



Freshwater landscapes

Contemporary practice

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@fluitans



A chalk stream education...



Dr Nigel Holmes

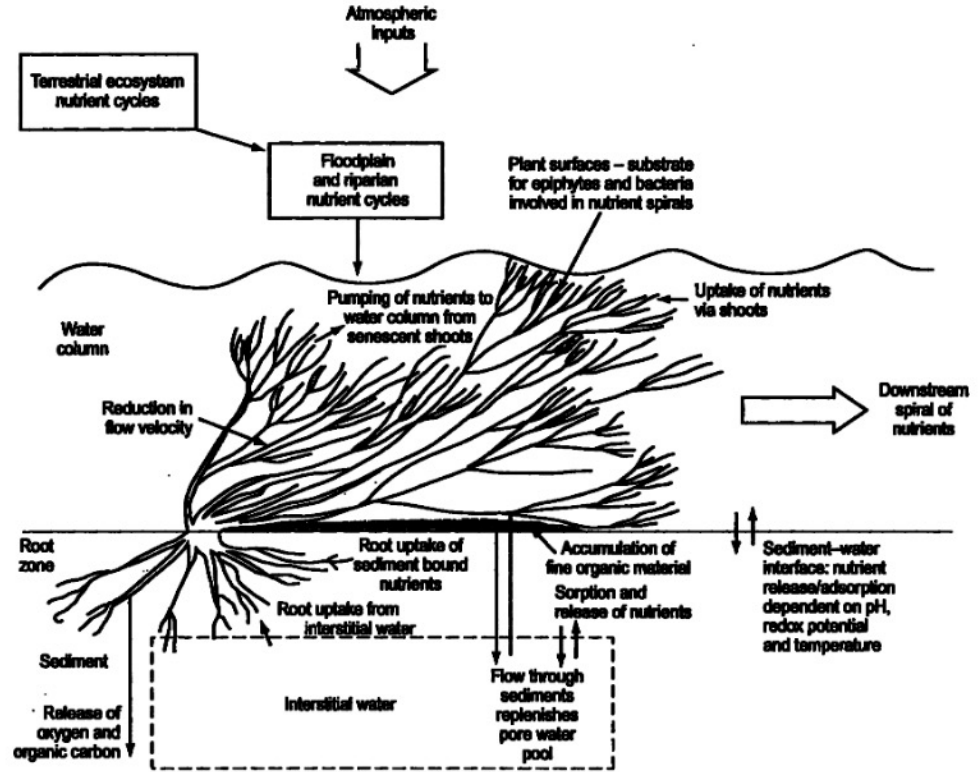
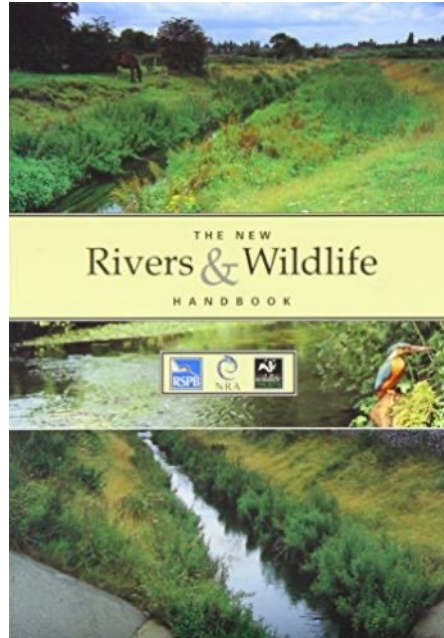


Figure 2 A conceptual framework for the role of macrophytes in fluvial nutrient dynamics



Overview

- Introduction to the National Trust (NT)
- The state of freshwaters & NT philosophy
- The Upper Bure - a Norfolk chalk stream
- Contemporary practice – full floodplain reconnection (Stage 0)



The National Trust

- Founded 1895 by three visionaries – *‘for the benefit of the nation’*
- 5.7 million members; 250,000ha. land; 775miles coastline
- 40% of land is protected as SSSI/ASSI
- Major landowner – catchment/landscape scale solutions are possible
- Around 30km of chalk stream across 20 different streams





National
Trust

What outcomes do we want?

