

LANDWISE project overview

NERC Evaluating the effectiveness of natural flood management programme

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LANDWISE: LAND management in loWland catchments for Integrated flood riSk rEduction

Research & Consultancy: University of Reading, British Geological Survey, Centre for Ecology and Hydrology, University of Gloucestershire, Forest Research, JBA Consulting, CGI Group, Institute for Environmental Analytics JBA Trust, University of Sheffield, Agrimetrics,

Policy: Environment Agency, Natural England, Forestry Commission

Flood Groups: National Flood Forum, Loddon Valley Residents Association, Swallowfield Flood Resilience Group, Pang Valley Flood Forum

Farm Advisors: National Farmers Union, Farm and Wildlife Advisory Group (SE), Farm and Wildlife Advisory Group (SW)

Farmers: Wilts Soil and Root Innovators, Penn Croft Farm, Hendred Farm Partnership, Fincham Farm Partnership, Yateley House Farm, Kingsclere Estate, Farmer Guardians of the Upper Thames

Conservation NGOs: The National Trust, Loddon Fisheries & Conservation Consultative, Blackwater Valle Countryside Partnership, Wild Oxfordshire, Foundation for Water Research, Action for River Kennet, South East Rivers Trust, Freshwater Habitats Trust, Berkshire, Buckinghamshire & Oxfordshire Wildlife Trust, Hampshire and Isle of Wight Wildlife Trust, Westcountry Rivers Trust

Local Flood Authorities: Wokingham Borough Council, West Berkshire Council, Hart District Council, Swindon Borough Council, Thames Regional Flood & Coastal Committee

Water Utilities: Affinity Water, Thames Water

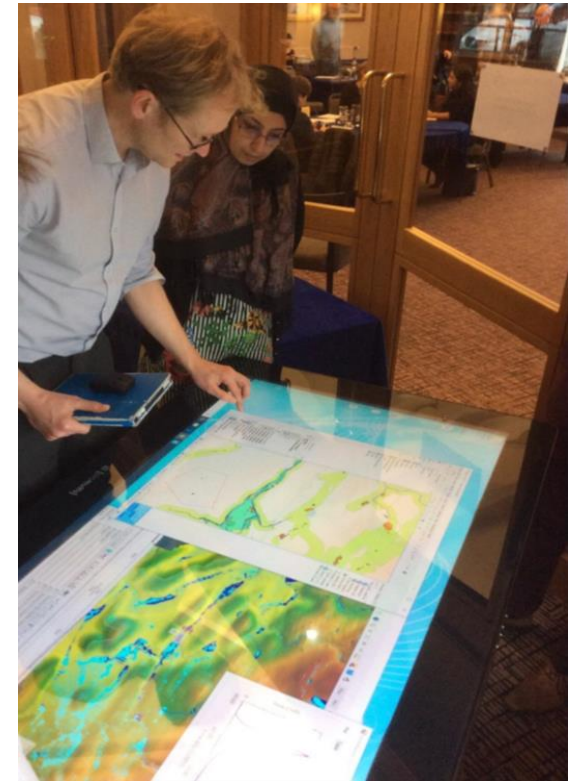
Catchment Partnerships: Loddon, Chilterns, Upper Thames, Evenlode, Kennet and others

NERC NFM programme overview



Programme Scope

- 2017-2021 £4 million programme
- Aim: carry out novel research on hydrological processes, including measurements and flood modelling
 - NFM measures
 - flood risk scenarios
 - from feature to large-catchment scales
- 3 projects
 - Landwise
 - Protect NFM
 - Q-NFM
- Robust evidence base to support decisions made on the design and delivery of NFM



Investigators



Project partners



Programme Executive Board



- Land-based NFM measures in lowland catchments (West Thames), particularly groundwater-fed
- Evaluating the effectiveness of NFM Measures
 - Identified by those who manage land
 - Land use and management e.g. tillage practise, crop choice and tree planting
 - To increase infiltration, evaporative loss, and below ground storage
- Using simple to novel measurement techniques
 - Field soil survey
 - Remote sensing methods to measure soil moisture
- Multi-scale modelling
 - Field scale
 - Small to large catchment

PROTECT-NFM



- Optimising NFM in headwater catchments to protect downstream communities
- Focus on upland catchments (Peak District) with peatlands and hard geology
- NFM measures: peatland restoration (gully blocking and Sphagnum cover) and upland woodland
- Developing sophisticated but computationally simple models
- Potential for low cost measures to reduce flood risk for small communities

<https://protectnfm.com/>

- Quantifying the likely magnitude of nature-based flood mitigation effects across different catchment scales
- Focus on Upland Catchments (Cumbria)
- NFM measures include
 - sward lifting, peatland restoration, leaky bunds and dams, floodplain reconnection, hedge and wall restoration, and tree planting
- Computer modelling and data collection to fill evidence gaps and reduce uncertainties

