

17 countries in the Middle East including Israel, Syria, Jordan and Egypt  
as well as  
South Africa, Pakistan, Southern India, Northern China  
will face absolute water scarcity by 2025

24 countries in sub-Saharan Africa  
will face severe economic water  
scarcity by 2025

Globally 70% of water taken from rivers or aquifers is used for irrigation (food)  
60% - 85% of this is wasted

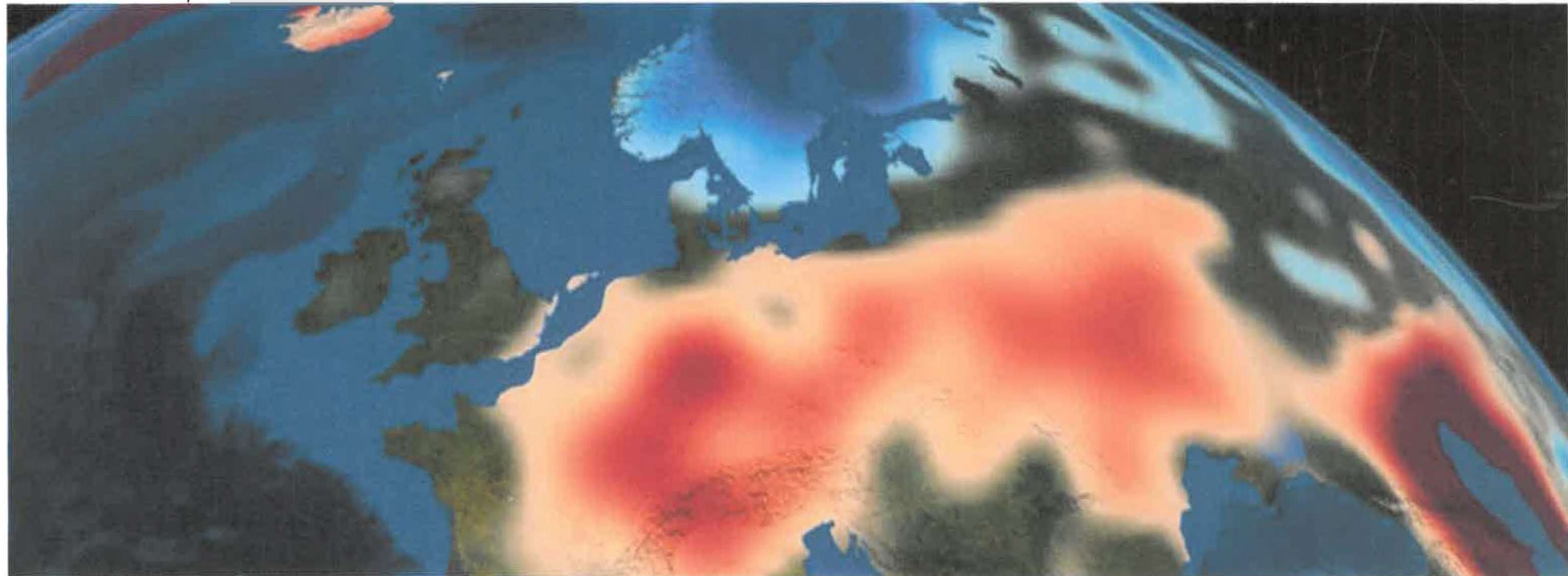
Presented in 1997 New Dehli: 50<sup>th</sup> anniversary Indian independence

