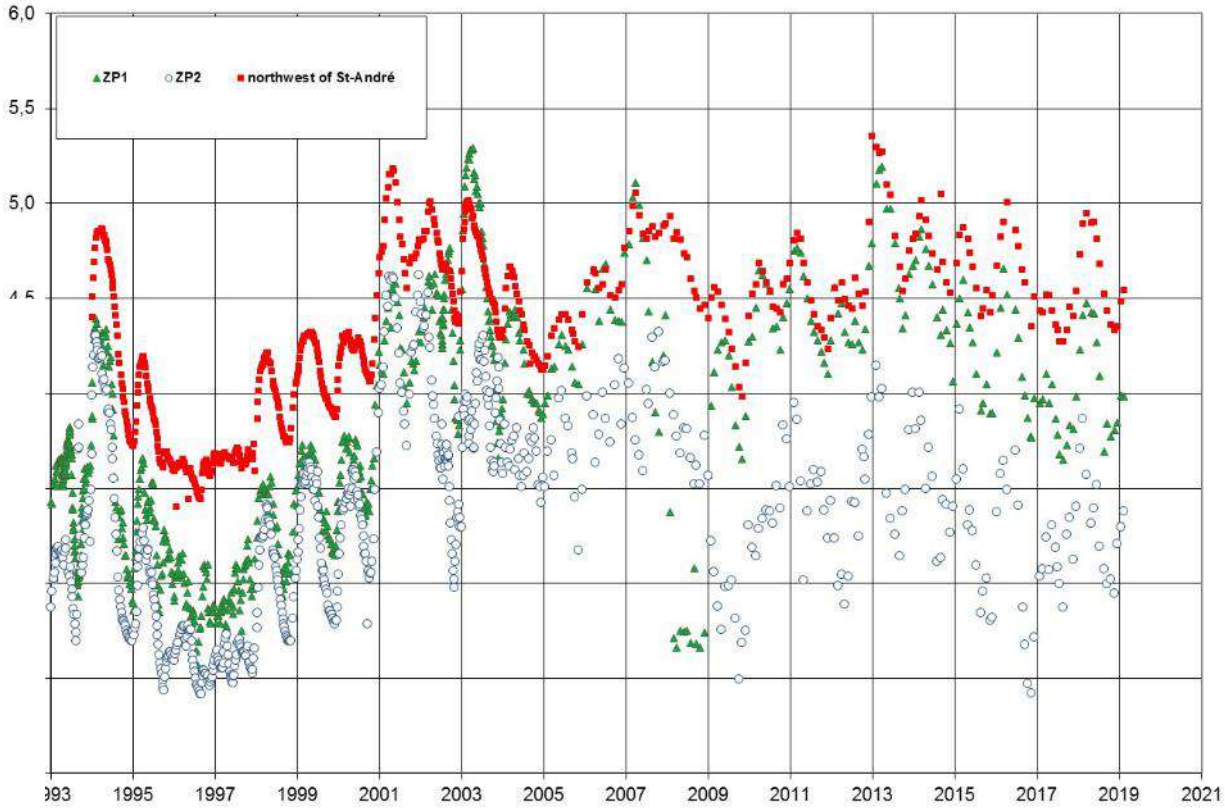
Continuous monitoring of different parameters e.g. conductivity, pressures, turbidity, chlorine content