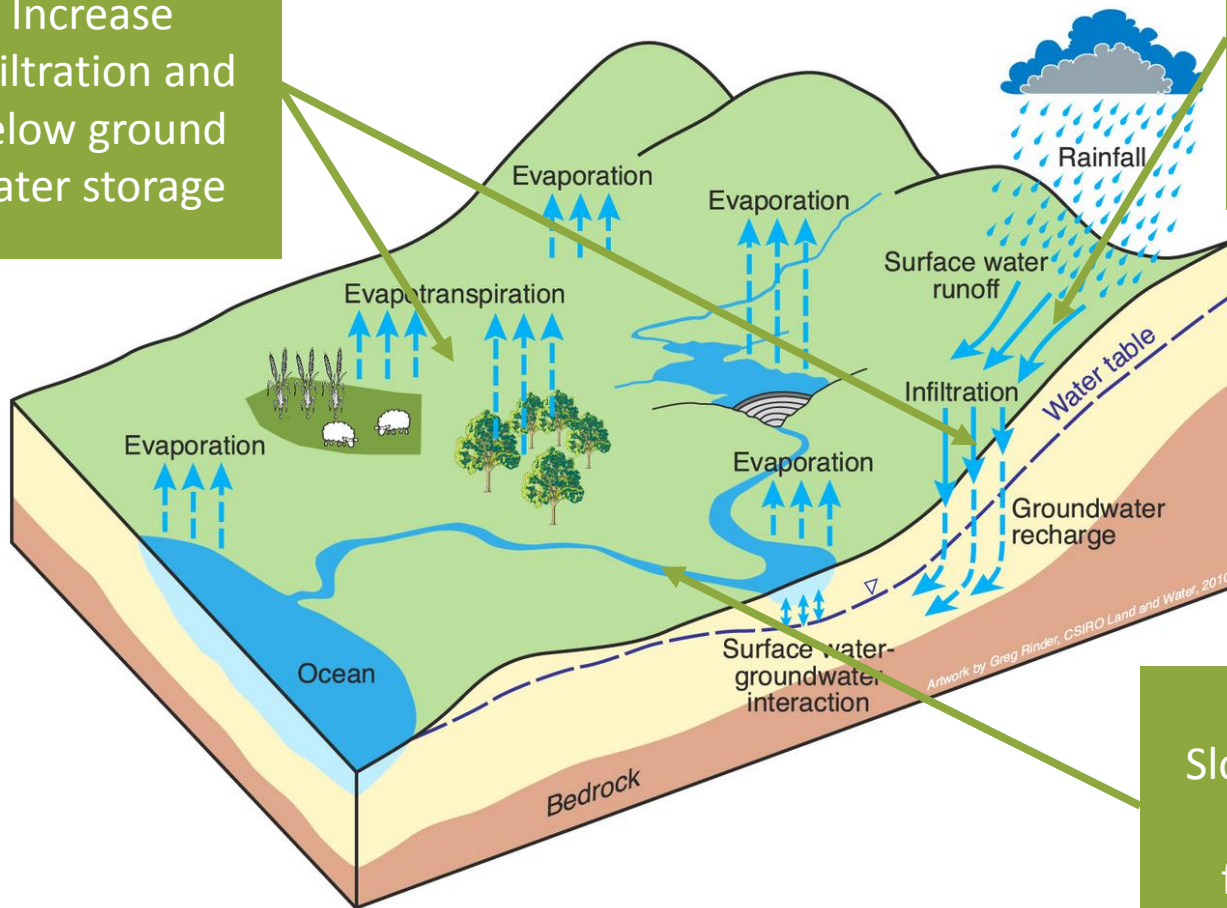
<https://www.lancaster.ac.uk/lec/sites/qnfm>

Landwise project overview

NFM options

Option 1:
Increase
infiltration and
below ground
water storage

Option 2:
Slow the flow of
water from
hillslope to river



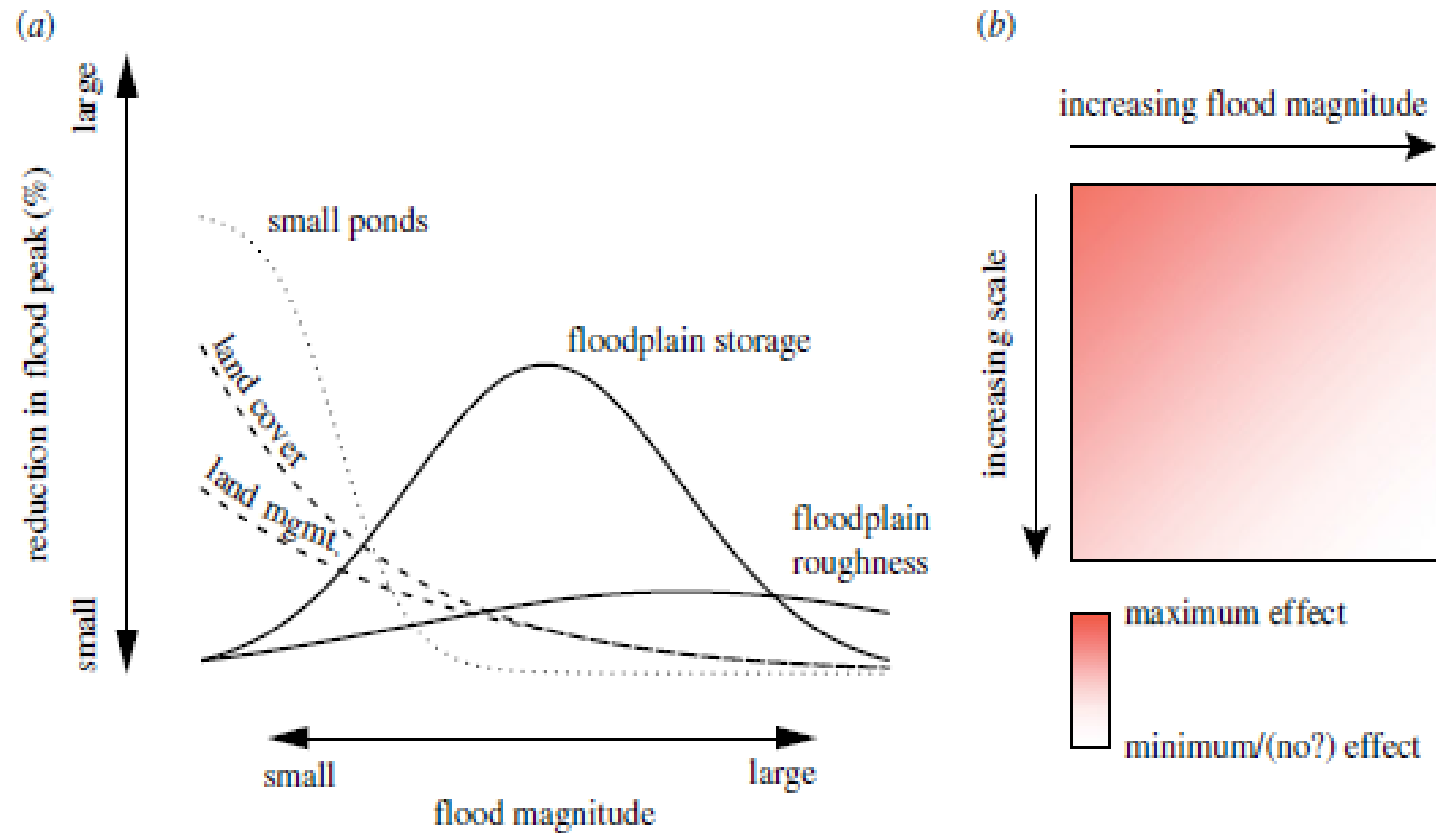
Option 3:
Slow and store
water on
floodplains