**Deliver our LON objectives:
Better, Bigger / More & Joined
by 2025**

**Have more of our land
accessible, especially close to
where people live**

**Create/restore, in partnership,
25,000ha priority habitat
beyond our boundaries**

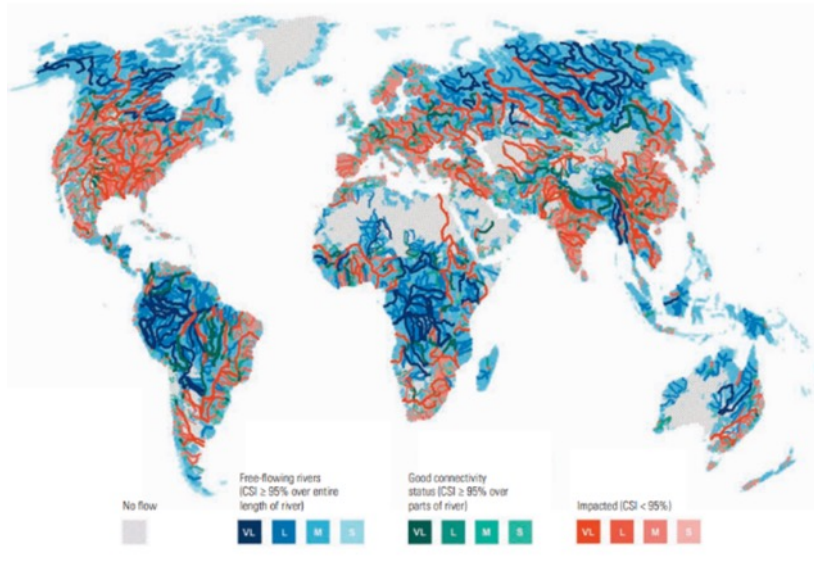
**Be Net Zero by 2030
Including:**

- Establish 20m trees
- Have 50% of our woodland in active management
- Restore our carbon rich peatlands and wetlands

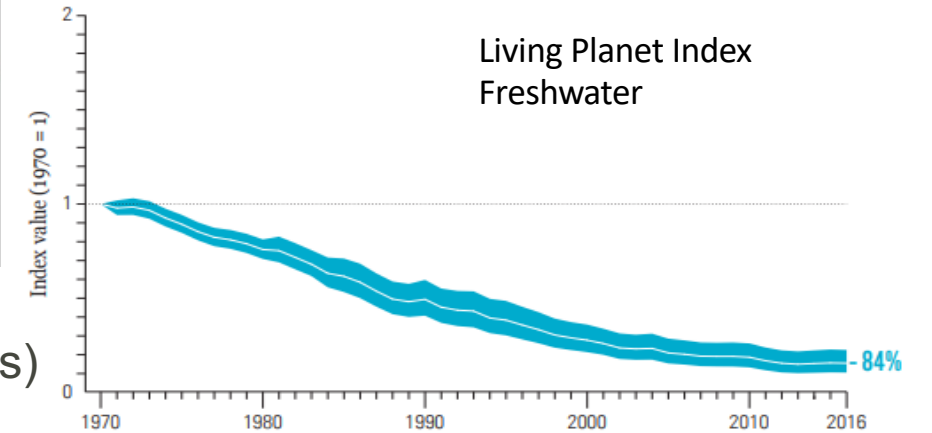
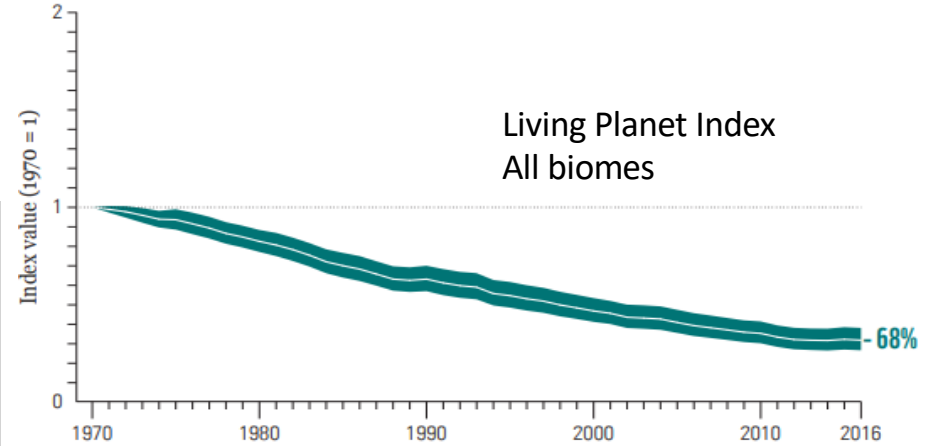
**Our land management
decisions are climate
informed**



