Sharing best practice and enhancing the benefits of Nature-Based Solutions

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Introduction

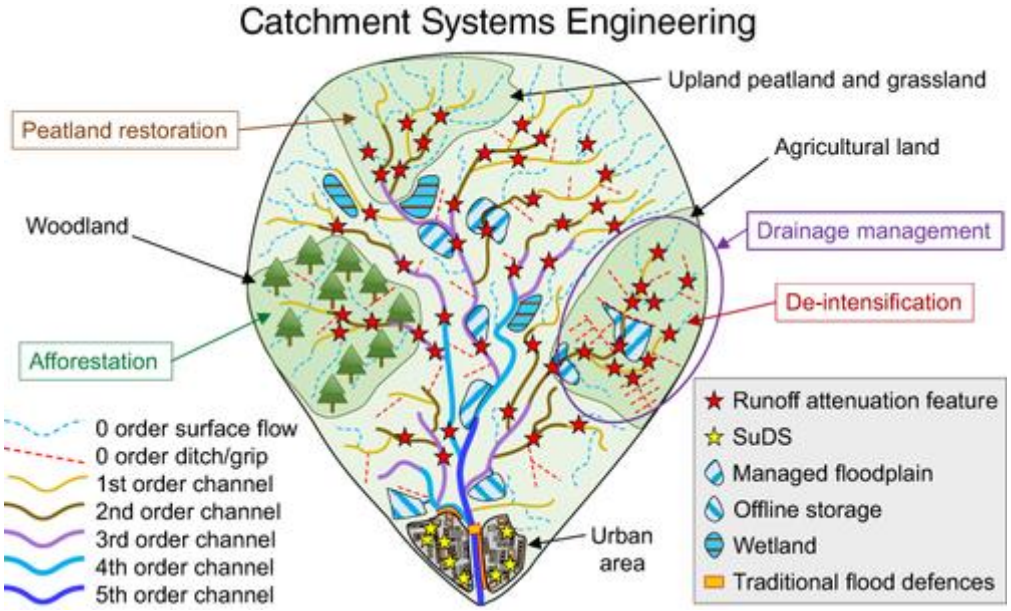
- **Nature-Based Solutions (NBS): working with nature to address societal challenges, providing benefits to both humans and biodiversity (IUCN)**
- One potential solution to current and future water-related environmental pressures
- NBS rollout is slow
- Need for evidence, guidance and approaches to maximise the benefits

Terminology: Reflections

- Focus of talk: **Nature-Based Solutions**
- **Other terminology references**
  - Natural Water Retention Measures (NWRM)
    - *Nature-based Catchment Management Solutions*
  - Natural Flood Management
  - A lot more terms out there