Research questions

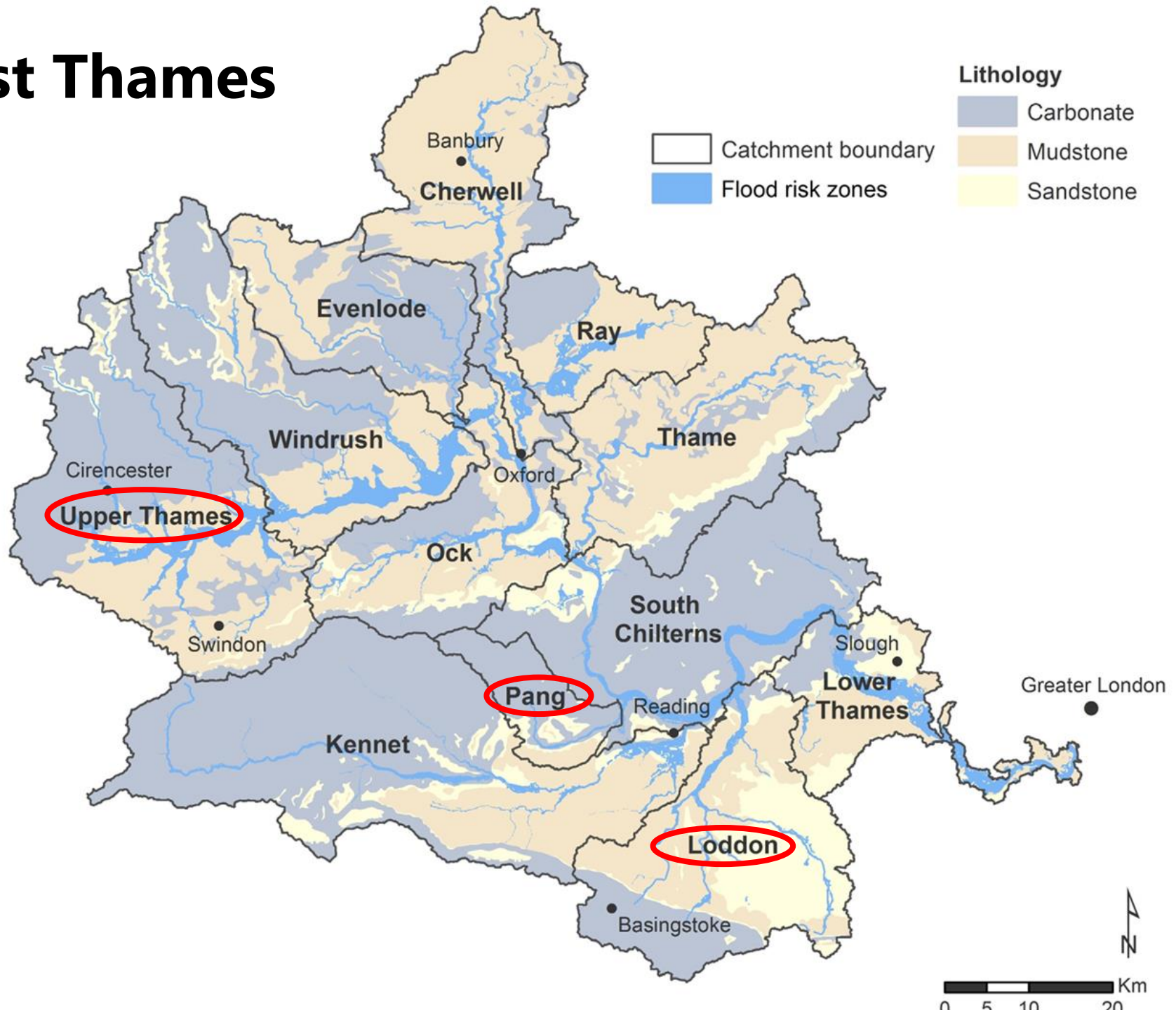
- **Qa.** How effective are different land-based NFM measures at **increasing infiltration, evaporative losses and below-ground water storage** in different locations across lowland catchments?
- **Qb.** How does the **effectiveness of land-based measures vary** seasonally and between years with respect to antecedent conditions, precipitation magnitude and duration?
- **Qc.** How effective are land-based measures at delivering **catchment-wide water storage and infiltration, thereby reducing runoff rates, compared to targeted approaches** to reduce downstream flood (and drought) risk across different catchment scales (<100-8000km²)?