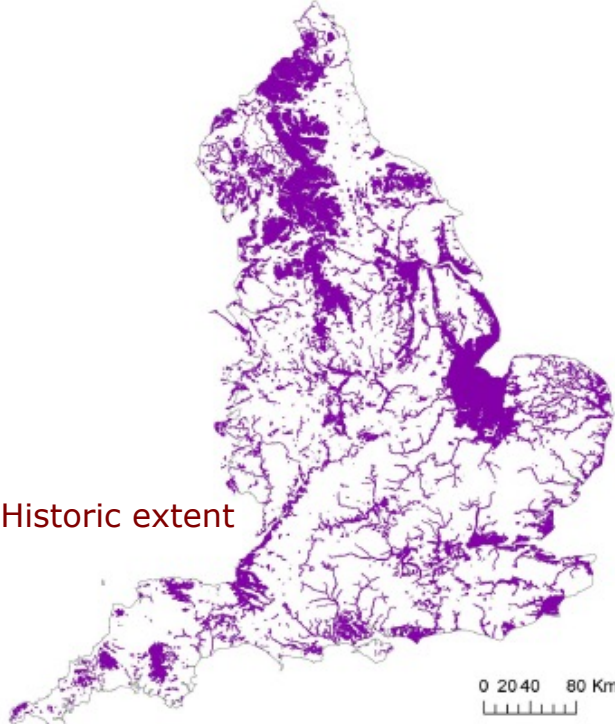
Freshwaters in trouble



No river in England is healthy (WFD status)

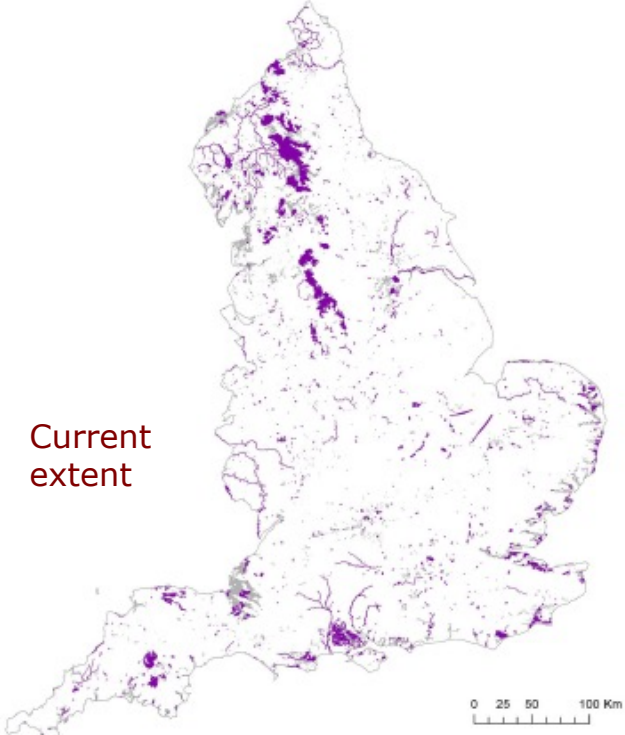


Loss of England's wetlands



Historic extent

Wetland Vision, 2008



Current extent



Freshwater landscapes – ‘the Waterscape’



From Sayer, 2014

Range of habitats (still, slow and fast flowing)