The infiltration resulted in a substantial decrease of water extraction



Resulting in higher groundwater levels





Higher groundwater levels resulted in enhanced natural values

Parnassia

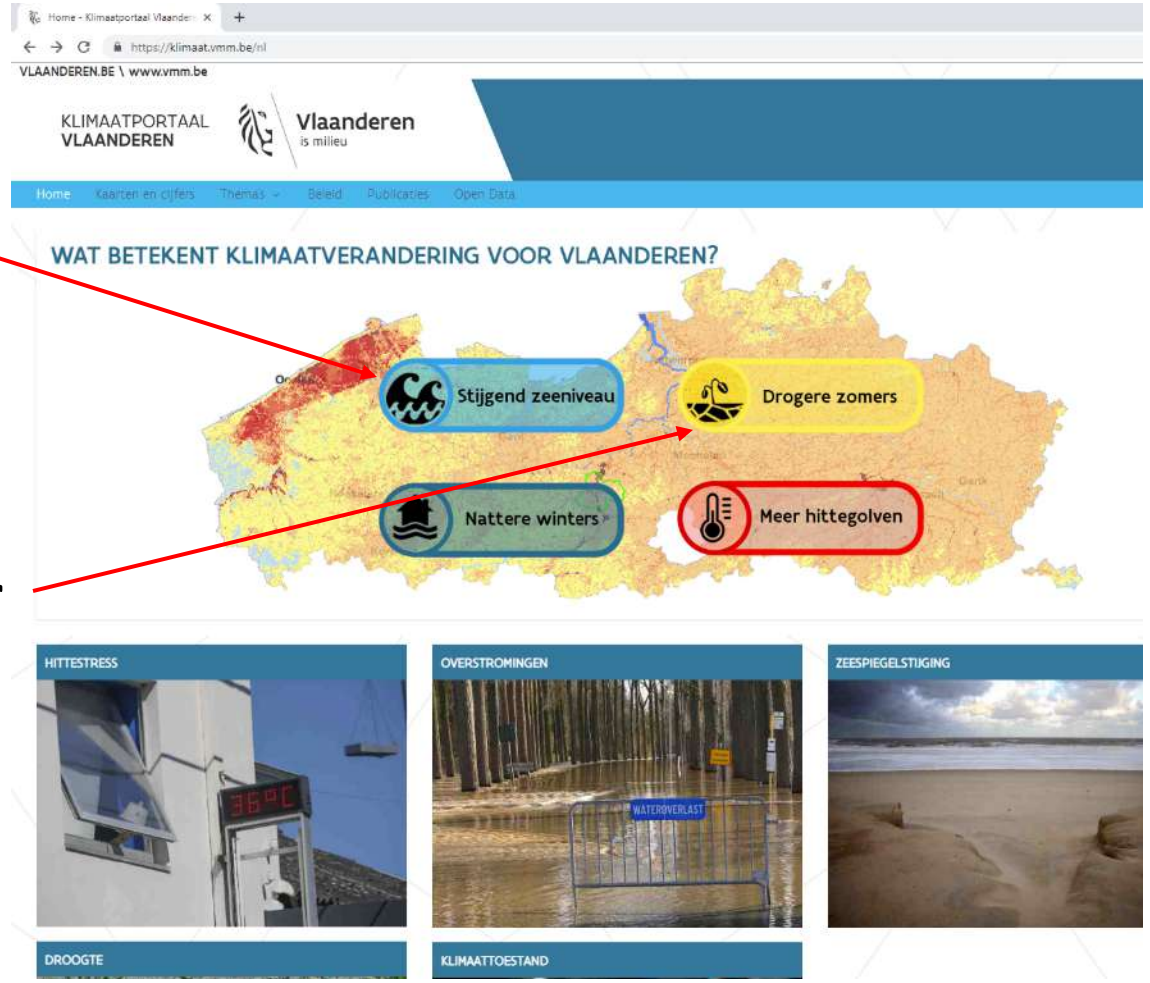
Wetlands

Orchids

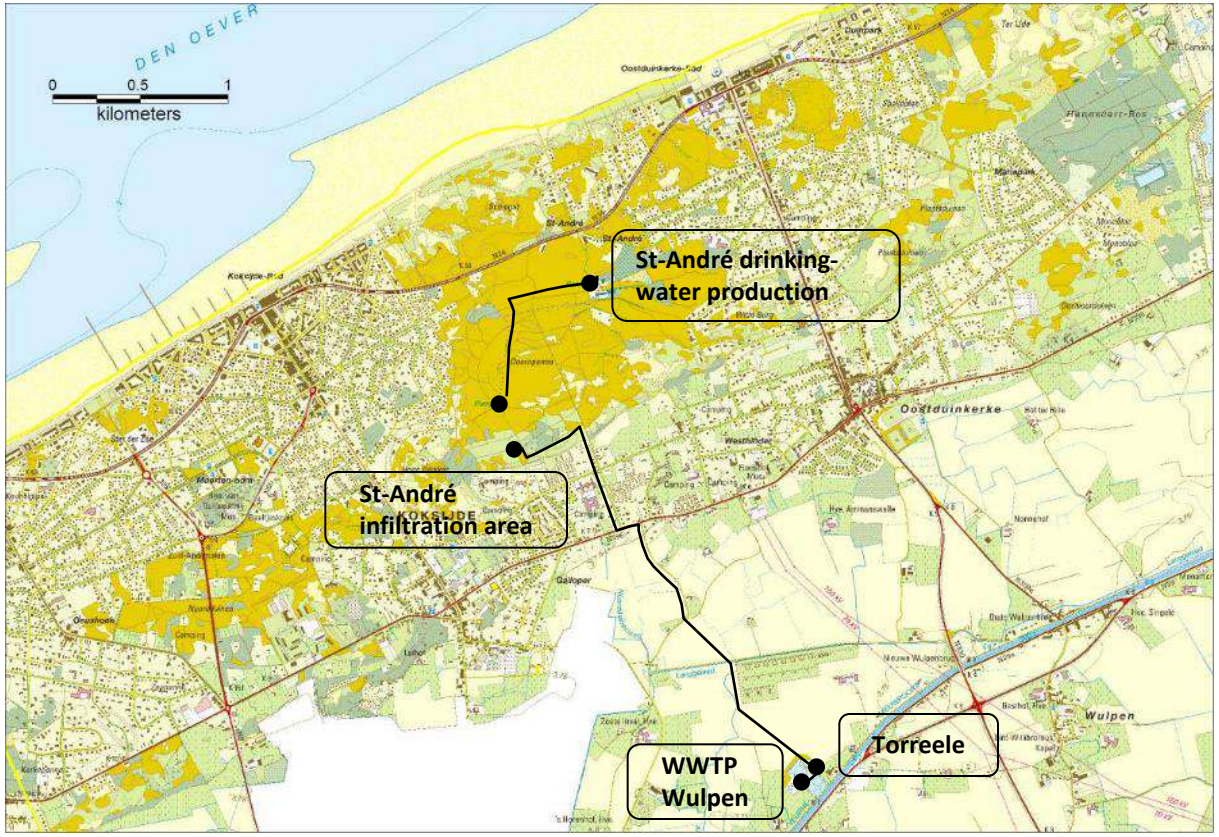
IWVA's reuse/MAR project is ADAPTIVE to climate change

Expected sealevel rise –
higher groundwater levels

Dryer summers and more frequent periods of heat –
increased infiltration in summer will be possible due to higher temperatures;
this will follow demand



Integration of wastewater reuse into existing drinking-water production scheme by managed aquifer recharge (infiltration in the dunes) :
good example of integrated water management



Last 2 dry periods (2017, 2018) proved that combination of water reuse and MAR is robust; drinking-water was secured

Resulting in better drinking-water quality

- **Hardness was halved since styart of infiltration;**
- **Less mineralized and less organics resulted in clearer water;**
- **Stable microbiology**

Temperature plays important role in infiltration capacity decreases with declining temperature