Core principles: Slow, Store, filter & disconnect

Managing our catchments for multiple purposes

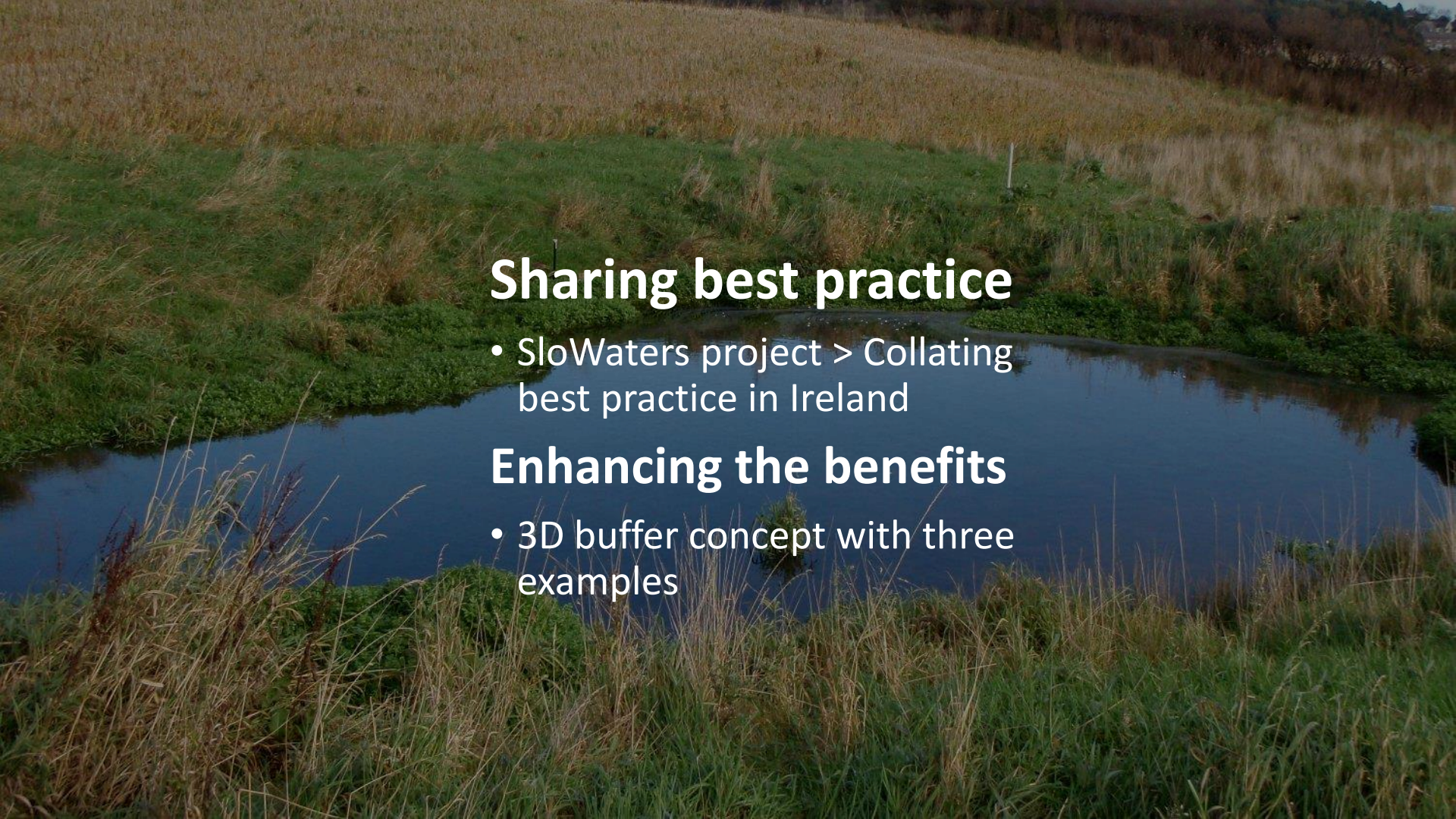


- **Catchment Systems Engineering approach**
- Proactive interventions that provide and enhance multiple ecosystem services