# Europe on the verge of water catastrophe as groundwater reserves dry up, scientists warn

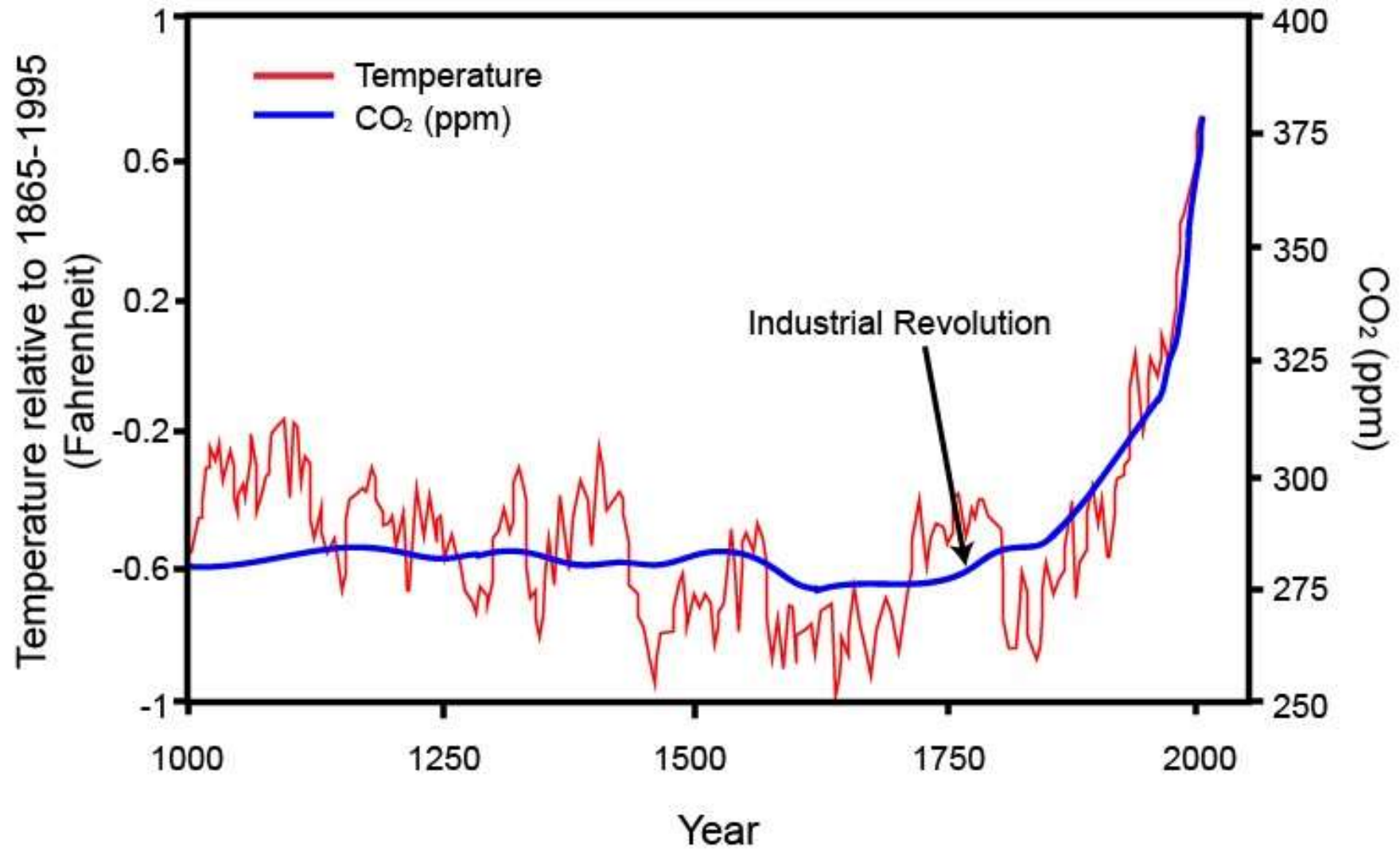
 INDEPENDENT

ALICE CLIFFORD

29 January 2023, 5:08 pm



Temperature and CO<sub>2</sub> for the last 1,000 Years



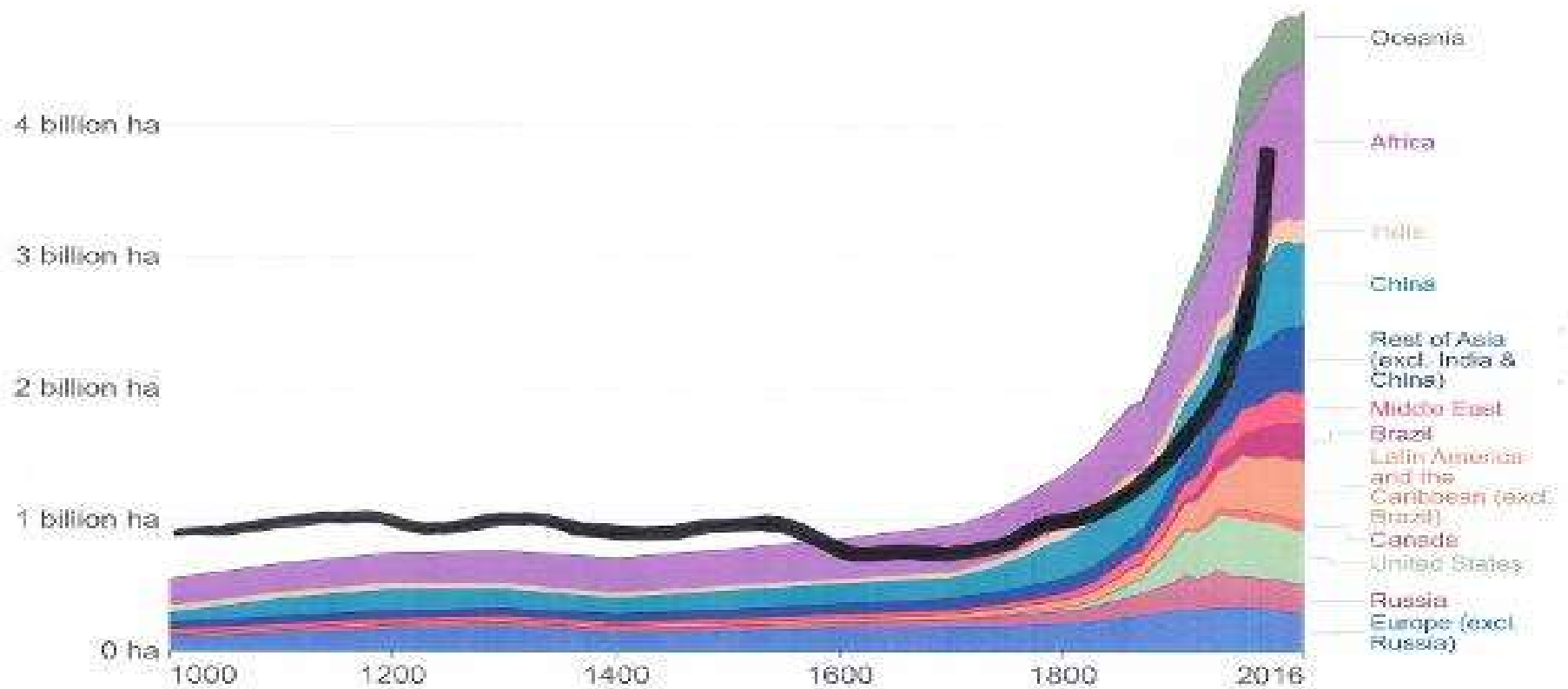
ACTIVITY	PRESENT VALUE	% OF TOTAL	SOURCE
FOREST FIRES	7 BT/AN	11.7	UNEP
RANGE/ MOOR FIRES	8 BT/AN	13.3	UNEP
FOREST MANAGEMENT(FIRES)	10 BT/AN	16.7	IUFRO
GRAZING CATTLE	9 BT/AN	15.0	HMRCS
REMOVING WOODLAND	10 BT/AN	16.7	IUFRO
AGRICULTURE	8 BT/AN	13.3	FAOHSA
FOSSIL FUEL EMISSIONS	8 BT/AN	13.3	IPCC
TOTALS	60 BT/AN	100.0	

