The multiple benefits of restoring floodplain meadows

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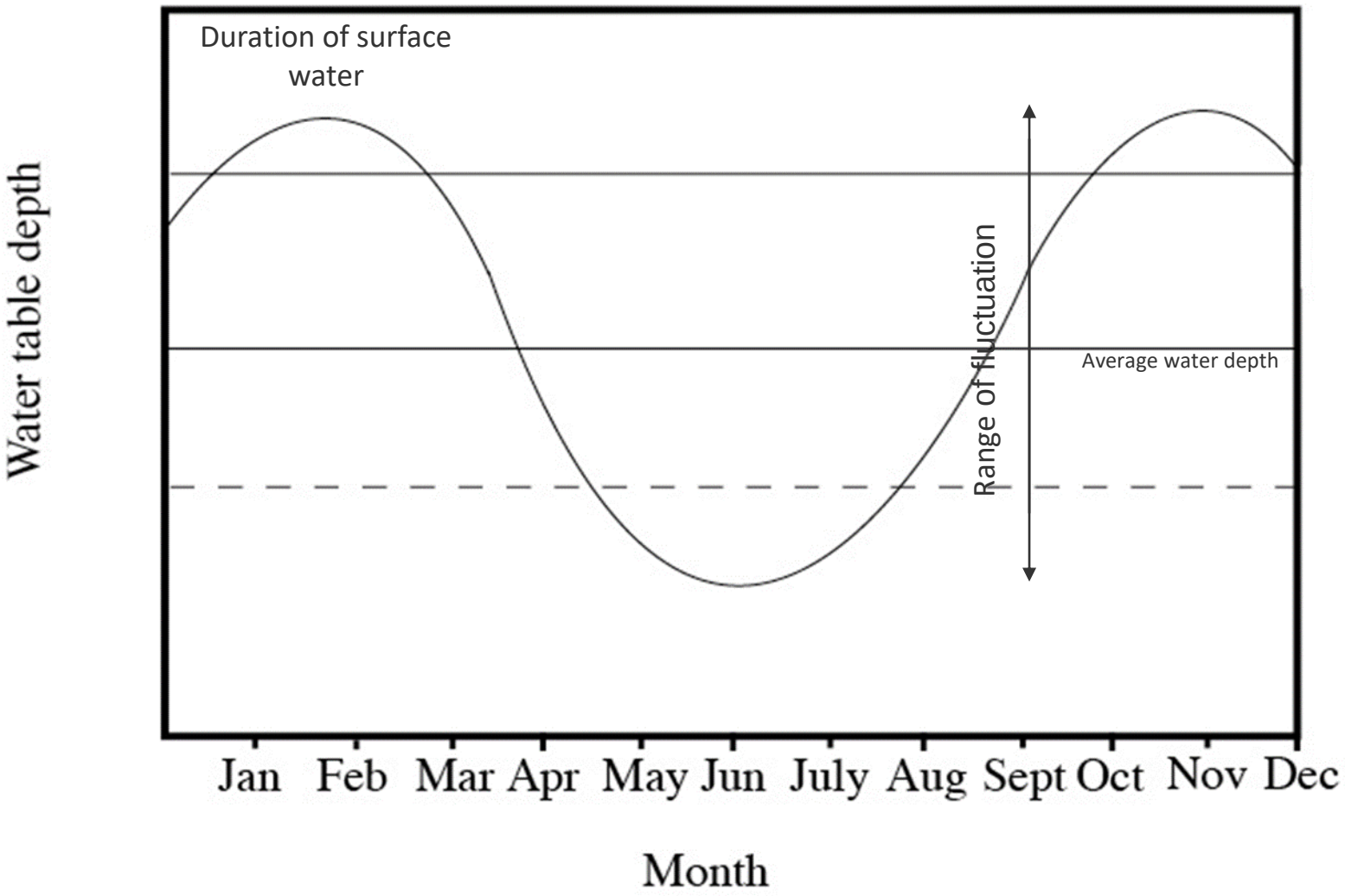
VALUING NATURE

Floodplain Meadows Partnership

The Open University

Structure of the talk

- History, management and grassland plant communities of the floodplain
- Natural capital of floodplains
- Restoration of floodplain meadows
- Key message


Duration of surface water
Water table depth
Range of fluctuation
Average water depth
Jan
Feb
Mar
Apr
May
Jun
July
Aug
Sept
Oct
Nov
Dec
Month

Burnet floodplain meadow (MG4)

