Making Restoration Mainstream

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PROGRAMME

DAY 1: 6 April 2000

10.00 Arrangement and coffee

10.40 Welcome and introduction – David Sear, University of Southampton

Session 1 - The Tools for Effective River Restoration (10.45-12.30)
Chairman: David Sear, University of Southampton

1. Mark Diamond (Environment Agency)
   Developing tools and strategies for river restoration

2. Malcolm Newson (University of Newcastle), David Sear (University of Southampton)
   Geomorphological procedures and river restoration: science, survey and sustainability

3. Sylvia Tunstall, Sue Tapsell (Middlesex University), Sally Eden (University of Hull)
   Involving the public in urban watercourse restoration and rehabilitation

4. David Telford (Environment Agency)
   River restoration……and now the bad news

5. Martin Janes (River Restoration Centre)
   Sharing experiences, the role of the RRC and its database

DISCUSSION

5 mins

20 mins

15 mins

15 mins

15 mins

25 mins
With thanks to the following:


My comments are my own but some do reflect their wider input. Any errors are all mine.
Experience influences our thinking (and biases)?

- Rivers and catchments are hugely modified
- Take a Catchment approach!
- Understand and work with their processes!
- Understanding rivers means visiting them!
- We can Restore them...
The changing Scientific Landscape of River Restoration

Processes & Connectivity

Ecosystems & Services
New Tools – rise of Geospatial Data

Morphology, Inorganic Sediments, Alluvial rivers and dynamic stability

Inorganic + Organic sediments, Wider range of channel types, Dynamic rivers, ecosystems with services

Castro and Thorne (2019)
57% of the River network (98,000 km) in top 2 highest damage categories.

47% in non-main river headwater streams.

65% Floodplains have been modified mainly for agriculture

9% lost to urbanisation

6.5% Now wooded or wetland.

Entwhistle and Heritage (2017)
UK River Restoration: What have we achieved?

- > 4000 individual projects and reports
- WFD
- UK NRRI (RRC 2022)

28 SSSI/SAC Restoration Strategy
2222 km river

62% < 1km long
Median = 600m

Cashman et al (2018)
Wood use in UK River Restoration
UK River Restoration: What have we achieved? (NRRI)

In past 35 Years
>2,500 km Restored

In past 35 Years
~ 930 £Million spent

In 25 Years time
5,000 km Restored

Note:
Does NOT include De-culverting, Weir removal, Fish passes, Case studies or Strategies, Bank erosion control.
Summing it up…….

Length of Physically damaged and disconnected River Network = +100,000km

Rate of Restoration = c.125 km/year  ~800 years to complete (a different planet by then!).

Cost of Restoration = c.25,000 - 80,000 £/km  3 - 8 £Billion to complete.

However you calculate it, our current techniques are expensive, small scale, and we do not really know if they are delivering what we say they will!

We need to do something very differently if we’re to convince society to Mainstream it
What might “Different” look like? The view from the community....

• **Make Restoration Relevant to Key Global and Societal Challenges**
  - Climate Change, Biodiversity Crisis, Human and Ecosystem Health & Wellbeing

• **Scale Up, Scale out and (Dis)Connect**
  - Think Catchment!
  - Bigger and more complex is better for biota and society
  - Funding (More and sustainable)
  - Scale down energy used to do it! – Work with Natural Processes.

• **Integrate People, Policies and Programmes**
  - Education and Co-production
  - Link Land & Water Policy and Programmes and simplify number of Initiatives.

• **Move away from restoring to the past towards the concept of the ‘Working (Messy) River’ that delivers societal and ecological benefits.**
Making River Restoration Relevant: Climate Change and River Restoration

- River networks adjust in Flood Rich periods
  So give them room to do it!

- Stream Temperatures
  Riparian Trees and Shrubs do the best job
  and they’re cheap!

- Catchments with disconnected drainage systems, carbon rich uncompacted soils + “messy” complex Rivers with connected floodplains deliver the largest NFM benefits

Dadson et al. (2017; in review)
Disconnected field drainage systems with carbon rich uncompacted soils + “messy” complex Rivers with connected floodplains deliver the largest C-Storage benefits.
Ciotti et al., (2021)

**FORM-BASED RESTORATION (1990’s tech)**

- High GHG Energy Source
- High GHG Materials
- Restricted Process Space
- Limited Change over Time

**PROCESS-BASED RESTORATION – 21st Century Tech**

- Low GHG Energy Sources
- Low GHG Materials
- Maximum Process Space
- Time and Space for Dynamic Change to Occur

**Complexity and Connectivity Matter**

- > Carbon Storage
- > Water Retention
- > Biodiversity

**But fix Catchment problems first!**
We can deliver “messy” rivers – but Scaling up?

River Brede NERI (1998)

USDA – Deer Creek Story Map

River Nar
Photos Charles Rangely-Wilson
For England & Wales:

22% of the most damaged rivers (37,500km) have V.High – High Geomorphic Activity.

39% (66,822km) have $>35\ Wm^{-2}$ stream power (erosional adjustment).

High potential to work with Natural processes to restore Rivers.
Cumbrian Floods 2009 & 2015

Changes in channel morphology resulting from a 1:600+ year flood results in a decrease in flood risk.

Floodplains stored ~1.6 million tonnes of coarse sediment.

c.£300 Million to have done this through river restoration.
Scaling Up 3: Working with Biological Communities to Deliver Restoration.

We need to understand ESE Role in Restoration and delivery of Ecosystem Benefits to society.

How to integrate ESE’s into Restoration planning and Natural Capital / ESS accounting.

Source of photos: Caddis Johnson et al 2017; Beaver The Economist; Barbel Andy Pledger
But...What about all the farmland, infrastructure and buildings?

- Integrated Land use planning framework needed.
- Take Time....7% increase is OK!
- Build Partnerships – longitudinal and lateral.
- Involve Good engineering at Risk points.
- Monitor, Learn and Communicate.
Education challenge - What Rivers do people want?

1990’s
Clean, clear, ‘comfortable wildness’ with access and facilities particularly in urban areas – no wood in urban.

2000’s
Clean, clear, accessible rivers with wooded riparian zone, wood in rural rivers but not urban.

2020’s+
Messy, complex Rivers and floodplains with wood and beaver. Challenge to access, with good water quality.

Gregory & Davies (1993); Piégay et al., (2013)
So ... the 3 Key Needs for Mainstreaming River Restoration

**Think Catchment First** - I do not think we’ve done enough to join up the catchment with our reach based restoration delivery. We’re still too site focussed. NFM helping this....but needs to be more than water! Need to work across sectors to deliver this.

**Work With Natural Processes** – it’s the most effective way to scale up, its cheaper long term, BUT it requires room to achieve its best.

**Communicate and Educate** - We know why and how to restore river catchments and river networks, and we know they can deliver societal benefits. The biggest constraints now lie in convincing people – and that needs evidence and education.
A cautionary tale…. Monetizing and Metrics in River Restoration Scaling Up or Dumbing Down?

Mitigation Credits and Mitigation Banking....

In N. Carolina, USA – **length of restored river is the credit.** More stream restored more credits. **Prevailing model for restoration is the single thread meandering channel.**

Result is homogenous meandering channels everywhere!

We Need to be careful in selecting our measures and targets for Restoration and we need strong informed regulators.
“The goal of river rewilding and restoration is not to restore a painting that then needs curating, it is about restoring a system that can come to look after itself while continuing to deliver a range of benefits for contemporary and future communities in a changing world”.

Modified from Paul Jepson (2016)