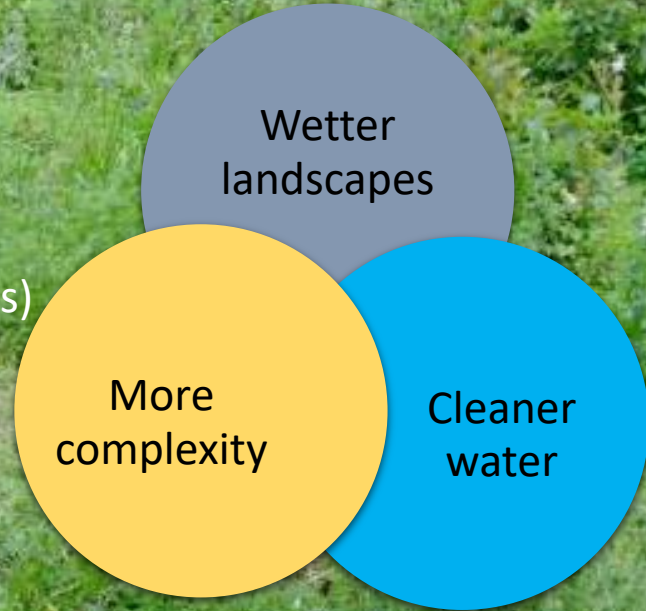
Many species able to use all habitats (only a few purely riverine species)

‘Connected’ water bodies offer refugia from high and low flows and poor water quality



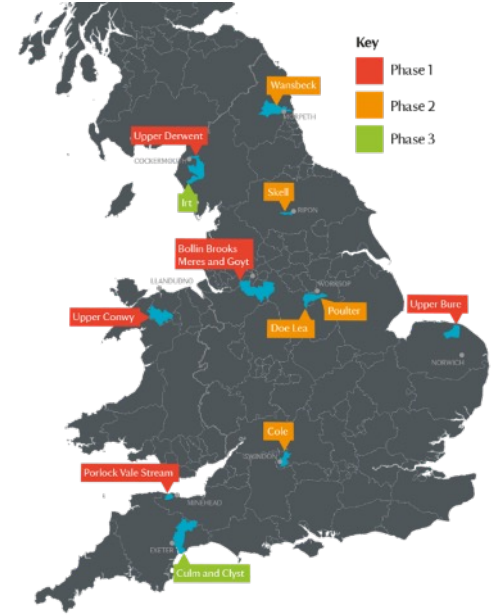
“Slow, Store, Filter”

Flood and drought resilience
Habitat creation and renewal (dynamic systems)
Landscape connectivity
Blue/teal carbon
Access opportunities
Downstream beneficiaries





A neglected chalk stream - the Bure



Upper Bure project: one of 5 NT integrated catchment management projects (Riverlands)

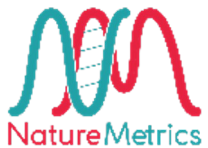
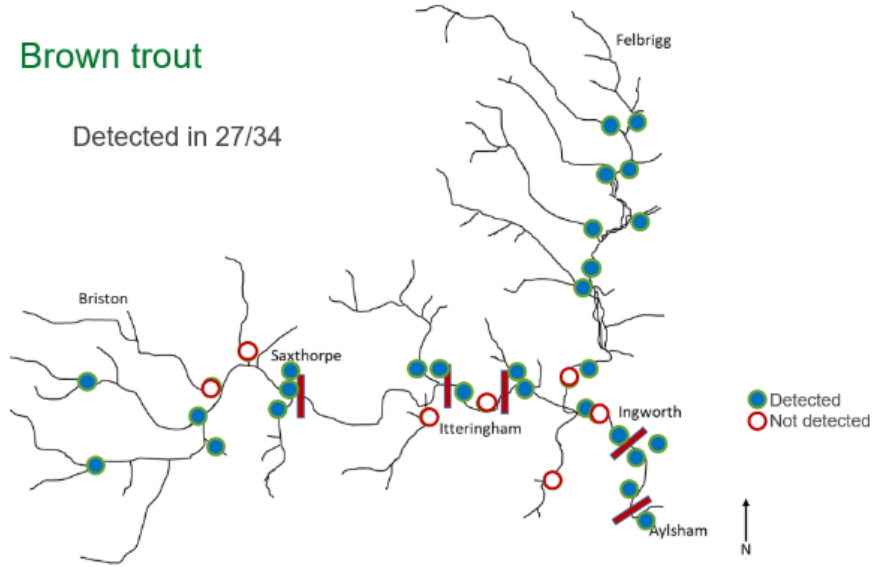
Modified by mills and agriculture; water quality issues (agriculture and small WWTW)