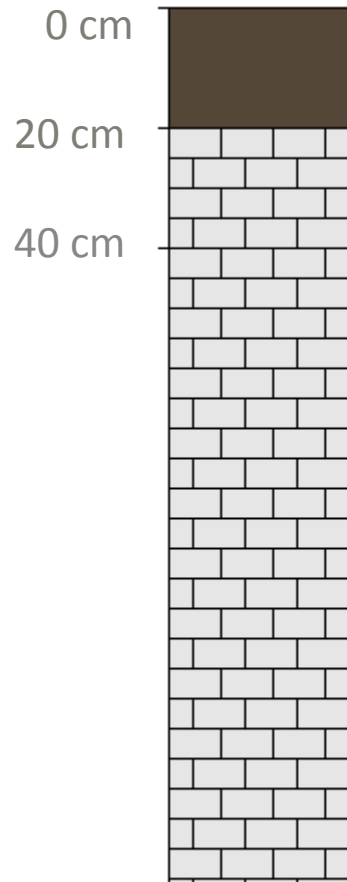
Testing a Theoretical Framework

- Dadson et al (2017) propose a conceptual framework for NFM measures

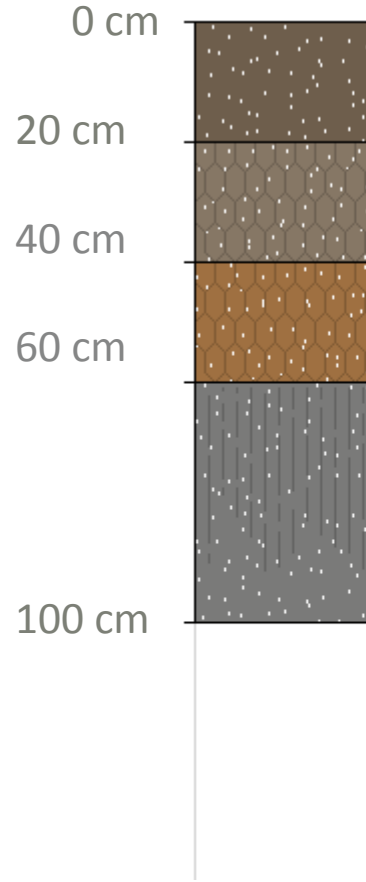


West Thames





**Shallow lithomorphic soil
over Carbonate**

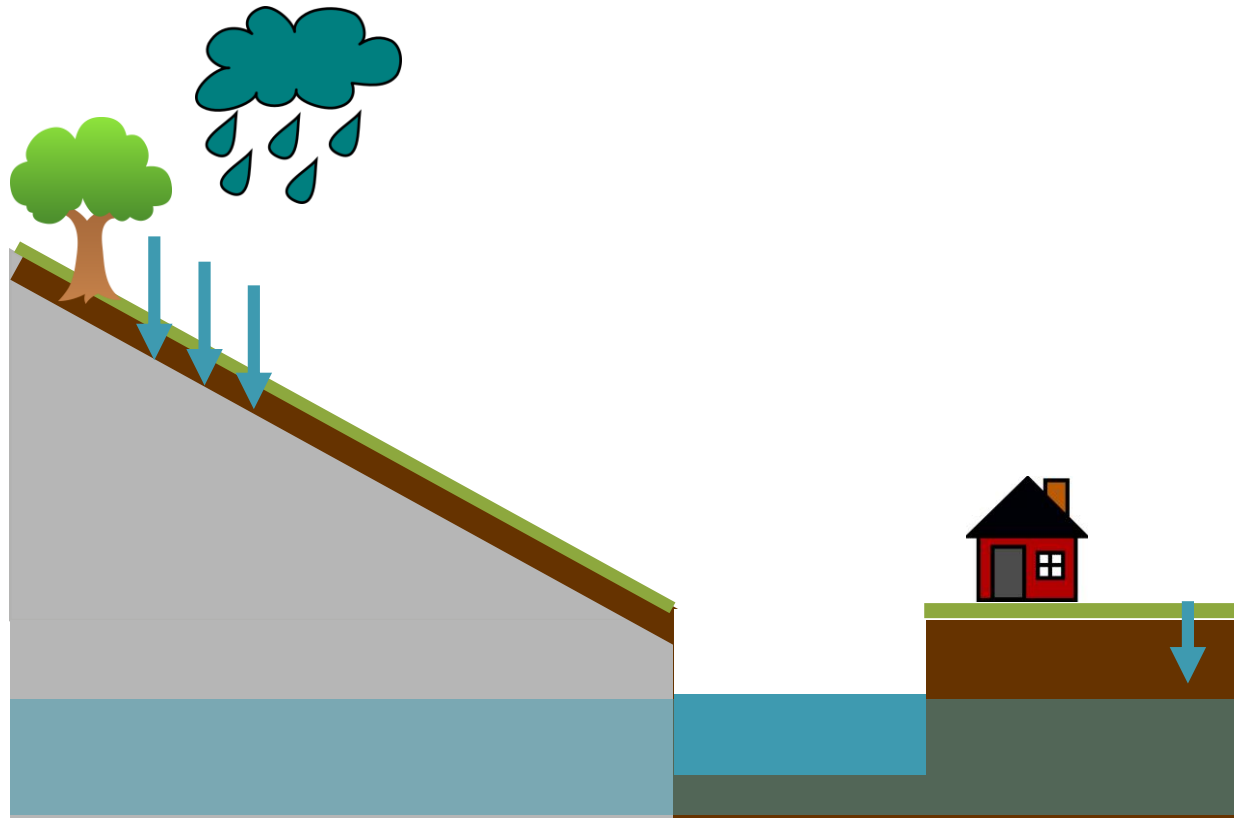


**Deep surface water gleys
over Mudstones**

Typical soil profiles

www.landis.org.uk

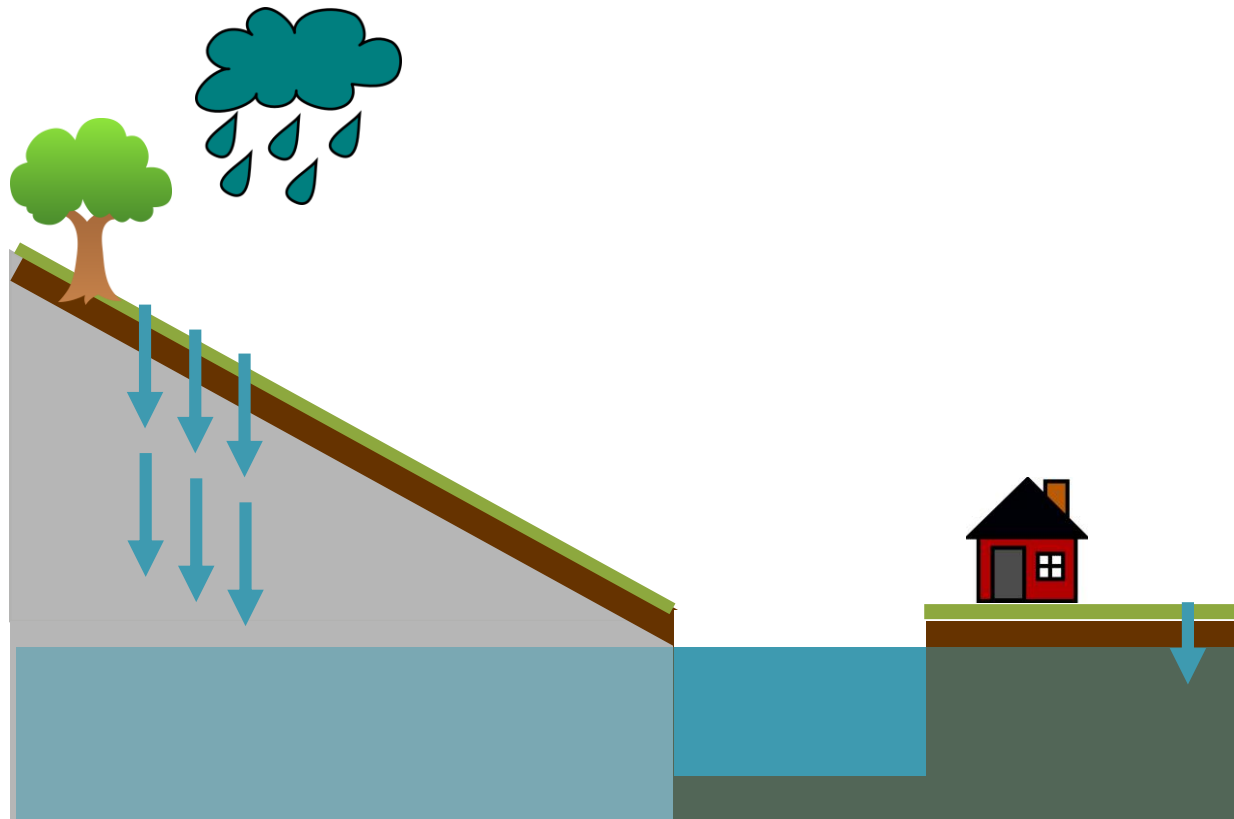
Short-term: Increase infiltration, decrease flooding...