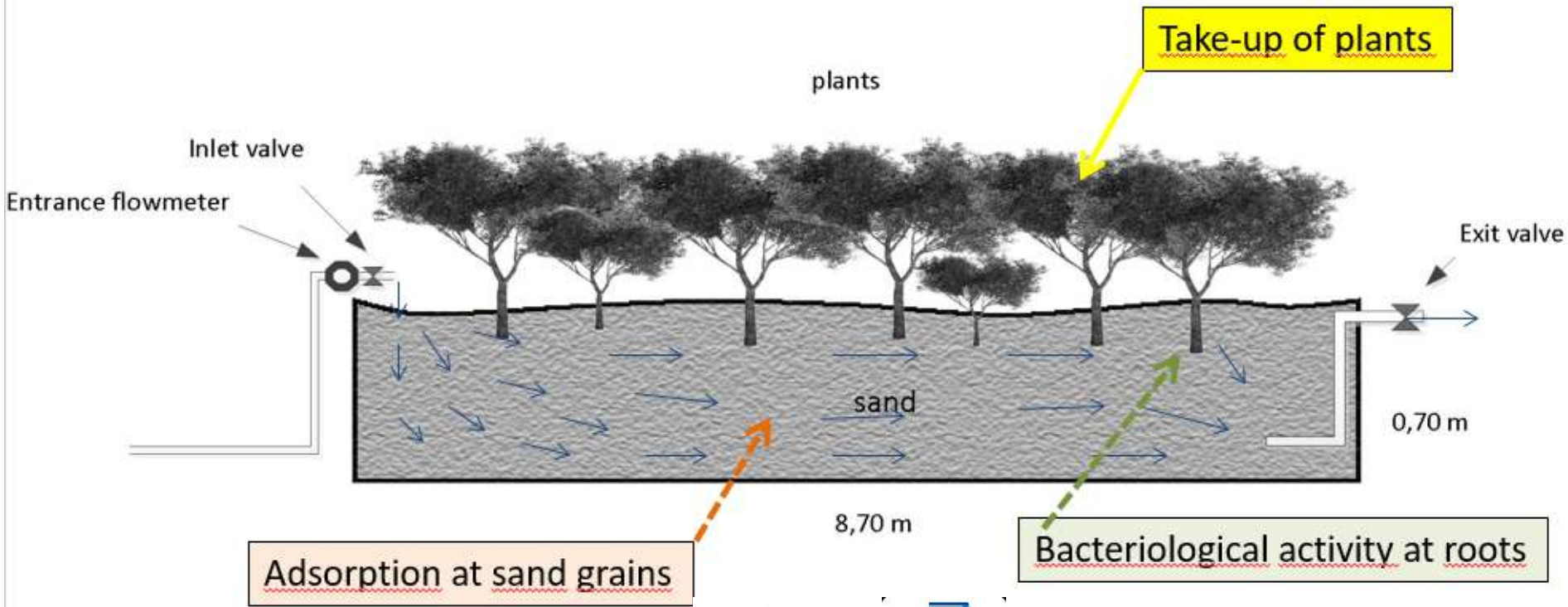
Infiltration was enhanced by implementation of ‘subterranean infiltration’ (since November 2014)

Infiltration pond was extended (since December 2018)