Alopecurus pratensis-Sanguisorba officinalis grassland

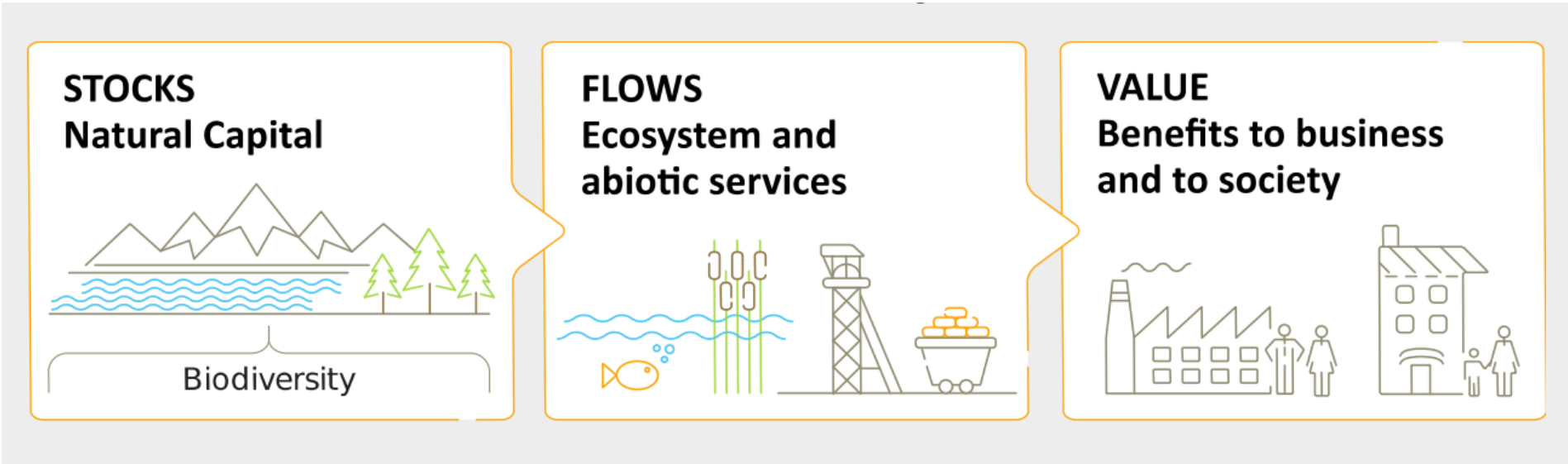
- Estimates of extent less than 1500ha
- European conservation status (Annex 1 habitat)
- Periodic flooding - well drained soils
- Four sub-communities

Kingcup-carnation sedge meadow (MG8)

Cynosurus cristatus-Carex panicea-Caltha palustris grassland

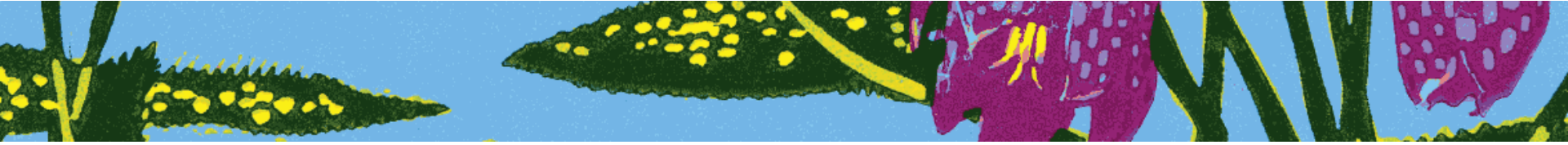
- Estimates of extent 300-800 ha
- No European conservation status
- Constant high water-table
- Four sub-communities

Natural Capital Assets and Ecosystem Services



- Elements of nature that produce value to people.
- Natural Capital is a method to value these resources

POSTnote 542, (2016) Natural Capital: An overview. www.parliament.uk/post



The extent (km^2) of different land uses within the floodplain (1:100-year flood).