'Natural' approach — Traditional engineering



See Hewett, Wilkinson et al., (2020) WIRES Water



Sharing best practice

- SloWaters project > Collating best practice in Ireland

Enhancing the benefits

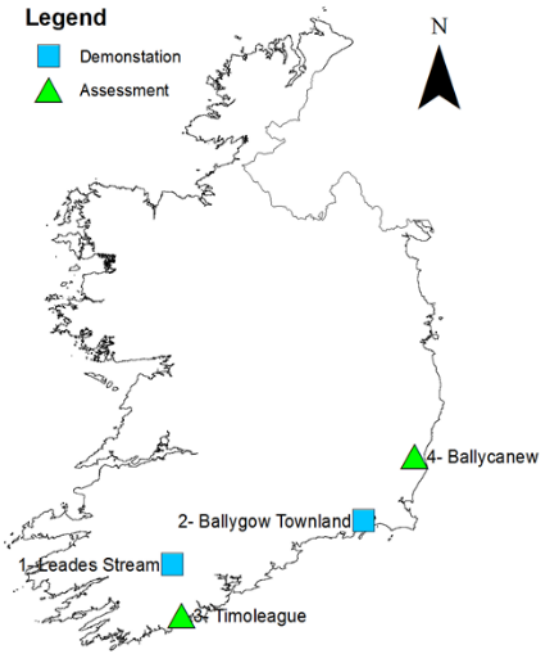
- 3D buffer concept with three examples

: a Strategic LOok at natural WAter reTention mEasuReS

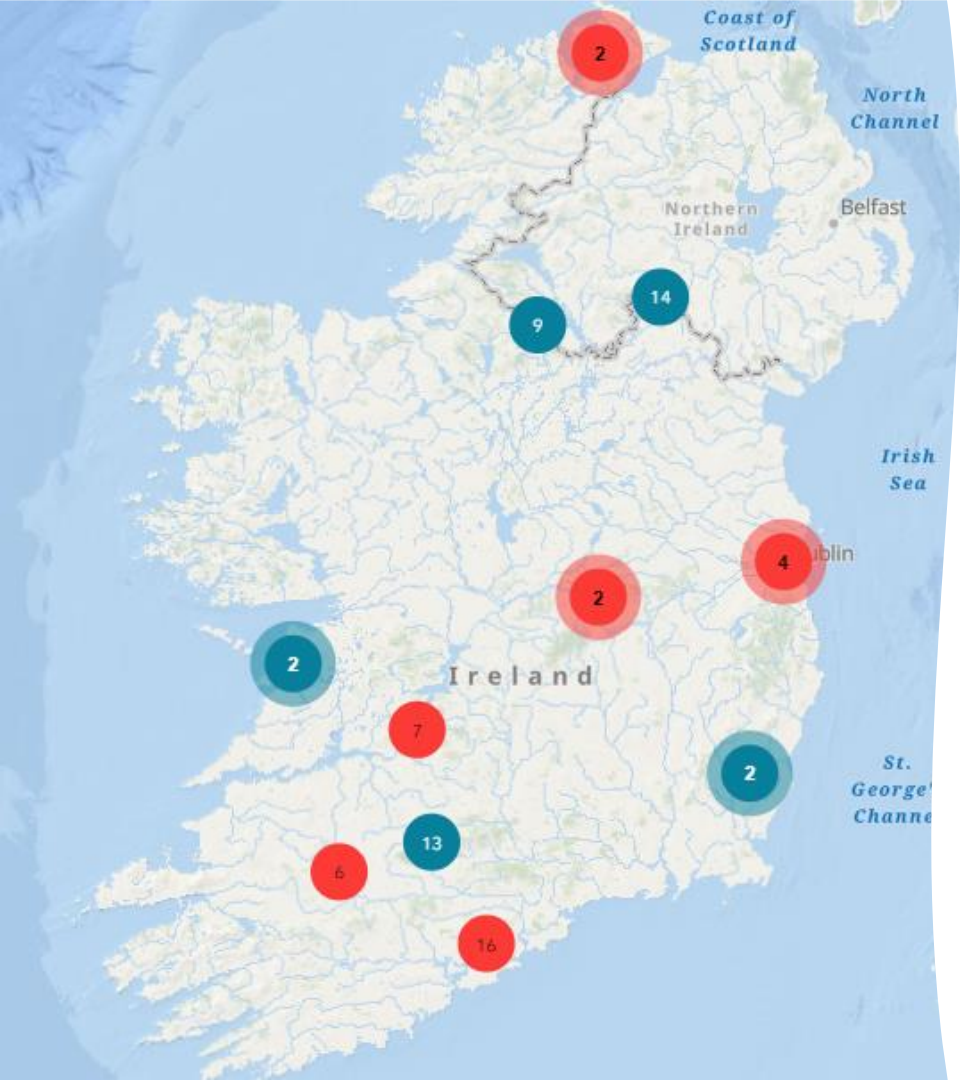
SLOWATERS

- Reviewing, demonstrating, mapping and modelling Natural Water Retention Measures potential in Ireland

www.slowaters.eu



This project is funded by the EPA Research Programme 2014-2020. The EPA Research Programme is a Government of Ireland initiative funded by the Department of Communications, Climate Action and Environment.