Recent developments at Torreele

TESTS TO MITIGATE IMPACT OF DISCHARGE OF RO CONCENTRATE BY USING A NATURAL TREATMENT

WILLOW TEST FIELD



WILLOW TREATMENT of RO concentrate

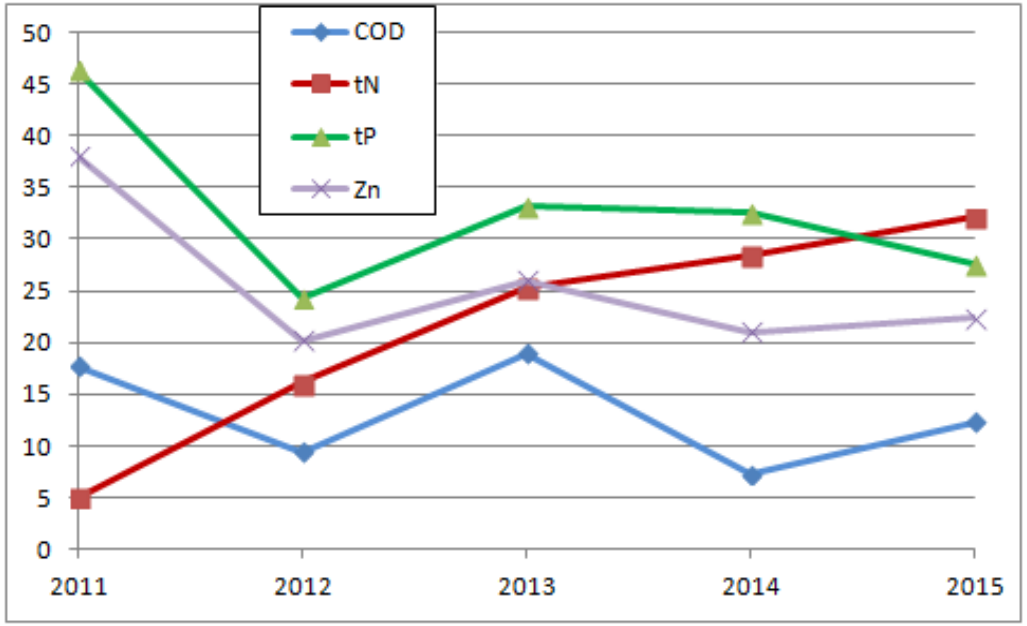
Start : 14/02/2011

04/05/2011

20/07/2011

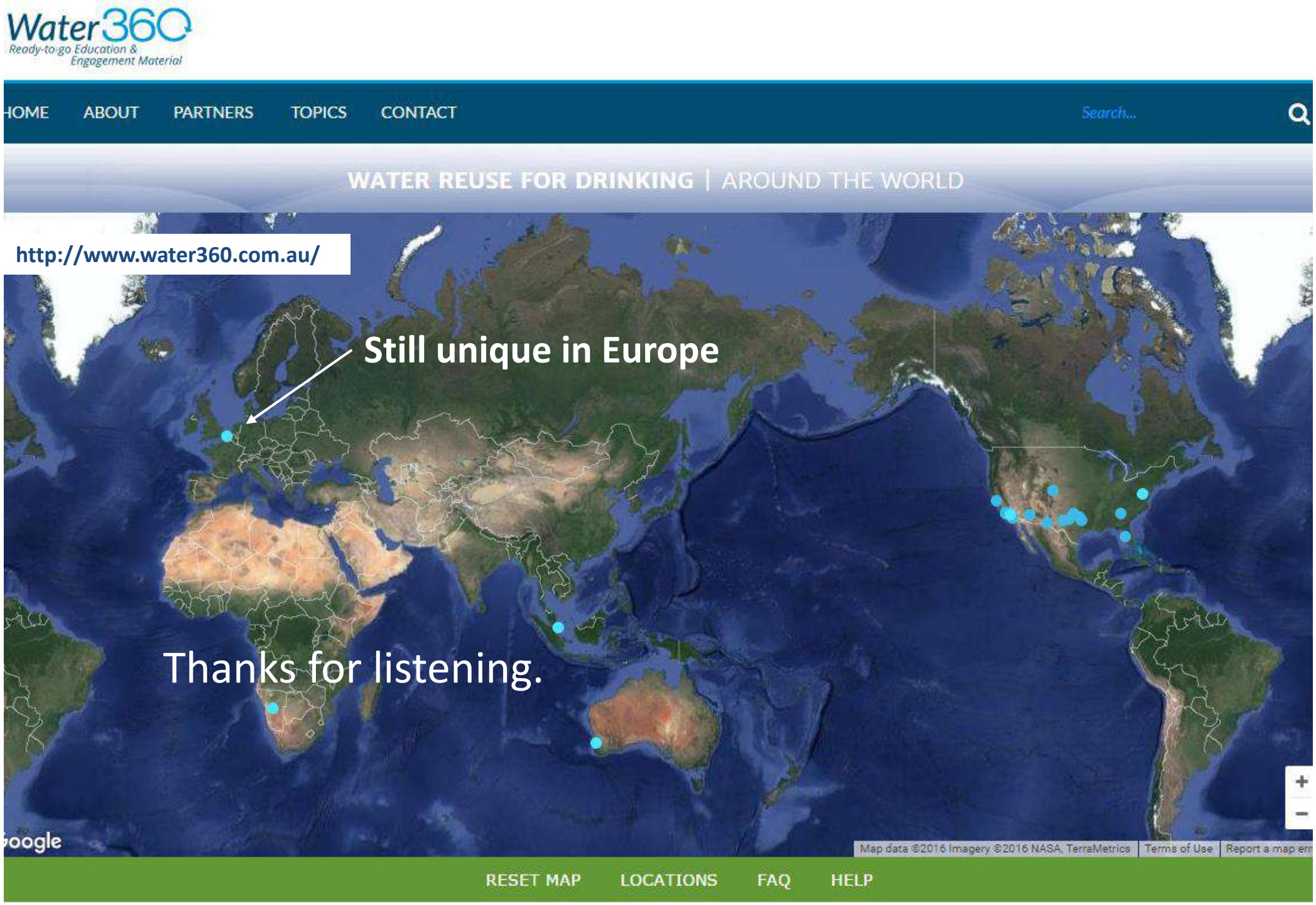
30/11/2011

WILLOW TREATMENT of RO concentrate



Average removal throughout the years :

- Improved for nitrogen : >30% in 2015;
- Phosphorous and zinc removal better in 1st year and stable since then :
around 30% for phosphorous and 20 to 25% for Zn;
- COD removal between 10 to 20%.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the umbrella body of the rivers trust movement

where there's water, there's life