WHY TARGET FF @13.3% WHEN AGRIC INC CATTLE IS 28.3%  
AND WHY IS AGRIC SO HIGH?

# Agricultural area over the long-term, 1000 to 2016



Total areal land use for agriculture, measured as the combination of land for arable farming (cropland) and grazing in hectares.



Source: History Database of the Global Environment (2017)

OurWorldInData.org/land-use - CC BY

# Soil: Losing up to 60 tonnes/Ha per annum @ <£100/tonne\*

\* @ 2010 fertiliser prices - +400% in 2022 !



## Stroud Valleys Soil Erosion Map

### Key Findings

- Erosion risk map indicates high erosion rates in Stroud Valleys, with hotspots in Painswick and Ramscombe catchments. This strengthens the evidence to tackle the sediment problem.
  - High proportion of silt in most samples indicates severe denuding in catchment.
  - Soil analysis to determine stability of silt re-use as a soil improver.
    - High organic carbon content improves soil structure and creates water retention.
    - High silt content in river silt may avoid water filtration, silt would form nutrient.
    - Phosphorus and Nitrogen content variable: 2-40% that of artificial fertilisers.
    - Some river hotspots in Ramscombe and Painswick exceed of > 1000.
    - Analysis indicates some silt that cannot be used for soil re-use due to high levels of Zinc.
- The evidence supports the anecdotal claims that silt is beneficial as a soil improver for agriculture.

River Site	Ramscombe Brook		Painswick Stream		Dodd Brook		River Treadwell	
	PA	N	PA	N	PA	N	PA	N
1	15.11	15.11	107.75	107.75	106.81	106.81	107.01	107.01
2	100.49	100.49	121.51	121.51	104.96	104.96	118.01	118.14
3	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
4	140.07	140.07	104.02	104.02	100.00	100.00	121.07	121.07
5			100.00	100.00	104.07	104.07	100.00	100.00

### Recommendations

- Combining cooperative field trials of river silt, transport routes and fertilizer application to agricultural land to show impacts on soil health and crop/soil outcomes.
- Integrate soil transport results with Erosion Risk Map to estimate availability of silt resources.
- Other low-cost/no-cost means of capture and reuse at local scale.
- Investigate water quality costs of soil extraction.



2010

Kat Gorham



### Legend

From River System

USLE

Value

High: 80.0163

Low: 0



The effects of agrochemicals on Stroud soils – the biggest cause of biodiversity loss, flood & drought !



# Two Stroud Farms ... Same Soil ?

Farm A

IMPERVIOUS SOIL  
Low carbon content  
500 Acres (of 2000 ac)  
50+yrs High Input  
Low employment  
Low productivity  
Highly polluting  
'Flush & Forget'  
**EXPLOITATIVE**



## CLIMATE: TIPPING THE TIPPING POINTS ?

Both arable & pasture lands degraded, poor aquifer recharge, raised nutrient/storm run-off & evaporation (convective storm intensification). **What is True Cost ?**  
Low till Glyphosate & Anthelmintics.



# Two farms ... same soil ?

## Farm B

ABSORPTIVE SOIL

High carbon content

23 acres (of 46 ac)

17yrs **“Zero input”**

High employment

High productivity

Zero pollution

*‘Care & diligence’*

**WEALTH CREATING**



## CLIMATE: TIPPING THE TIPPING POINTS ?

Zero input forces best ecological & social consequences.