River Bure eDNA Pilot Project (BBSRC Grant)

Brown trout

Detected in 27/34







Adding clean water ponds

(over 50 small ponds/wetlands targeted in Bure catchment)

50% ponds lost during C20th; 80% of the remaining in poor state

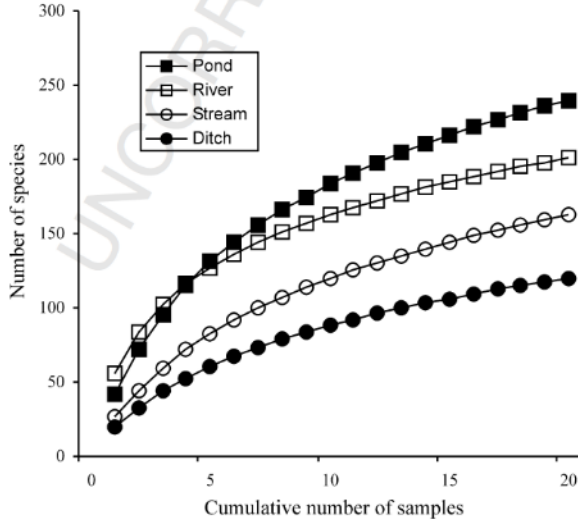
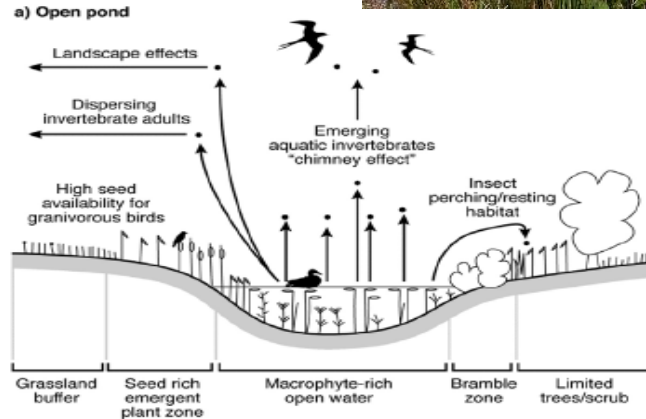


Fig. 3. Accumulation curves for plant and invertebrate species from the four waterbody types.



Landscape features (birds, plants, invertebrates)

Richer in aquatics

Kick-starting natural recovery



Large wood – River Bure



Reinstating floodplain features



Backwaters and floodplain wetlands (Scarrow Beck, Bure)