Chalk hillslopes

Clay & gravel floodplains

Longer-term: Increase infiltration, increase flooding from higher ground water levels...?



Chalk hillslopes

Clay & gravel floodplains

Could help with drinking water supply...?



Short-term: Increase evapotranspiration to increase infiltration, decrease flooding...



Chalk hillslopes

Clay & gravel floodplains

**Long-term: Increase evapotranspiration,
decrease flooding due to lower ground
water levels, but do we want low flows?**



Chalk hillslopes

Clay & gravel floodplains

**Exacerbates
drinking water
supply
problems...?**



WP1: Use local knowledge & technical data to create scenarios

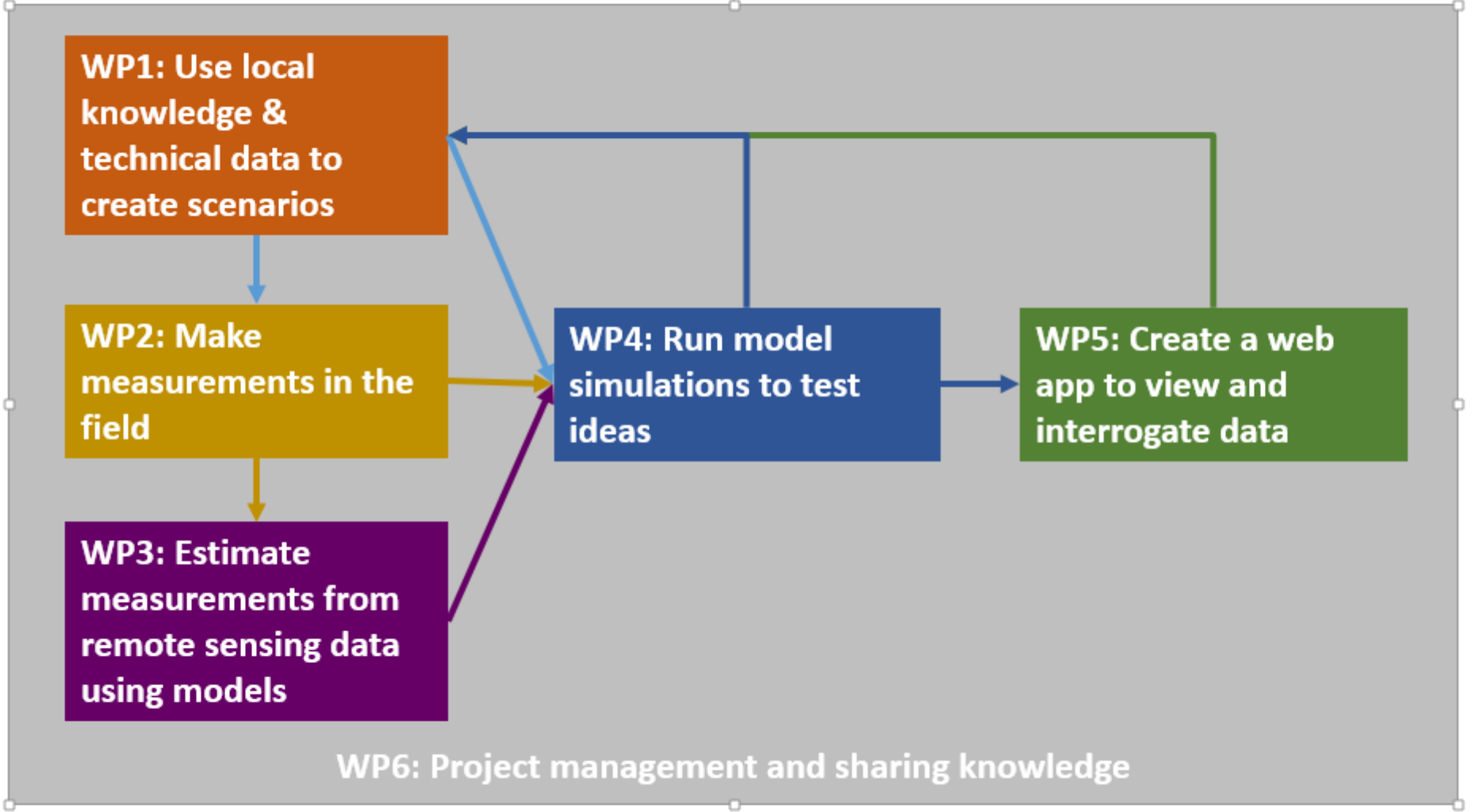
WP2: Make measurements in the field

WP3: Estimate measurements from remote sensing data using models

WP4: Run model simulations to test ideas

WP5: Create a web app to view and interrogate data

WP6: Project management and sharing knowledge



Working together with our partners (2018-2021/22)

- **Working groups**

- Farmer knowledge and new agri-policy report
- Field work
- Remote sensing (to be set-up)
- Data visualisation (to be set-up)
- Communications

- **Workshops on NFM scenarios** (modelling follow up to come)