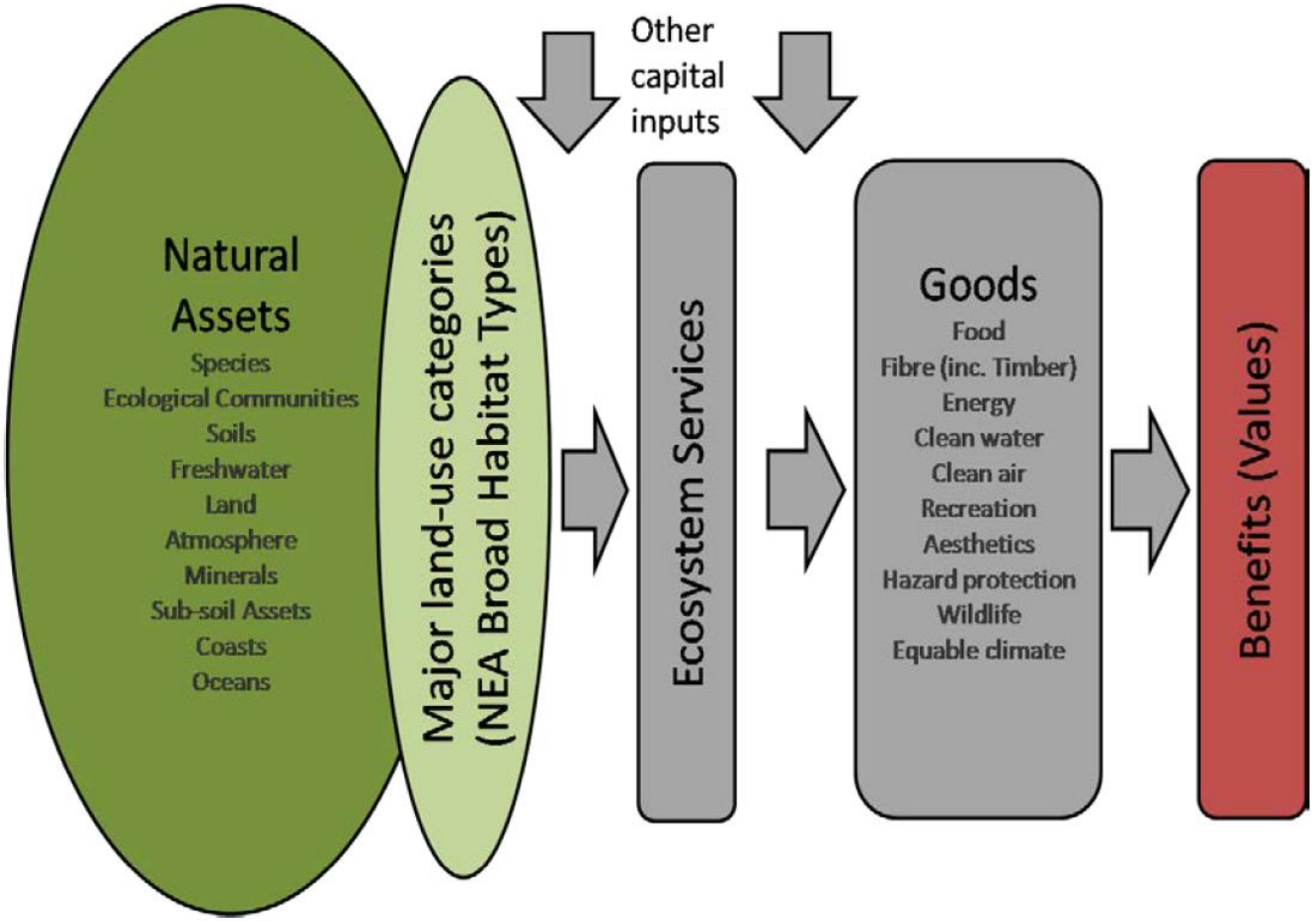
Land Use	England*		Wales#		Total	
	extent	% cover	extent	% cover	extent	% cover
Arable and Horticulture	2350	35.6	135	10.3	2485	31.4
Improved Grassland	2200	33.3	655	50.2	2855	36.1
Broadleaved, mixed and yew woodland	450	6.8	135	10.3	585	7.4
Coniferous woodland	30	0.5	12	0.9	42	0.5
Neutral Grassland	200	3.0	20	1.5	220	2.8
Fen, Marsh and Swamp	20	0.3	25	1.9	45	0.6
Urban & suburban	650	9.8	100	7.7	750	9.5
Total floodplain	6600		1305		7905	

Land use categories are from the CEH Land Cover Map 2015.