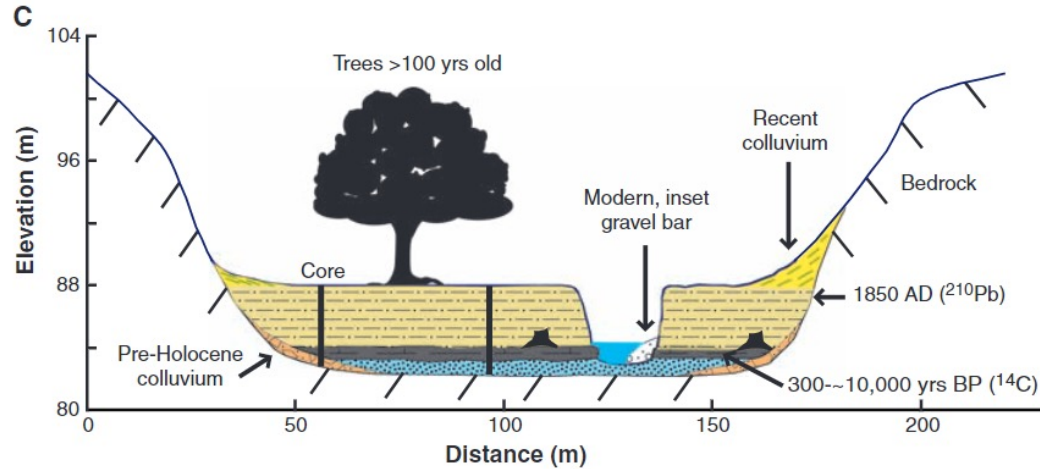


Floodplain 'connection' – working within constraints

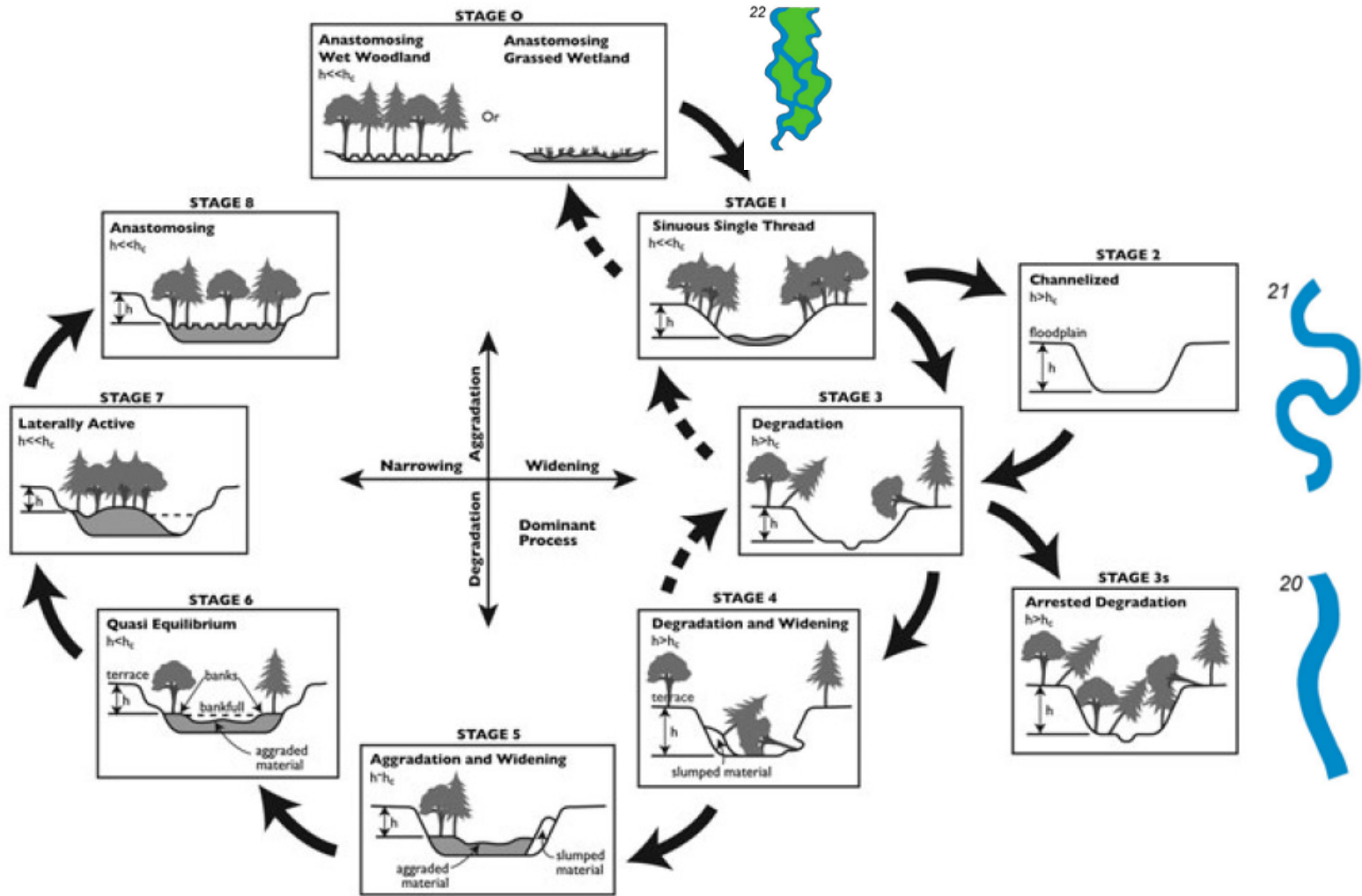




Stage 0 Origins – Walter & Merritts (2008)



“ before European settlement, the streams were **small anabranching channels within extensive vegetated wetlands** that accumulated little sediment but stored substantial organic carbon....thousands of 17th- to 19th-century milldams, buried the pre-settlement wetlands with fine sediment....**incised channels are not natural archetypes for meandering streams**”





