



# HIGHLIGHTS FROM THE VALUING NATURE PROJECTS





**VALUING  
NATURE**



**VALUING NATURE**  
**Peatland Tipping Points**

# Peatland Tipping Points

Mark Read (PI) et al. (Laurence Jones)

Newcastle University, University of Leeds,  
SAMS/University of York, BTO, SRUC, CEH IUCN  
peatland programme

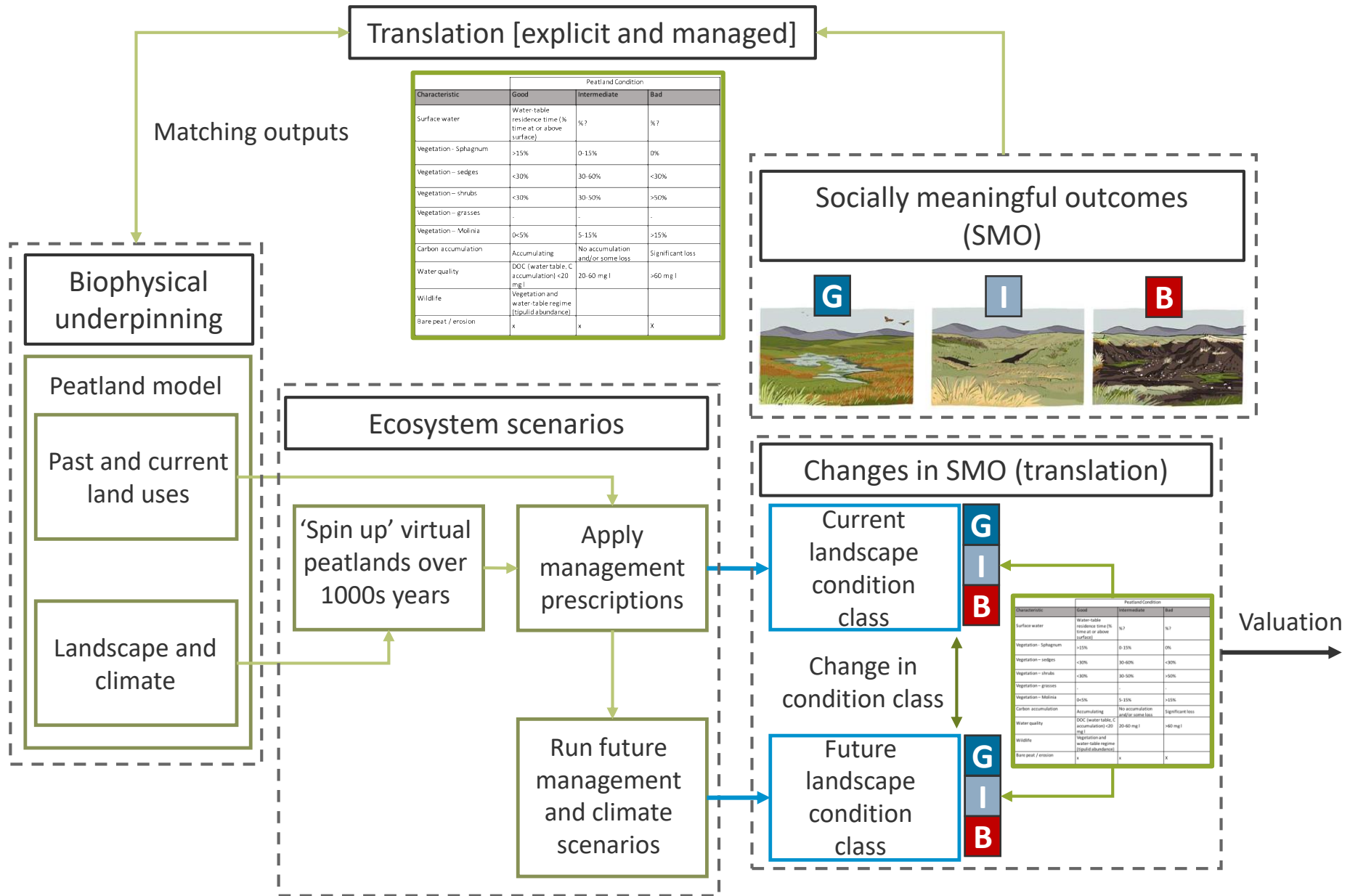
# Project Aim

To investigate how changes in climate and how we manage land might lead to abrupt changes, or “tipping points”, in the benefits that peatlands provide to UK society, informing management and policy to enhance the resilience of these systems to future change

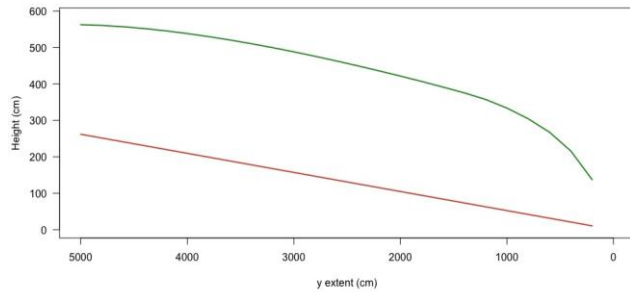
# Key Findings

- Action is needed to avoid potential tipping points:
  - Upland grazing and peat accumulation
  - Climate change and Golden Plover populations
- Although less popular with recreationalists (especially walkers), 80% public support for peatland restoration (rewetting) based on climate, water, wildlife, culture and economic benefits
- Public willing to pay £127–414 ha<sup>-1</sup>y<sup>-1</sup> and peatland stakeholders deliberated a “fair price” of £100 ha<sup>-1</sup>y<sup>-1</sup> for these benefits
- Restoration is cost-effective (benefit:cost ratio 1.4–3.5) with greater benefits of early restoration
- Monitoring measures differ and are not easily compared or synthesised to inform policy/practice