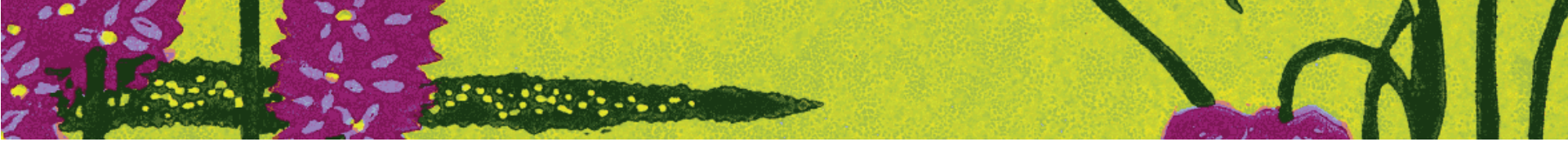
** Data from England is based on 2007 data, from Heritage & Entwistle, 2017.*

 # Data from Wales, unpublished data, Floodplain Meadow Partnership.

Natural Capital and Benefits Framework

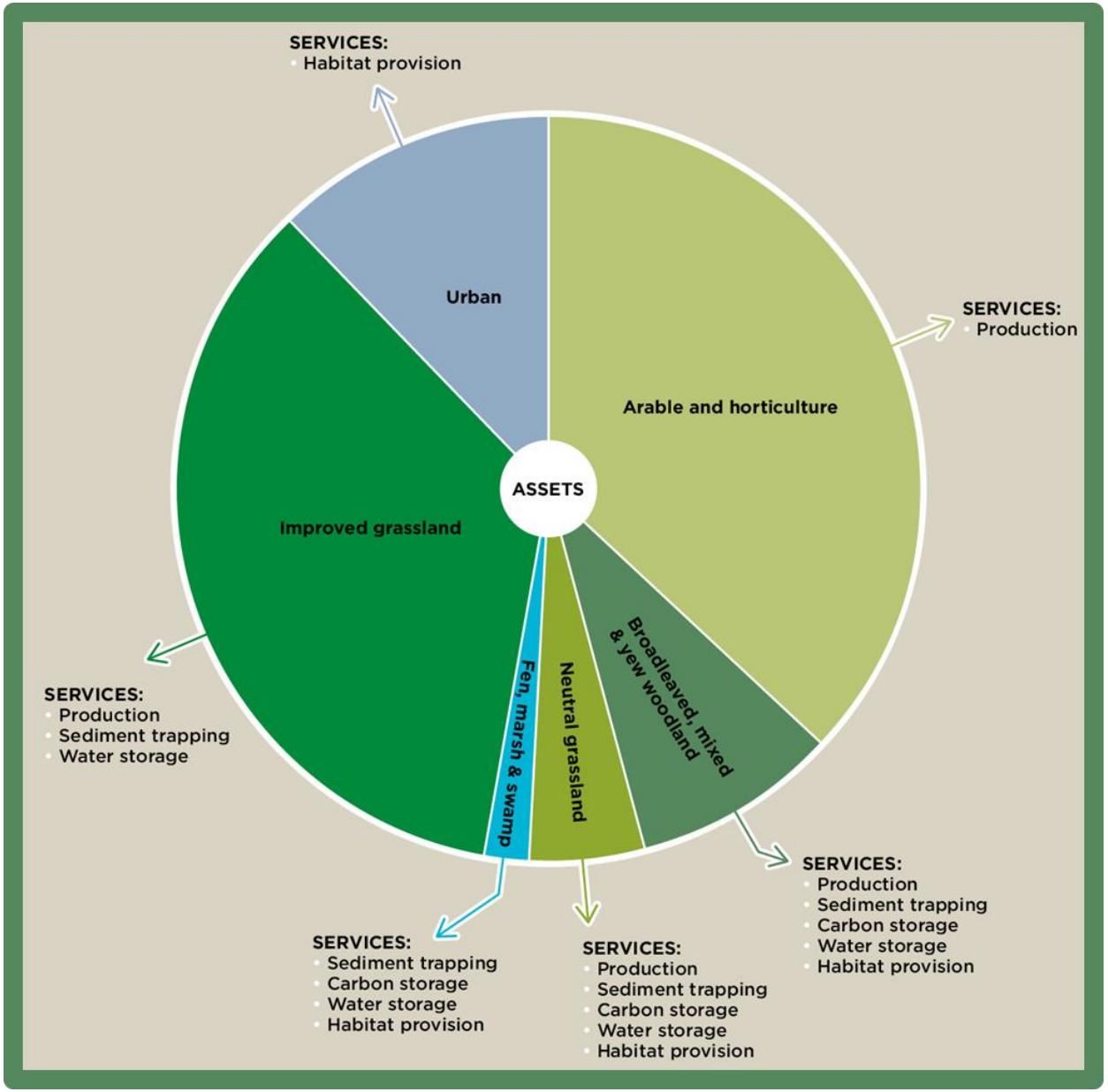


(Natural Capital Committee, 2014)



Floodplain ecosystem goods and services – the flows of natural capital and value to society.