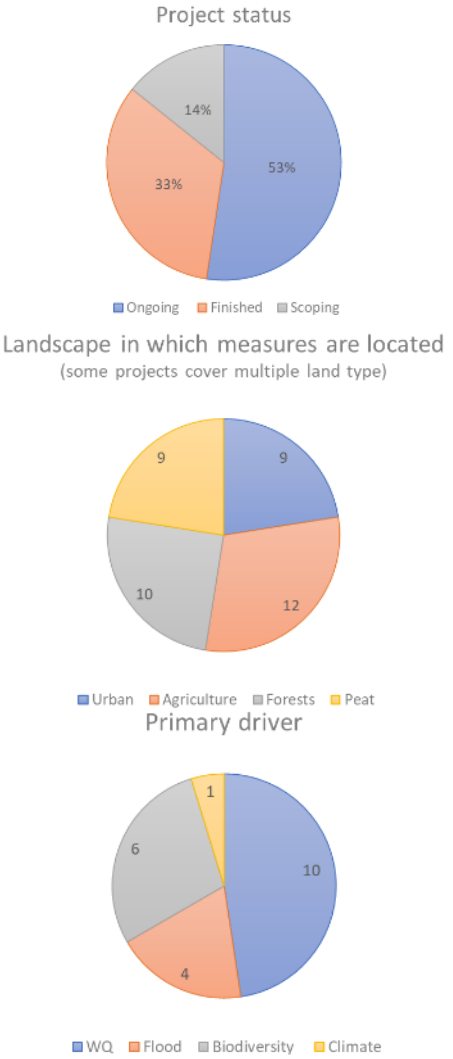


Irish NWRM cases

- Level of NWRM for flood management in Ireland
- Source: Online form and literature search.
- 22 **Projects** identified
- Of these there is a **minimum of 85 sites** (but many more not listed)
- Each case has a primary driver but acknowledge wider benefits
  - Not many flood driven projects
- Survey focused on forest, peat & agriculture but we received urban cases as well.
- *Survey is still active*

Case studies: overview

- Most projects are monitoring and/or modelling the outcomes of their work (or intend to)
- Focus: rural, but we gained urban responses.
- Very little in the way of evidence statements for Flood Risk Management.
- **Does this mean 'flooding' is not being explored in these projects?**
- **Is there potential to 'enhance' the flooding benefits?**



Focus on Riparian Buffers

- ~42000 ha total buffer zones in agri-environment funding in England > only 13% of this land targets watercourse riparian zones.
- Minimum width (2m) and many not fully compliant
- Lifespan: of narrow buffers may be short

See: Stutter, Wilkinson et al., (2020) 3D buffer strips

Forestry Commission

Environment Agency

Evidence

3D buffer strips: Designed to deliver more for the environment

Report

Stutter, Wilkinson et al., (2020) 3D buffer strips: Designed to deliver more for the environment. Environment Agency for England and Wales Scientific evidence report.