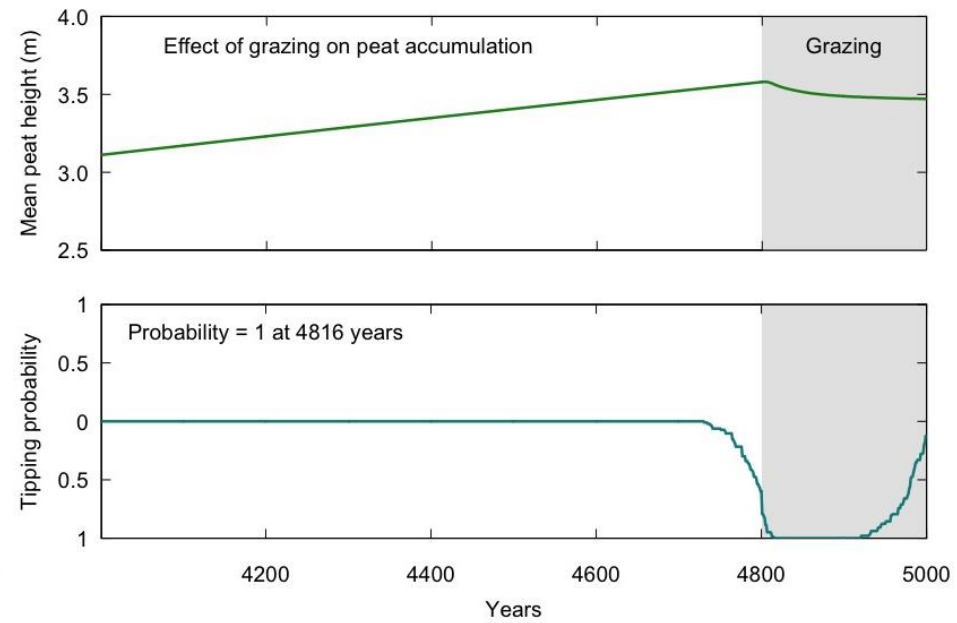
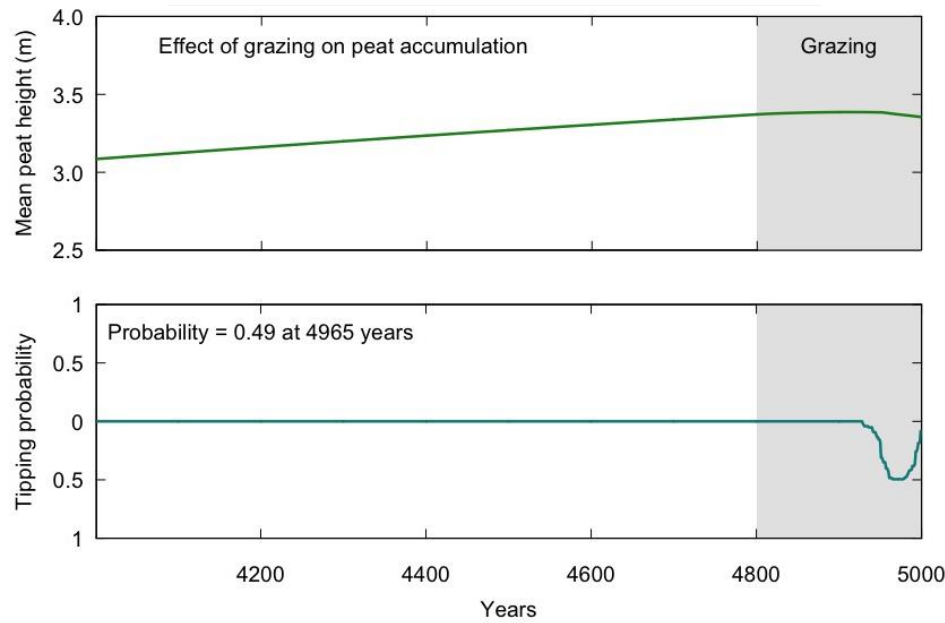
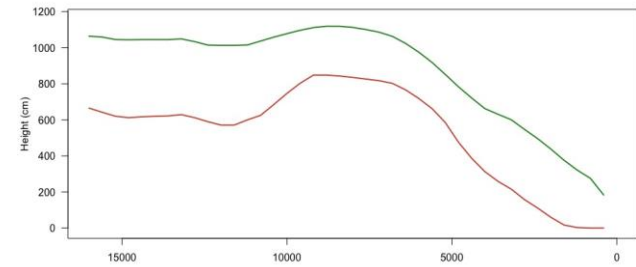
# VNP: Peatland Tipping Points



## Low probability of tipping



## High probability of tipping



Change point detection courtesy of Chris Bolton, University of Exeter

# Implications

- Peatland restoration is a cost-effective opportunity for the land use sector to reach net zero emissions by 2050 and avoid tipping points
- Restoration has broad public support, but early action is needed to maximise benefits
- It is possible to standardize peatland restoration research/monitoring data collection to enable synthesis for evidence-based policy and practice