Goldrill Beck Restoration

Restoration completed 2021
1.8km reach (£740K)
~ 1.4% of Eden SAC
20 years from idea to completion



Stage 0 Restoration (full floodplain reconnection)

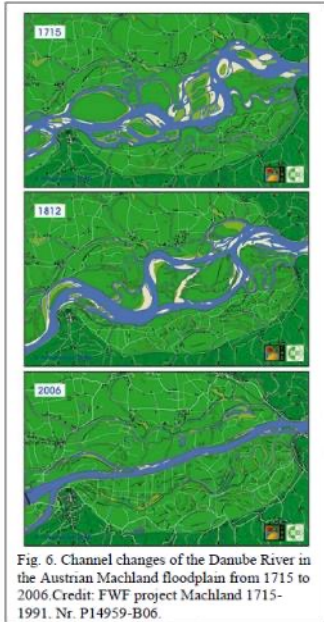
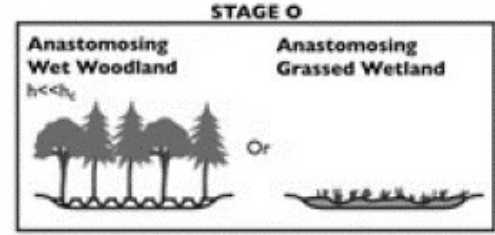


Fig. 6. Channel changes of the Danube River in the Austrian Machland floodplain from 1715 to 2006. Credit: FWF project Machland 1715-1991. Nr. P14959-B06.

Selworthy Stage 0 pilot

A landscape photograph showing a river with several large, fallen trees in the foreground. The river flows through a green field towards a line of trees and a hill in the background. The sky is clear and blue.

Stage 0 Multiple benefits (from Prof C. Thorne)

Hydrology

Floodplain reconnection
Flood attenuation
Hyporheic exchange
Surface+Ground Water
storage and release
Base flow maintenance

Morphology

Channel stability
Morph. complexity
Sediment deposition,
storage & release
Adaptive capacity
System resilience

Habitat quality

Complex vegetation
Temp. regulation
Fine sediment and
Pollution retention
Nutrient cycling
Carbon storage

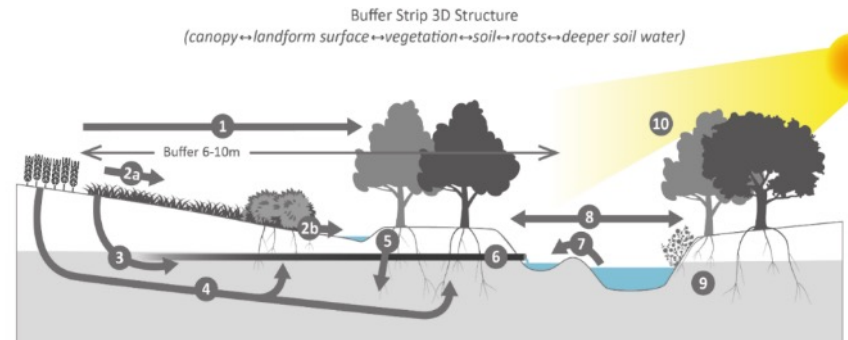


Floodplains – potential for habitat creation

~90% UK floodplains 'not fit for purpose'

Scope for range of habitats

- mosaics (new PH FWM)
- wet woodland
- species-rich grassland (floodplain meadow)
- Stage Zero restoration
- Beavers





Floodplain forest – Middle Rhine





Final thoughts – the opportunity



1. Improving our rivers and other freshwaters needs a holistic approach to improving water quality, naturalising hydrology and considering biological naturalness.
2. We need to think about the whole landscape - small waters are important for biodiversity and can be 'cleaner'.
3. We need to rethink how we use river corridors and floodplains; making space for nature in the floodplain (messy, complex, unpredictable)
4. If we can live with natural processes (Stage 0, beavers) in some parts our catchments we can make our landscapes more resilient to existing pressures and climate change
5. We can enhance cultural landscapes (chalk streams, water meadows, floodplain meadows) near to people and have the both of both worlds



*“The brook oer such neglected
ground
Ones weariness to soothe
Still wildly threads its lawless
bounds
And chafes the pebble
smooth”*

John Clare 1793-1864