*“Best least cost solution”*

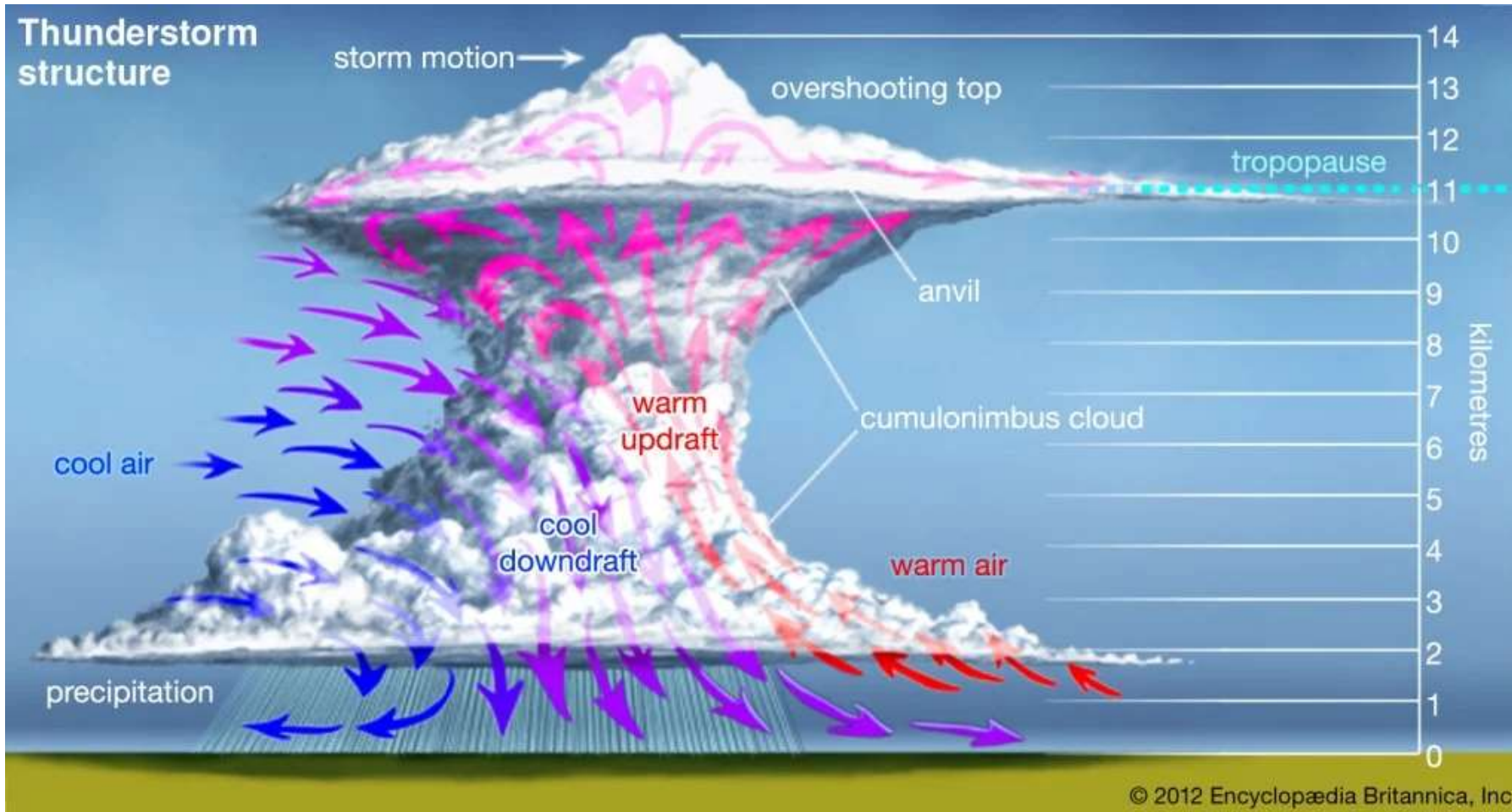
*Scale is vital*







# Effects of Temperature Gains



Rhei-Erft-Kreis/AP Photo

**Chemical agriculture intensifies convective storms**



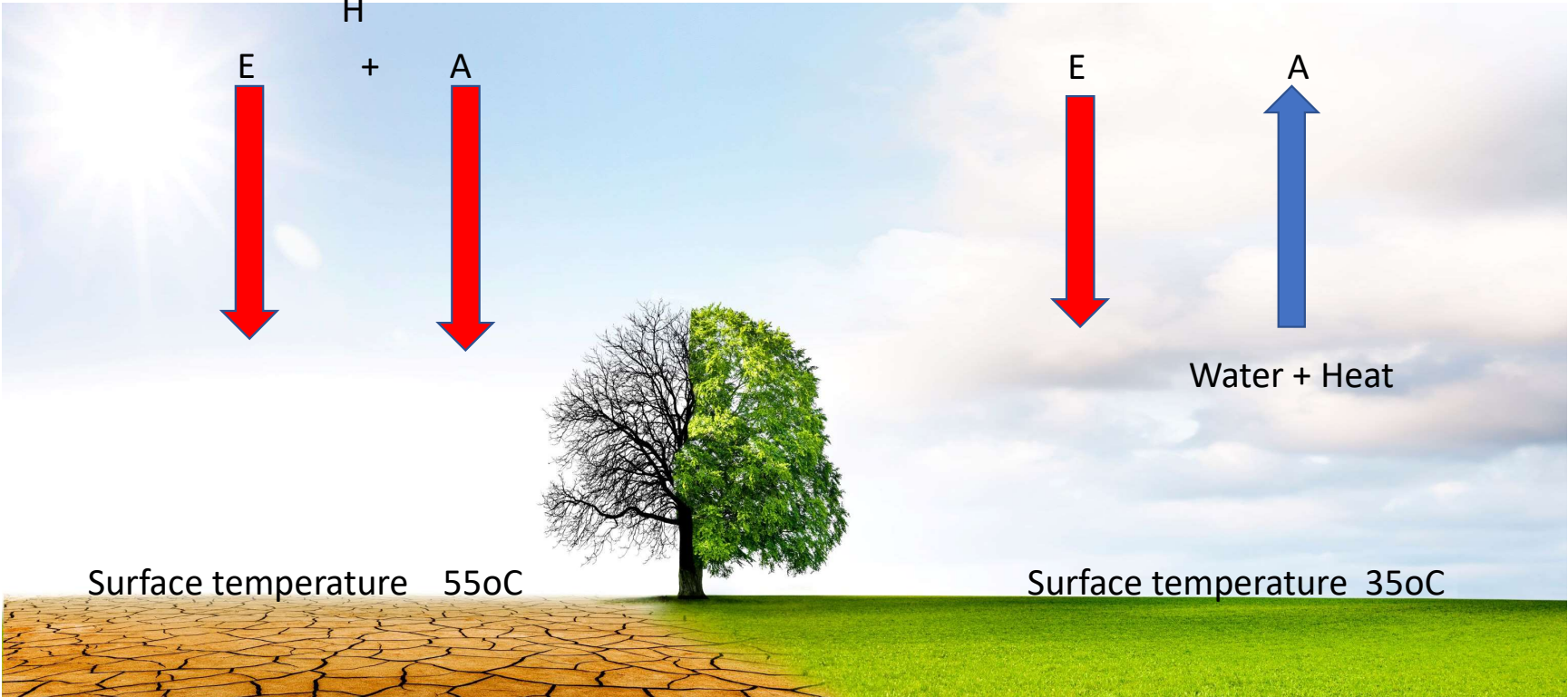


196 people died after houses collapsed. Erfstadt Germany

Net radiation = (H) = latent heat (E) + sensible heat (A)

Air temperature 40oC

Air temperature 32oC



Surface temperature 55oC

Surface temperature 35oC

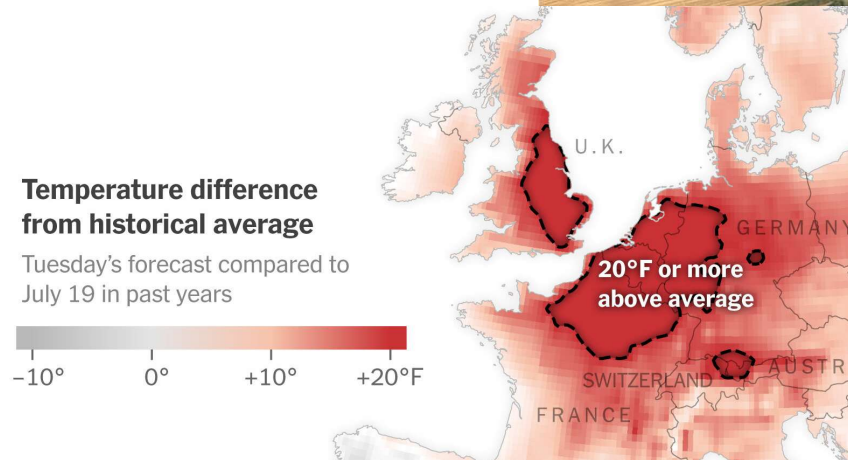
Water + Heat

# Reversing Temperature Gains

*Caused by chemical arable farming*