# VALUING NATURE

## Tipping points in lowland agricultural landscapes (TPAL)

Adrian Newton, Bournemouth University

James Bullock, CEH



# Project Aims

Overall aim: to examine the mechanisms and consequences of tipping points in lowland agricultural landscapes.

Specifically, the research aimed to find out:

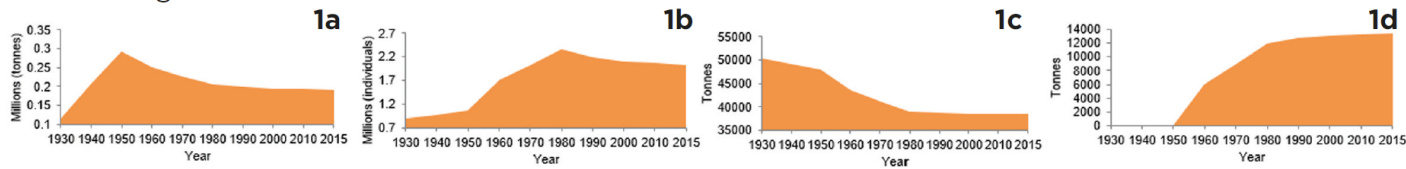
- How has the environment of Dorset changed in the recent past?
- How might it change in the near future?
- What are the implications of such change for human society, and specifically for economic growth and employment?