- Catchment Partnerships: Upper Thames, South Chilterns, Loddon, Kennet, Ock

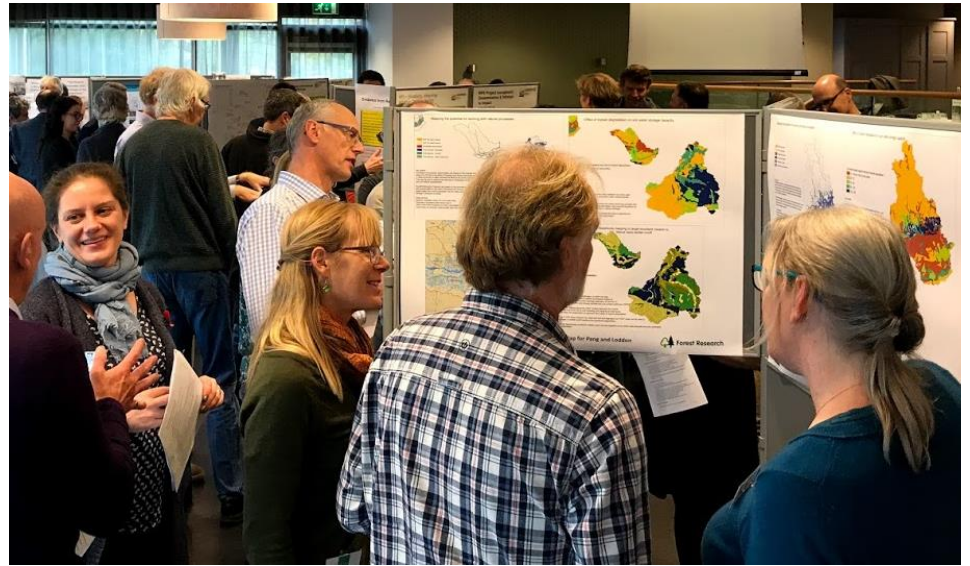
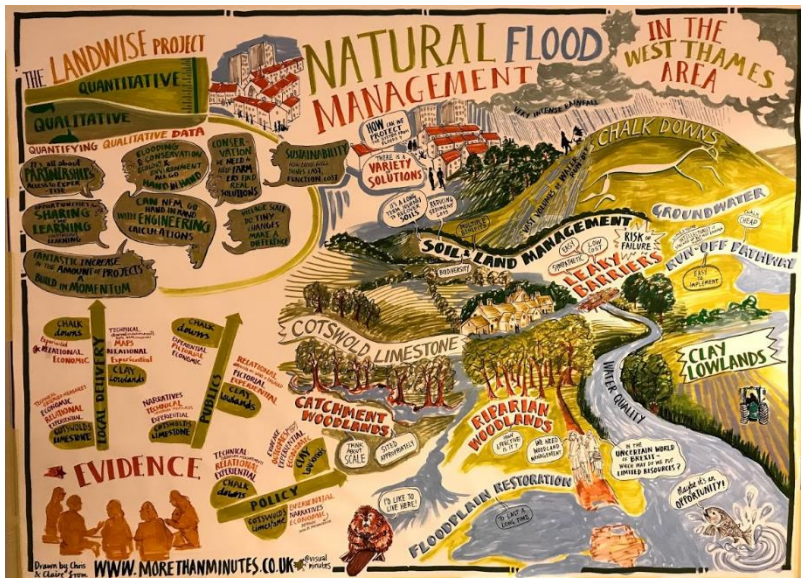
- **Advisory Board**

- Two meetings, three more to go

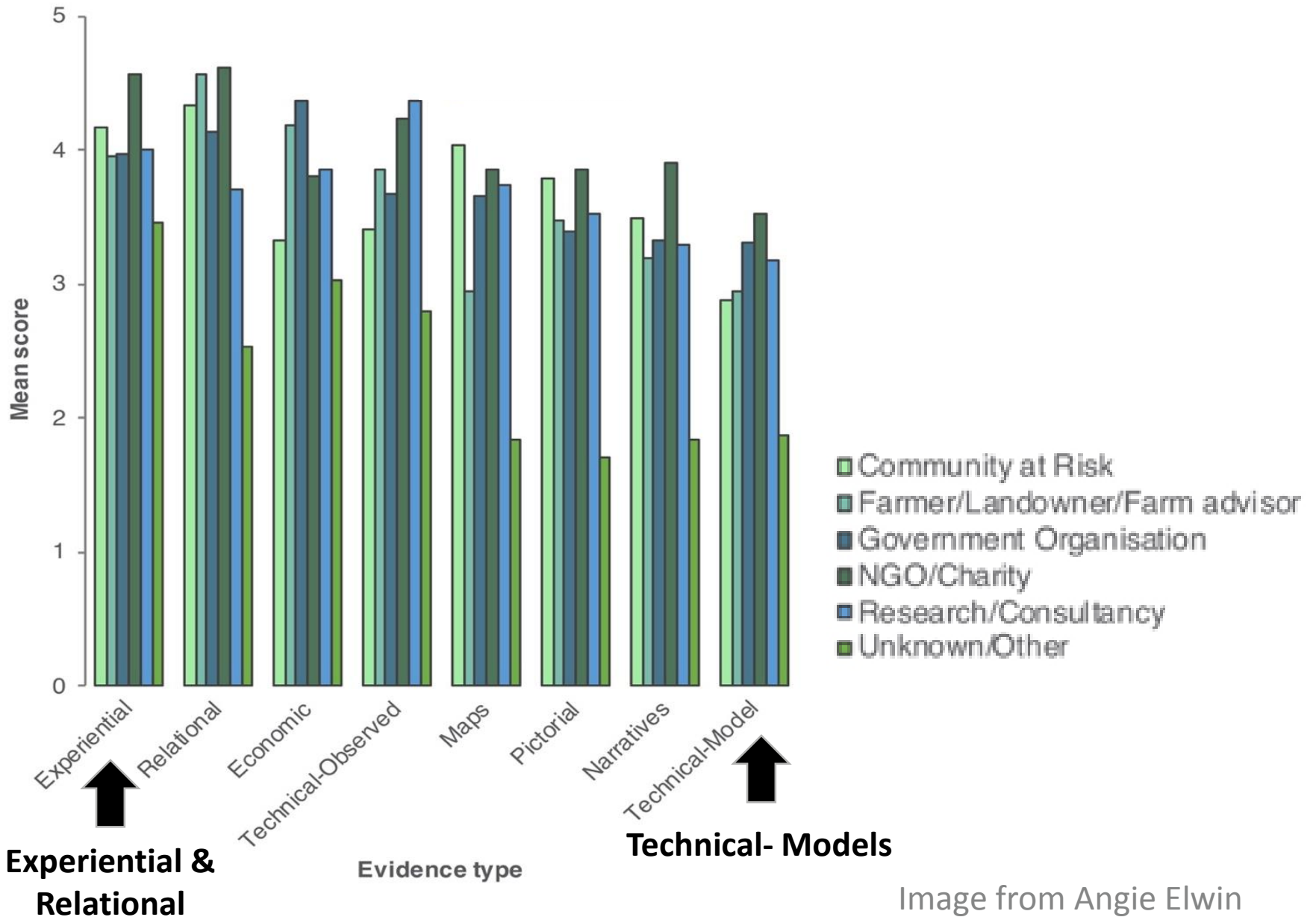
- [almost] **Annual workshops**

- Reading, 6 Nov 2018
- Culham, 20 Feb 2020
- FarmEd, Honeydale Farm, 9 Jun 2021
- Final meeting winter/spring 2021/22

Some things we learned at the last annual workshop....