The 3D buffer concept

Forest Research

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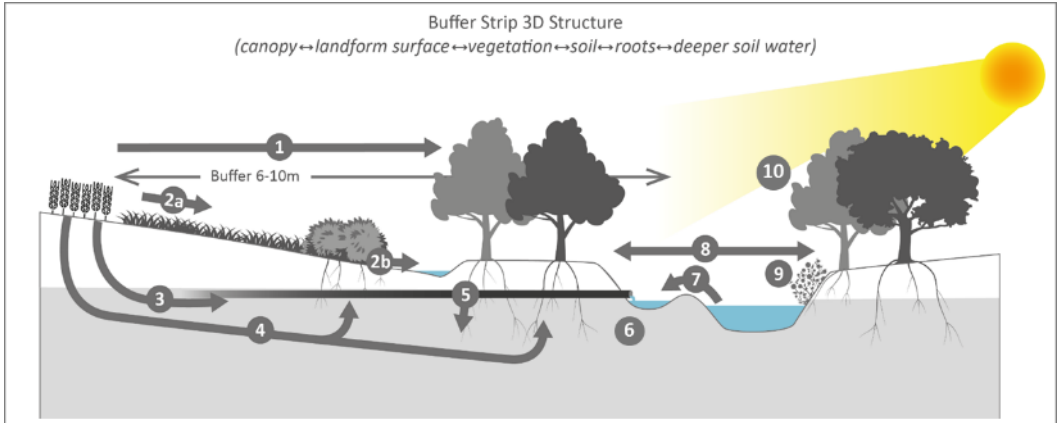
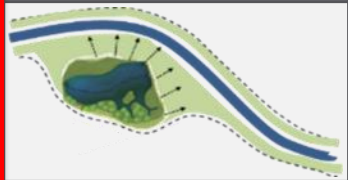
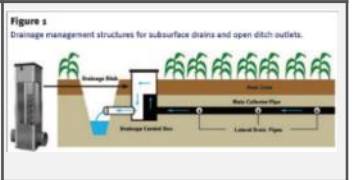
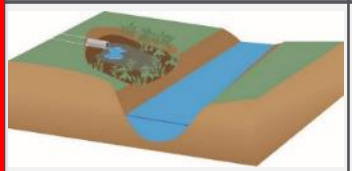
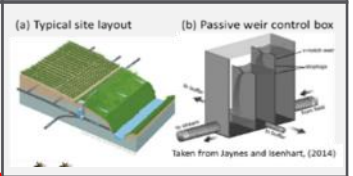
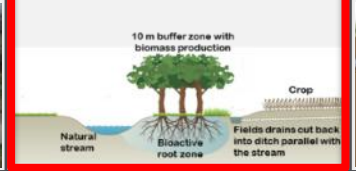
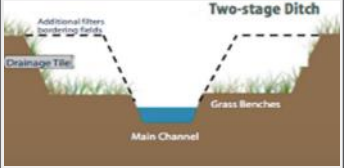


1	Interception of spray drift by tree canopy	6	Interception of soil artificial drainage waters to encourage nitrate processing
2	Surface runoff control: (a) deposition and infiltration amongst vegetation, (b) for extreme erosion and fine particles against raised ground features	7	Altered bank profiles to increase connection with the floodplain, diversify soil wetness, trap sediments and nutrients
3	Within-soil processing by soil chemistry, microbiology and soil fauna	8	Enhancing interactions between terrestrial biodiversity and aquatic ecosystems promotes in-stream nutrient processing
4	Nutrient uptake into biomass from shallow and deeper soil water via roots	9	Bank stabilisation via tree roots and bank-side planting
5	Increasing soil organic matter by plant litter and carbon via plant roots	10	Riparian shading to mitigate elevated river water temperatures

Grass buffer strip	Raised buffer: runoff	Buffer wetlands	Controlled drainage
			
Wildflower buffer	Raised buffer: overbank	Tile drain-fed wetlands	Tile drainage onto saturated buffer zone
			
Wooded buffer	Sediment trap	Integrated buffer zones	Two-stage channel
			
Magic margins	Sediment filter fence	Denitrifying bioreactor	In ditch sediment trap
			

Measures database

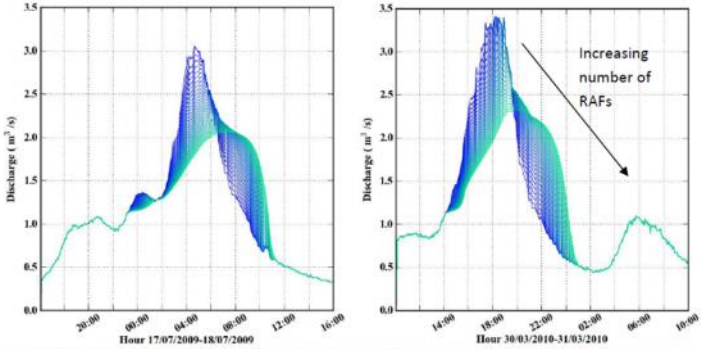
Stutter et al., (2022) Database of sixteen riparian management measures, Mendeley Data, V1, doi: 10.17632/ggc3pz78w4.1

www.smarterbufferz.ie

This project is funded by the EPA Research Programme 2014-2020. The EPA Research Programme is a Government of Ireland initiative funded by the Department of Communications, Climate Action and Environment.