Jake Freestone, a regenerative farmer from Tewkesbury in the Cotswolds, told the Guardian he had found a **10C temperature difference** between soil that has cover crops and organic matter and that which does not. He says the methods he uses make soil act as a “massive sponge”, holding water and needing less irrigation.

[The Guardian, Fri 12 Aug 2022](#)



**Also moderating flood, drought and  
*intensive convective storms***

Penman Equation

	Latent heat	Sensible heat	Soil
Wet soil	1730	-4	-33
Moist soil	940	289	+142
Sand	100	500	+1100

URBAN HEAT ISLAND(CITY)

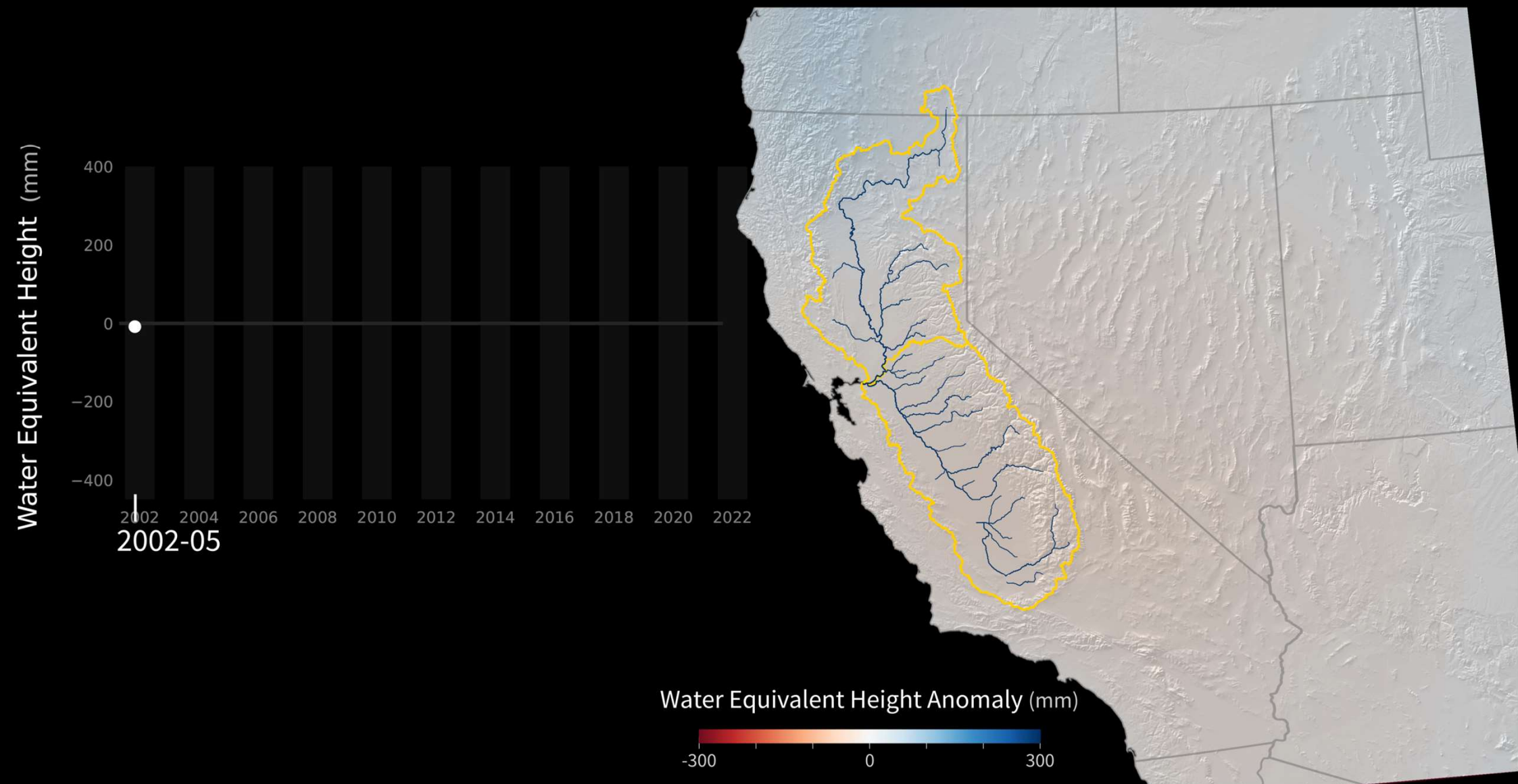
CITY CENTRE	32c
URBAN	28c
OUTSKIRTS(FARMLAND)	24c