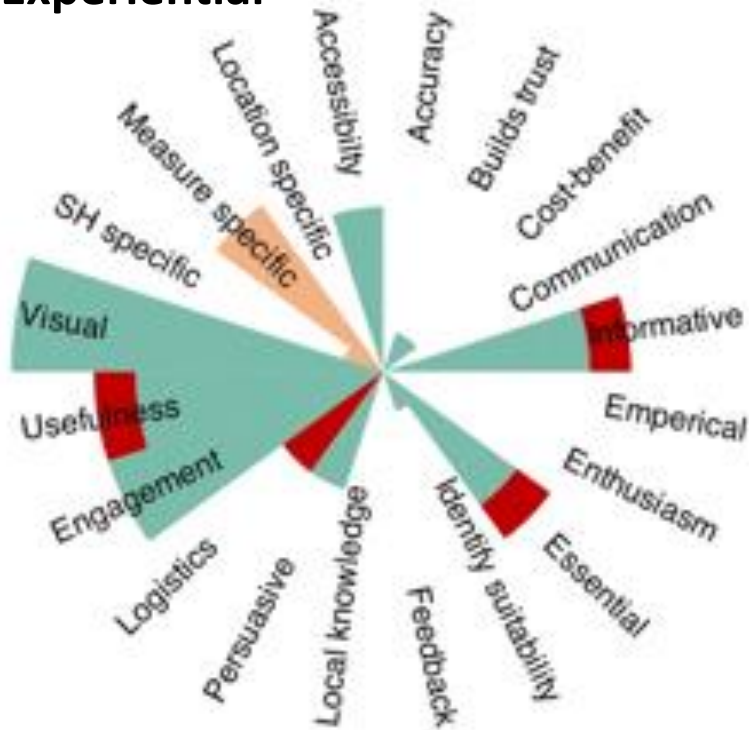


What type of evidence on NFM effectiveness do you need?

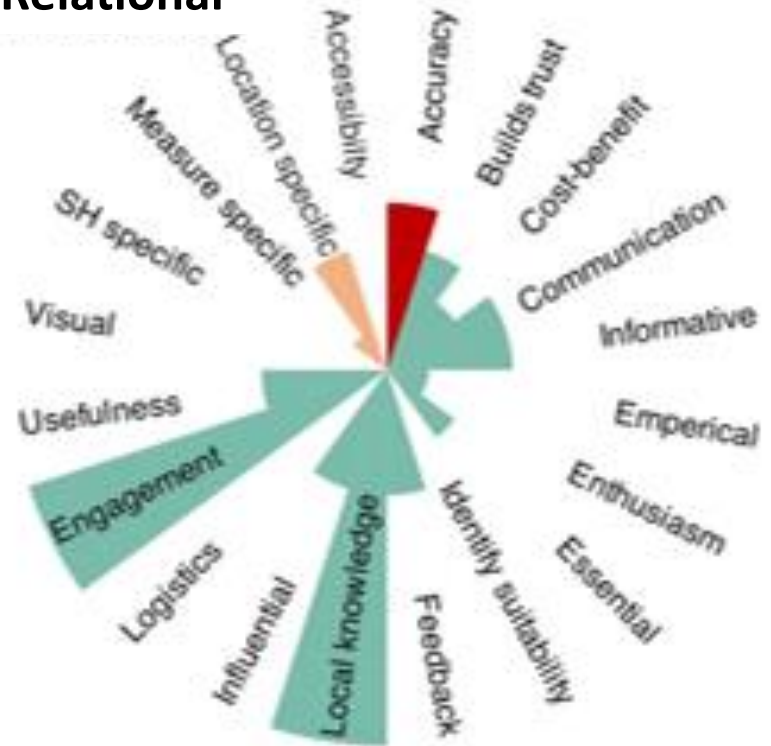


What did people think about different types of evidence?