Ecosystem services provided by floodplains	Description of environmental or social goods and services	Land Use					
		Arable and Horticulture	Improved Grassland	Broadleaved Woodland	Coniferous Woodland	Neutral Grasslands	Fen, Marsh and Swamp
Food	Agriculture; crop and livestock production	+	+			+	
Fibre	Timber production, reeds & osiers			+	+		+
Climate Regulation	Carbon sequestration and storage	-		+	+	+	+
Pollination	Habitat for pollinating insects			+		+	+
Water quality	Sediment trapping	-	+	+	+	+	+
Natural Hazard Regulation	Flood storage	+	+	+	+	+	
Biodiversity	Species-rich habitats – high diversity and rare species			+		+	+
Nutrient cycling	Nutrient Management	-		+		+	
Soil formation	Soil development			+		+	+
Cultural history	Strong 'sense of place' and social history			+		+	+
Aesthetic	Enhancement of the landscape, intrinsic appeal			+		+	+
Recreation	Enjoyment of the outdoors	+	+	+	+	+	+


SERVICES:
• Habitat provision
Urban
SERVICES:
• Production
Arable and horticulture
ASSETS
Improved grassland
Broadleaved, mixed & yew woodland
Neutral grassland
Fen, marsh & swamp
SERVICES:
• Production
• Sediment trapping
• Water storage
SERVICES:
• Production
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• Carbon storage
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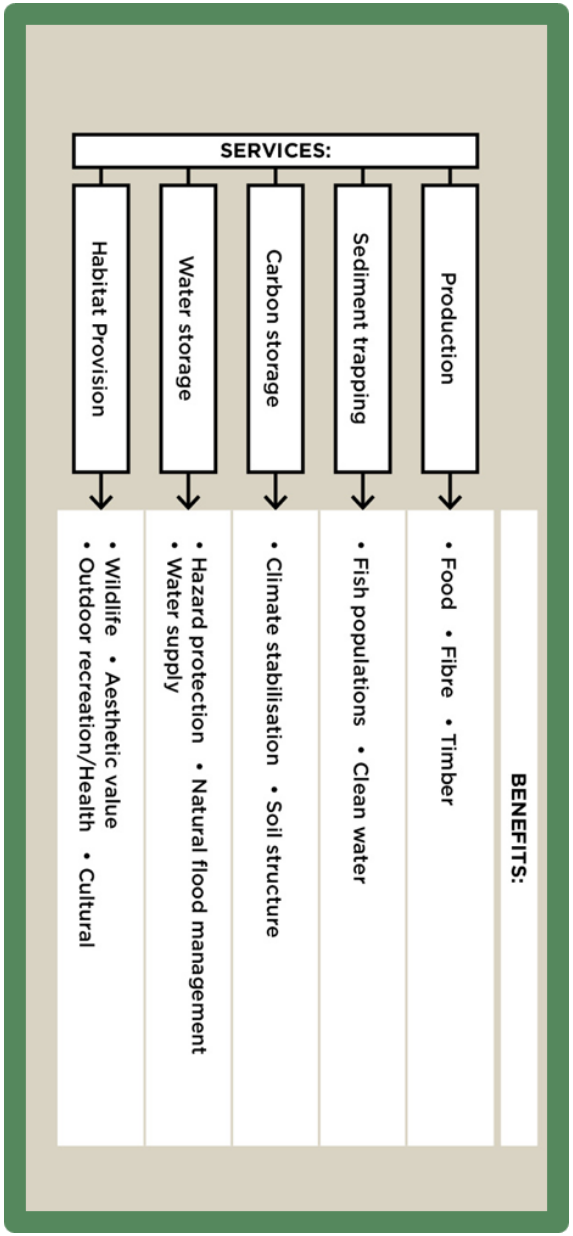
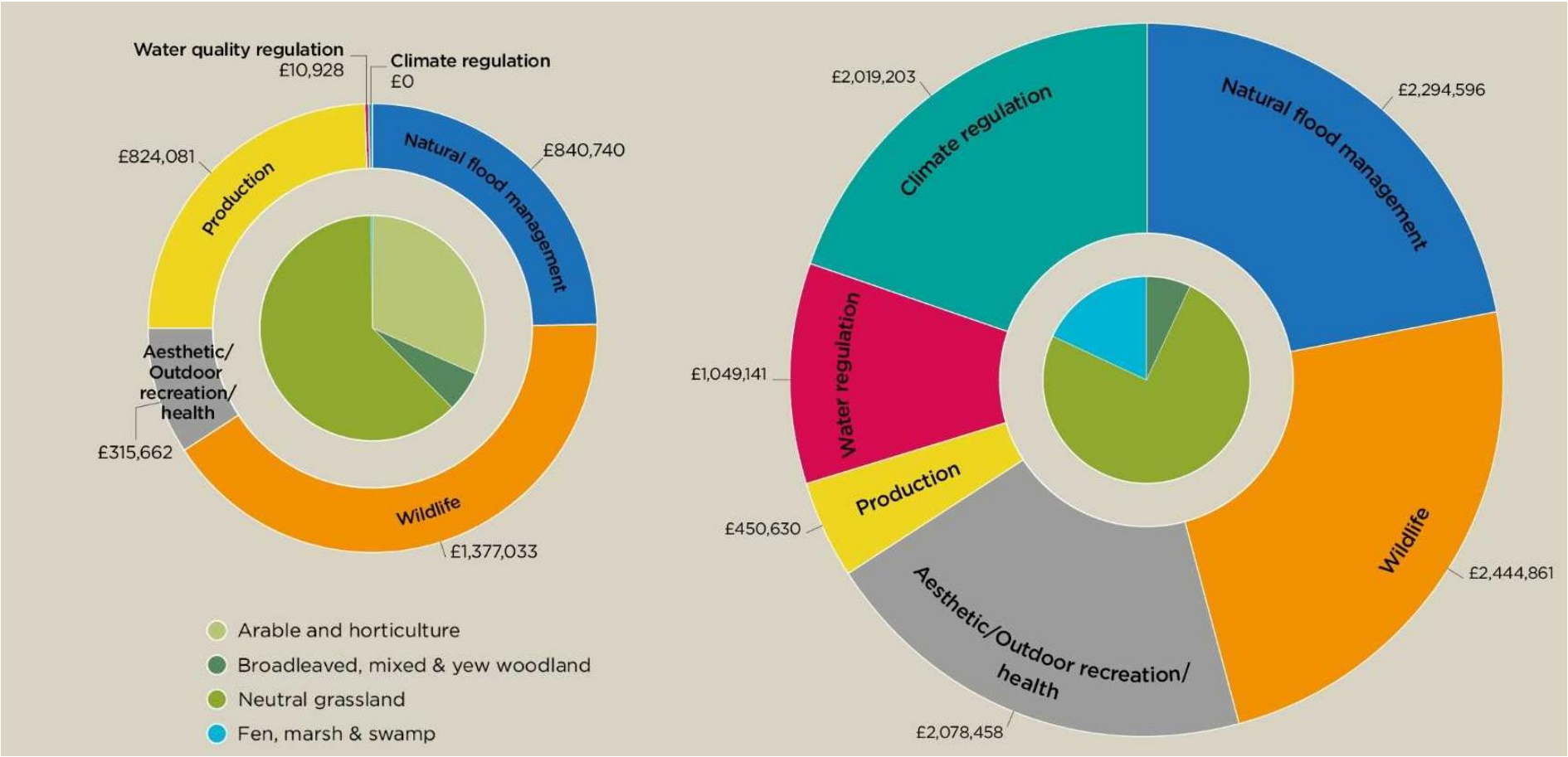

SERVICES:
Habitat Provision
Water storage
Carbon storage
Sediment trapping
Production
BENEFITS:
• Food • Fibre • Timber
• Fish populations • Clean water
• Climate stabilisation • Soil structure
• Hazard protection • Natural flood management
• Water supply
• Wildlife • Aesthetic value
• Outdoor recreation/Health • Cultural

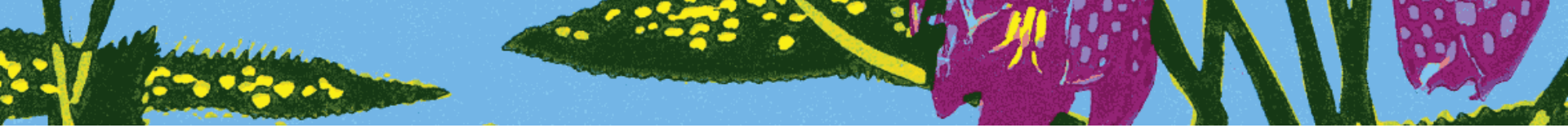
Valuation of floodplain ecosystem services

- Market valuation of agricultural production.
- Cost of agricultural production to the environment.
- Ecosystem services that have a non-monetary value.
- Replacement cost and willingness to pay approaches.