GLOUCESTER FARMLAND

DRY SOIL NO PLANT COVER	34c
SOIL WITH PLANT COVER	24c

RIVER NILE PLANTED BORDER STRIP	38c
MEROE RUINS	55c

# GRACE & GRACE-FO observations of Total Land Water Storage changes over California (2002-2022)





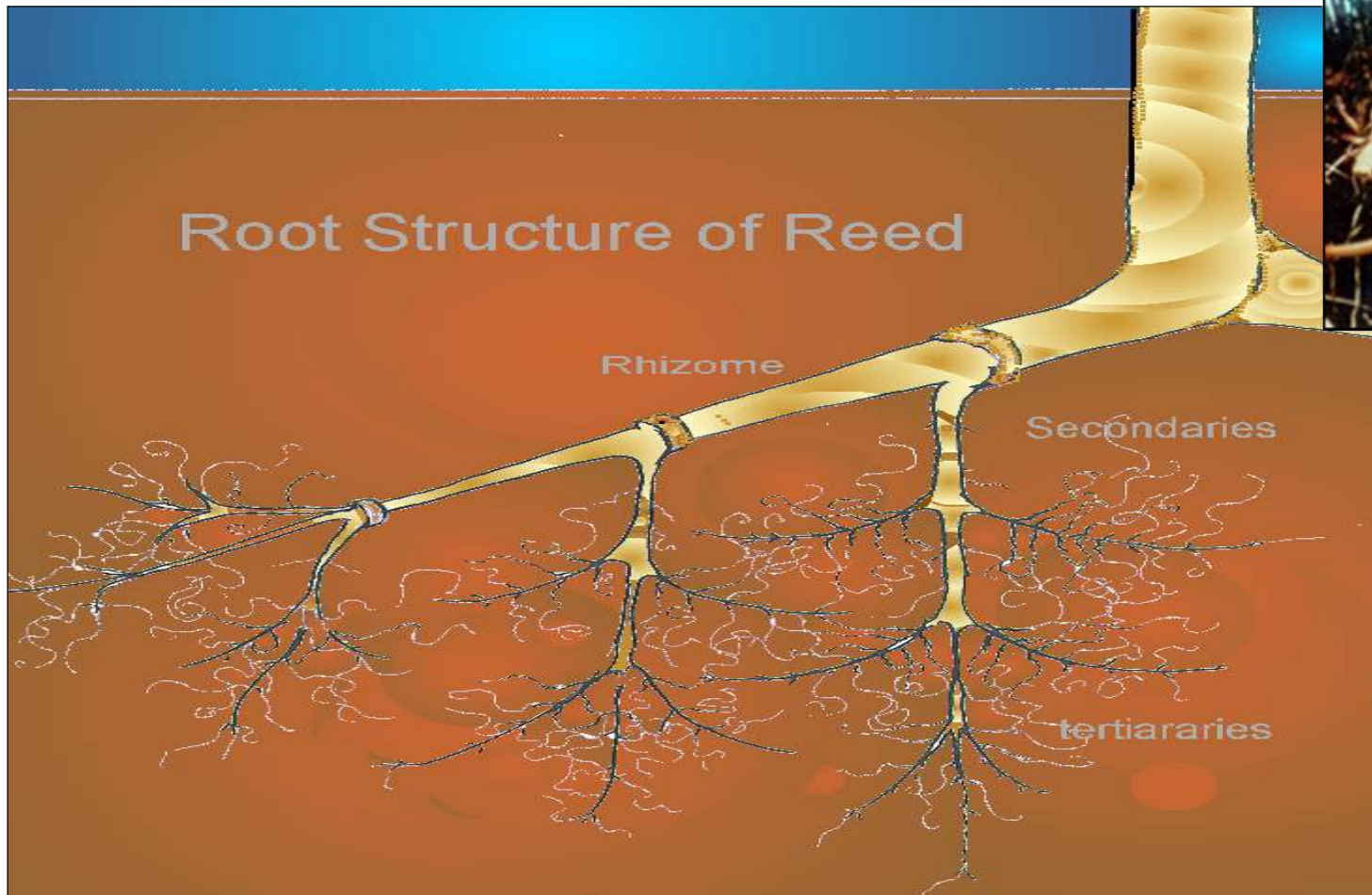


Soils hold three times the amount of carbon present in the atmosphere and four times that held by living matter.