Experiential



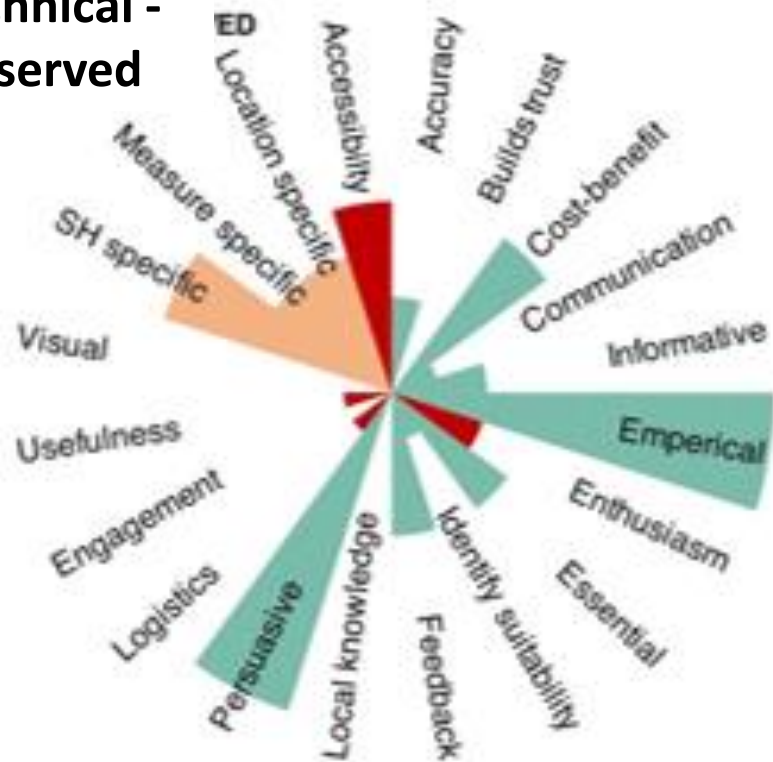
Relational



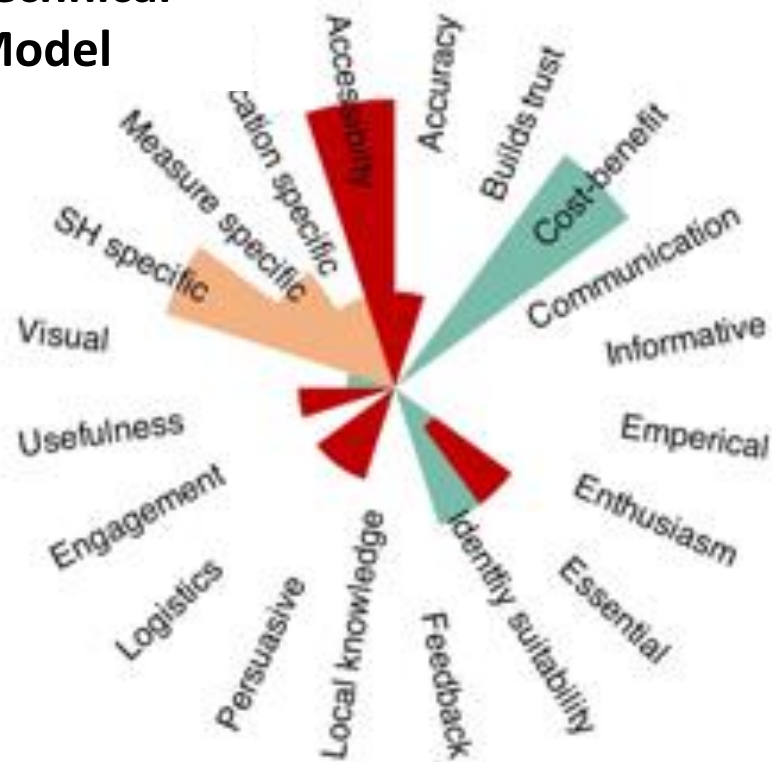
■ Positive ■ Negative ■ Neutral

What did people think about different types of evidence?

Technical - Observed

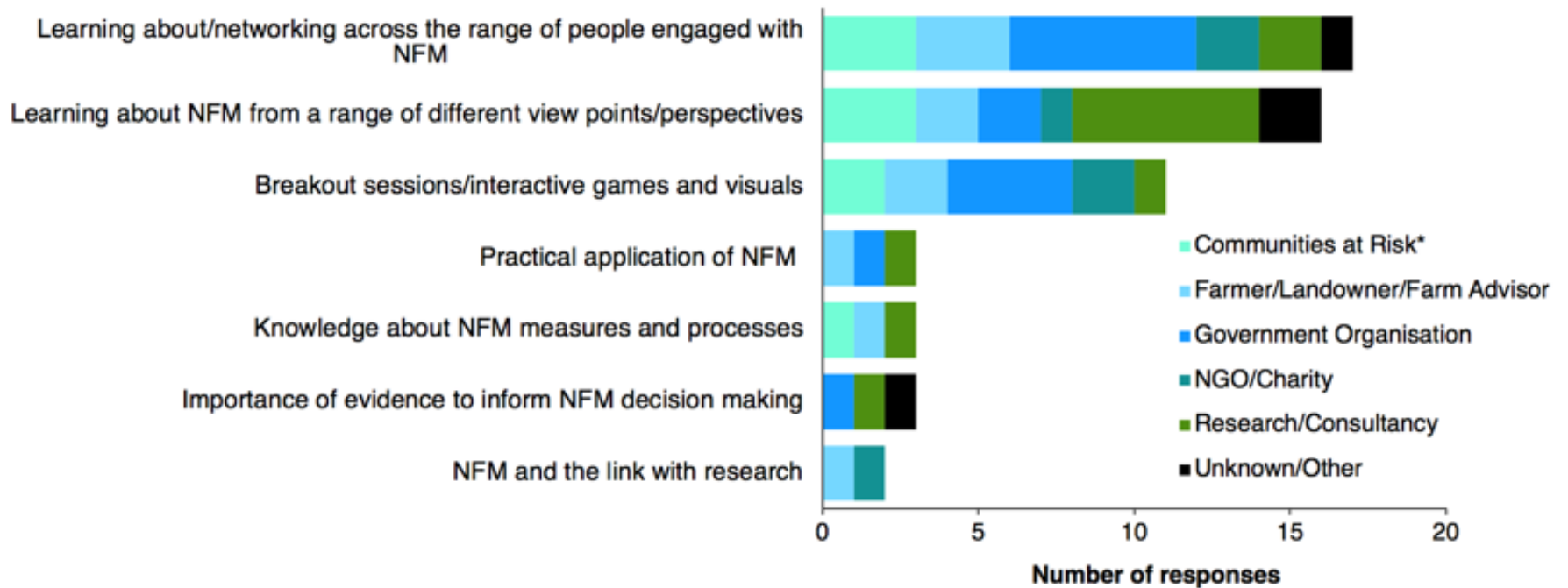


Technical - Model



Positive Negative Neutral

What was the most important thing you learnt today?



Agenda for today: Morning

10:30 Morning session 1: Using local knowledge for NFM (Chair: Joanna Clark)

10:30 Joanna Clark, Welcome and overview of Landwise project

10:40 Angie Elwin, Creating NFM scenarios through participatory workshops

11:00 Chris Short, Farmer knowledge to inform NFM

11:30 Comfort break and coffee

11:45 Morning session 2: Using technical knowledge for NFM (Chair: John Hammond)

11:45 James Blake, Preliminary results from the broad scale survey

12:05 David Macdonald, Modelling NFM

12:25 Will Meslanka, Using remote sensing data from satellites and field work to inform NFM

12:45 – Lunch, posters and activities

Agenda for today: Afternoon

13:45 – Afternoon session: NFM delivery and new Environmental Land Management Schemes (Chair: Chris Short)

13:45 Joanne Leigh, FWAG, Local Delivery and new ELM Pilot in the Upper Thames

14:05 Adella Buckland, Engaging the experts, in the field – working positively with farmers to identify opportunities for NFM on their land

14:25 Panel discussion – New Agriculture Bill and ELMs – do we need data and modelling to inform new policy?

Panel: Joanne Leigh, FWAG; Tom Ormesher, NFU; Adrian Hares, Wilts Soil and Root Innovative Farmers; Charlotte Hitchmough, Action for River Kennet; Graham Scholey, Environment Agency; Louise Webb, Defra; Yvette de Garis, Thames Water

15:00 close

A photograph of a lush green field with tall grass and small white flowers. In the background, there are trees and a house under a cloudy sky.

Thank you for listening to these ideas
Interested to hear your thoughts