Service provision before and after restoration from intensive to extensive agriculture



Hölzinger, O. & Haysom, K.A., (2017) Chimney Meadows Ecosystem Services Assessment. BBOWT, Oxford



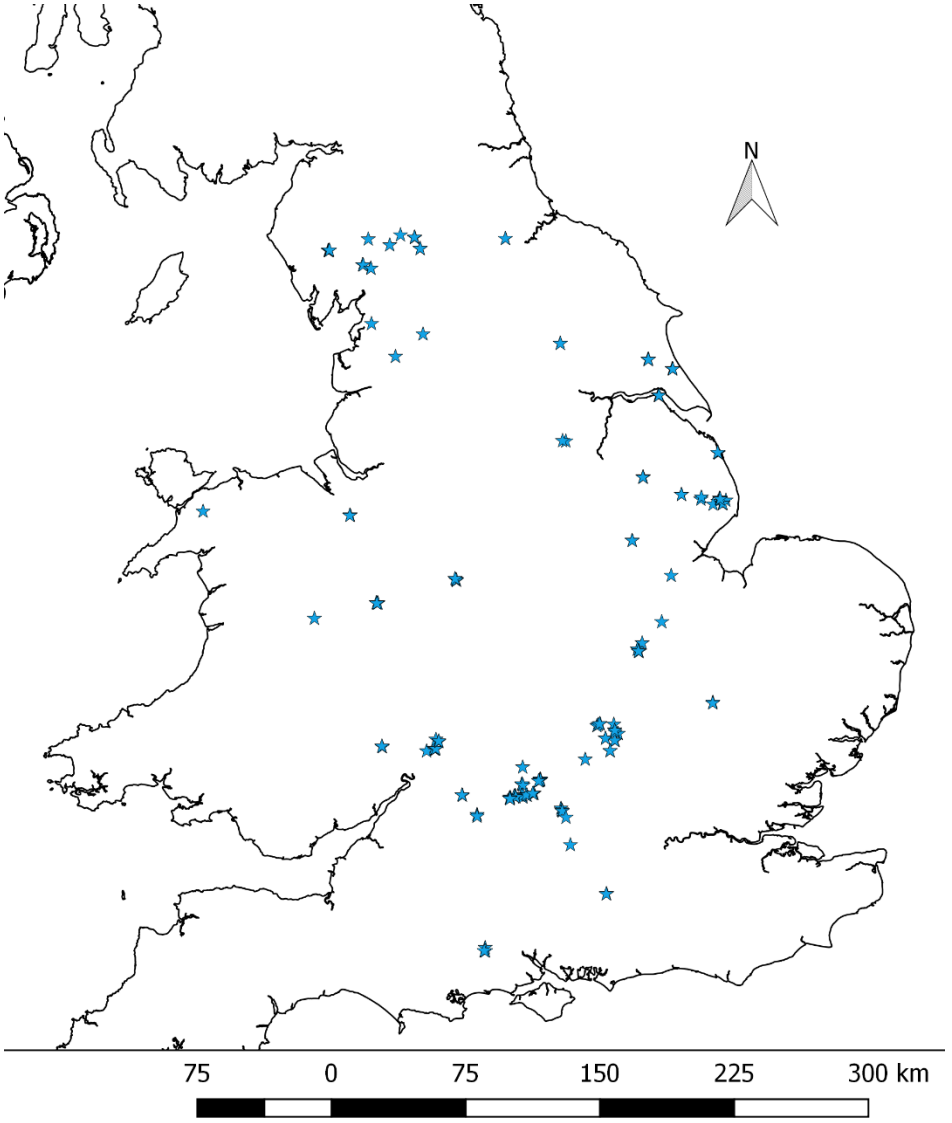
Restoration Success

John Ellerman Foundation

- Engage with practitioners
- Extent of floodplain meadow restoration activity
- Case studies
- Best practice
- Improve restoration of floodplain meadows

Restoration Sites

- 174 sites
- 834 ha
- 113 Agri-environment
- 38 arable – 112 grassland
- Restoration techniques
  - 47 green hay
  - 39 management
  - 53 seed mix



Site visits 2016-2018

John Ellerman Foundation

- Interview with landowner/manager
- Vegetation survey and soil status
- Feedback findings and give management advice
- Small capital fund