In the last 10,000 years agriculture and cities have lost 840 billion metric tons of Carbon dioxide.

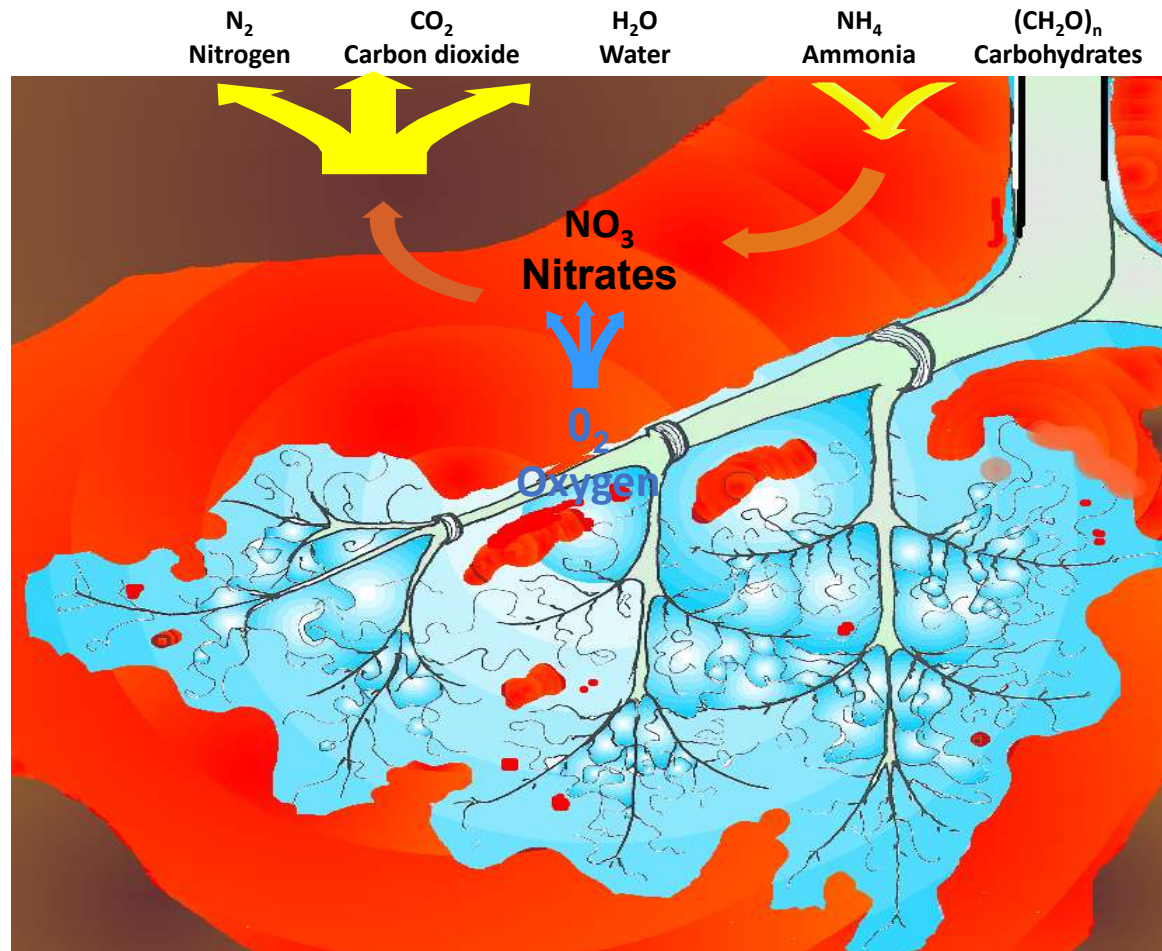
Many soils have lost 50-70% of organic carbon.