Raised field margins

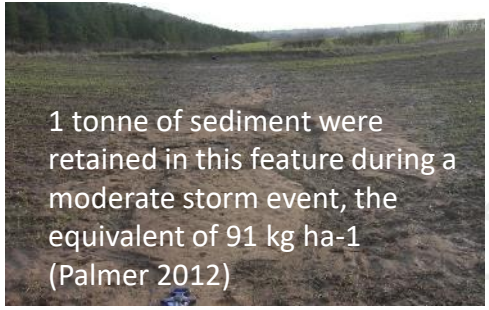
- Enhancing sediment capture and temporary flood storage
- Land can still be managed
- Volume up to 10,000 m^3
- ***Win-win measure?***
- Guidance on construction is essential



From: Nicholson et al., 2019. Journal of Flood Risk Management

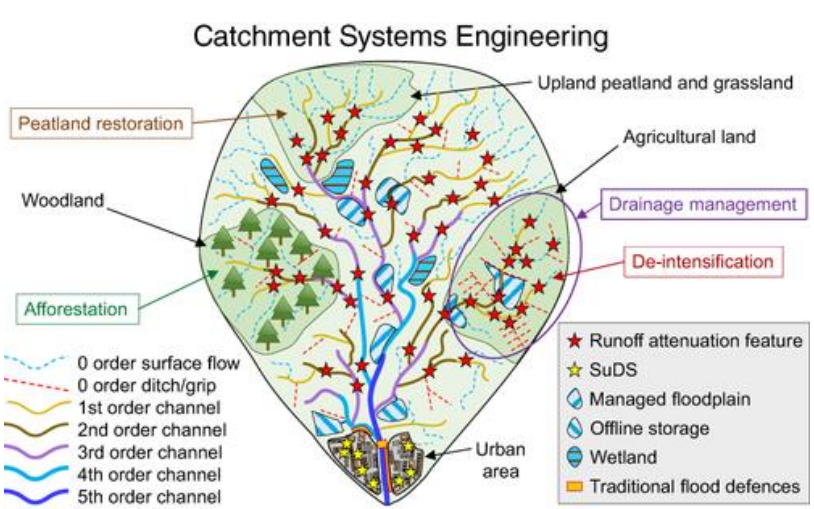
Raised buffer: runoff UK

Raised buffer: overbank



How do we manage future flooding, *droughts and WQ*?

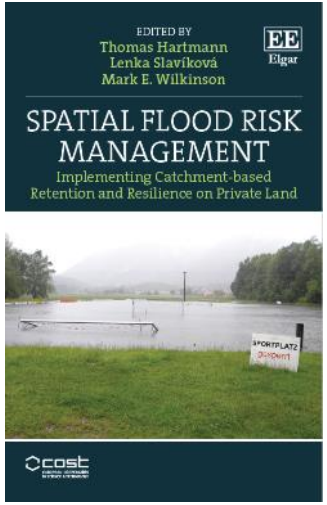
Large numbers of measures requires large amounts of land



Headwaters

Floodplains

Built up areas



Hydrology

Socio-political

Stakeholders

'Natural' approach — Traditional engineering

Concluding thoughts

- Restoration – can we restore our landscapes?
- It is possible to enhance ecosystem services through soft engineering approaches
- Its not *'one size/approach fits all'*
  - *Range of measure – treatment train*
- Extreme events: large amounts of storage = large amounts of land.

INTERESTED?

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VISIT OUR SITE

https://www.slowaters.eu

ANY QUESTIONS?

Happy to answer these!