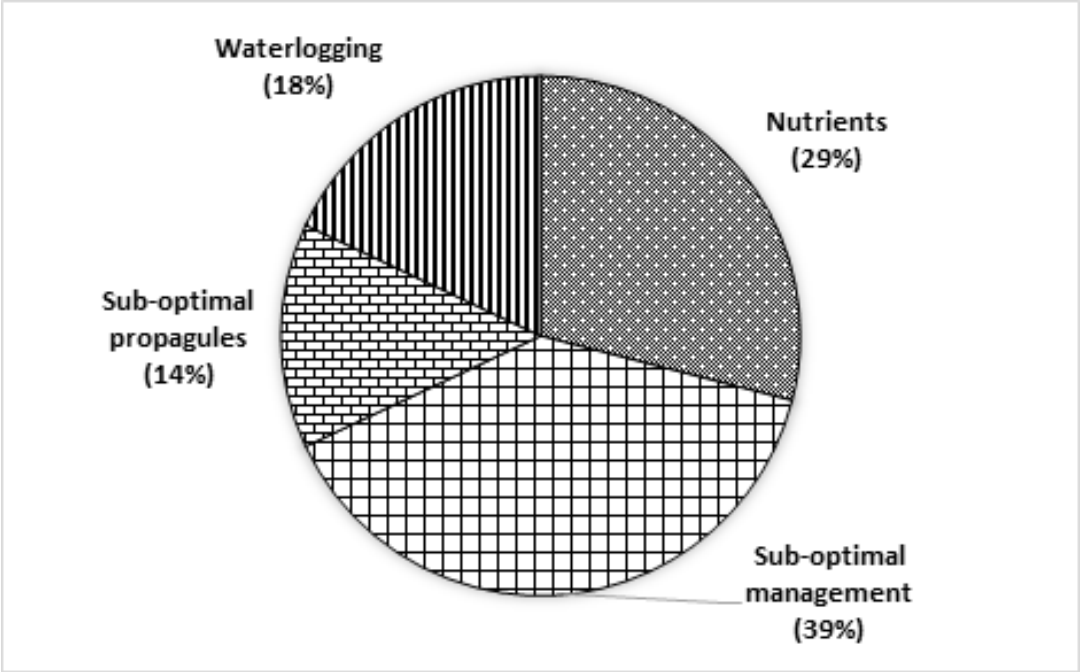
Data analysis

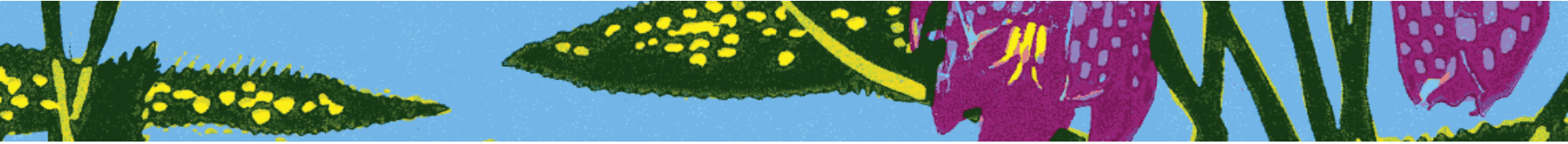
John Ellerman Foundation

- Species richness/m^2 each quadrat (5 per field)
- Ellenberg indicator scores soil wetness (F), reaction (R), and nutrient content (N)
- Plant community
- Restoration succes
    - category 1 (start again)
    - category 2 (making progress)
    - category 3 (excellent outcome)

Primary constraints

- Restoration success
  - start again
  - making progress
- Four constraints
  - limiting conditions
  - sub-optimal





Restoration Outcomes

- The majority of floodplain meadow restoration projects were found to be moving towards a successful outcome.
- Water and soil conditions are critical to the success of floodplain meadow restoration.
- Restoration success can be long process and is affected by the lack of, or irregularity of management.
- Restoration of the main target community – Burnet floodplain meadow was achieved in a few sites.
- Restoration techniques appear to be less important in determining a successful outcome.
- Overall restoration success appears to be more a function of time and consistent management.

Evidence gaps

- Effectiveness of floodplain restoration in reducing flood risk.
- Ecological and biogeochemical processes.
- The extent of habitats.

Key Messages

Floodplains are special environments in terms of the variety and extent of services they offer.

A natural-capital perspective can be used to inform and compare land-use decisions.

Enormous potential to increase the extent of floodplain habitats that can provide us with multiple benefits