# How (soil) nature works ?



X-section of *Phragmites* bed

# Gaseous Pathways



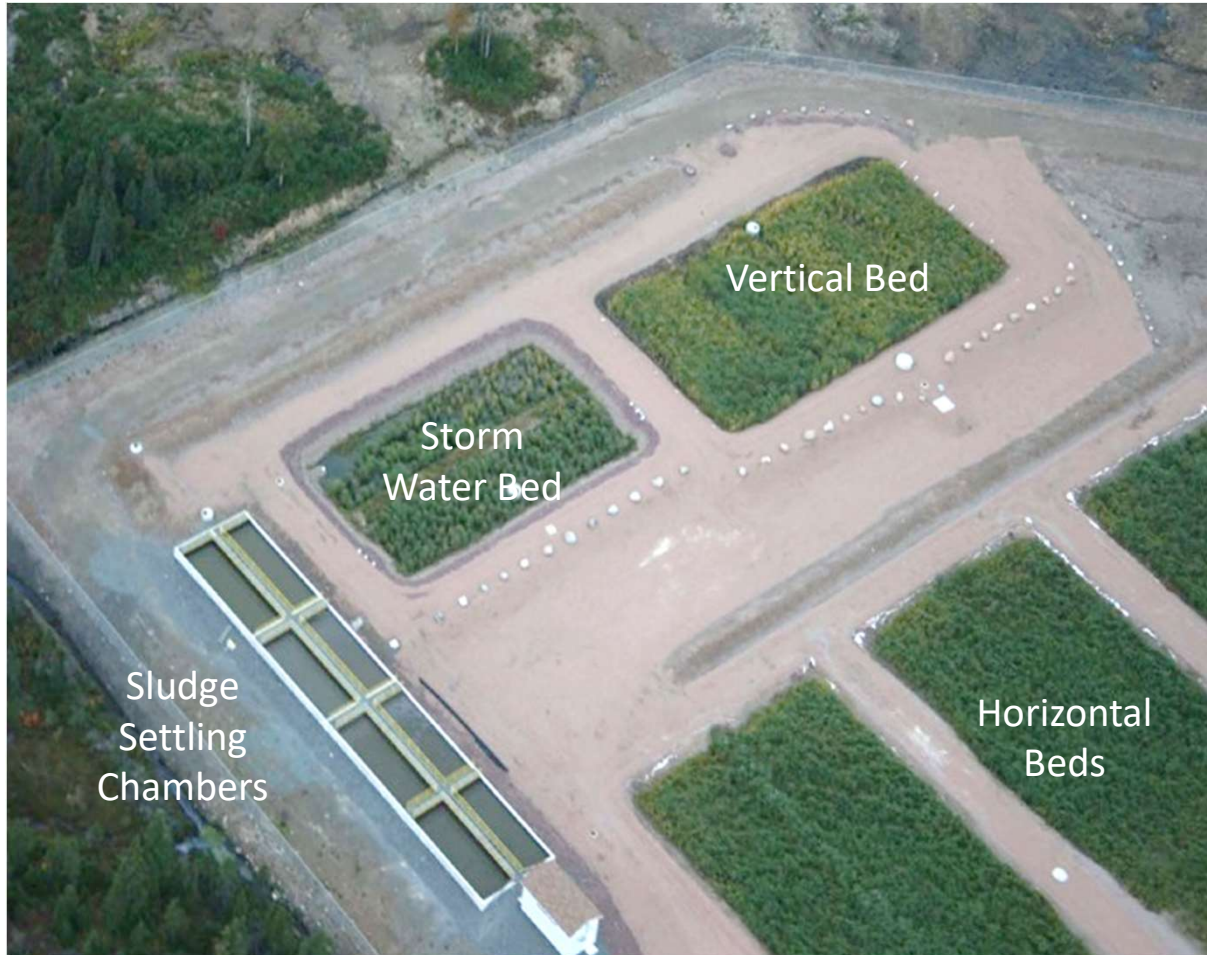
OTHFRESEN INLET AREAS AS SEEN BY STAFF OF WRC IN DECEMBER 1984



Carbon sequestration was already in tons per annum. Phosphorous was entrapped and ammoniacal ammonia removed.

Fig. 1. Inlet channel and reed bed on the Southern works after 10 years operation

# Typical layout of integrated system



Canadian system discharging into salmon river

## Reed Bed Technology

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### ICI Chemical Works, Billingham

over 250 chemical effluents sent to reed bed for treatment



# ICI Billingham



Input = 3,000m<sup>3</sup> /day : up to 30,000mg/l COD  
phenols, amines, detergents etc

30+ yrs operation – estimated 17,000 tonnes  
of carbon sequestrated

Worldwide interest ...

Water holding capacity over 5 hectares equal  
to 15,000 tons.

# Energy/Emissions Comparison

Over a sixteen-year operating period compared with an identical-sized plant of conventional design and mode of operation (activated sludge)

## **Based On:**

**Layout and operation for 2,500 PE (7 operating years)**

**Layout and operation for 4,500 PE (9 operating years)**

## **Total disposal rates over 16 years: $C_{106}H_{180}O_{45}N_{16}P$**

**COD**                      **1,500,000 kg**

**N**                              **140,000 kg**

**P**                              **16,000 kg**

Building humic matter and  
sequestering carbon,  
phosphorous in the soil.

OTHFRESEN



# Energy/Emissions Comparison

	<u>Reed Bed System</u>	<u>Activated Sludge System</u>
<b><u>Energy Consumption</u></b>		
Electricity consumption	35,000 kWh	40,000,000 kWh
Equivalent coal	17,000 kg	20,000,000 kg
<b><u>Emissions</u></b>		
CO <sub>2</sub>	47,000 kg	53,000,000 kg
NO <sub>x</sub>	70 kg	81,000 kg
SO <sub>2</sub>	125 kg	142,000 kg

App 5,550 tons of CO<sub>2</sub> sequestered as humic carbon in the soil  
App.53,000 tons emission reduction - from a single works

## CONCLUSIONS

The Net Zero policy offers no substantial justification for the closure of fossil fuel energy production or the claims made for carbon dioxide induced global warming.

Rather, the economic damage caused by the policy will prevent adequate finance being available for rectifying an already serious situation.

Drought and famine will begin to increase rapidly over the coming years and Europe will suffer major population incursion as a result.

It is a priority to move back to traditional agriculture and apply soil carbon sequestration techniques to the land.

The design of catchments using natural soil/plant techniques would be more effective, cheaper and provide local community action jobs far better than the concrete and tanks systems used at present.

Emissions would in any case be substantially reduced as a result.