# Key Findings

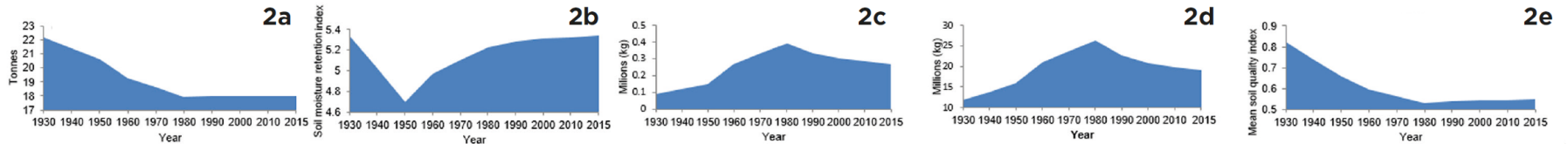
- Dorset's natural capital has been seriously degraded over the past 80 years
- Provision of most ecosystem services has declined significantly since the 1930s
- The provision of ecosystem services is important to local businesses (47% dependent on service flows)
- The value of land use to the wider economy is far higher than that of food production
- Investment in natural capital would benefit the economy far more than expansion of agriculture
- Some thresholds detected in natural capital, suggesting that abrupt changes in provision of ecosystem services are possible in future

# Results

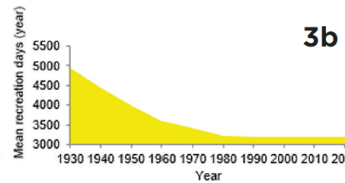
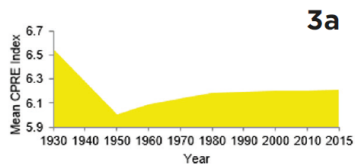
## Provisioning Services



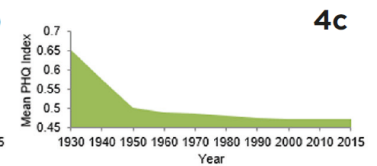
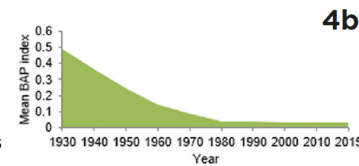
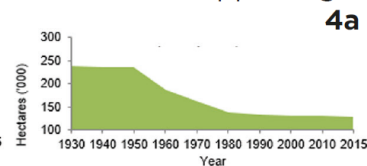
## Regulating Services



## Cultural Services



## Habitat and supporting Services



**1a** Food production (crops) **1b** Food production (livestock) **1c** Timber (broadleaved)

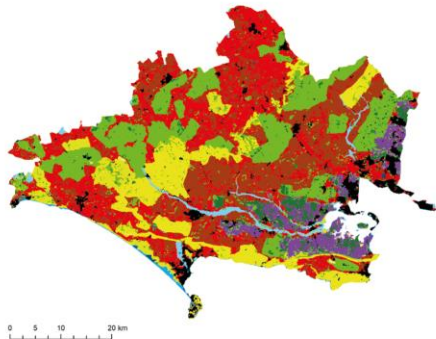
**1d** Timber (coniferous) **2a** Carbon sequestration and storage **2b** Flood protection **2c** Nutrient export

**2d** Nutrient retention **2e** Soil quality **3a** Aesthetic value **3b** Recreation value **4a** Habitat area (BAP species)

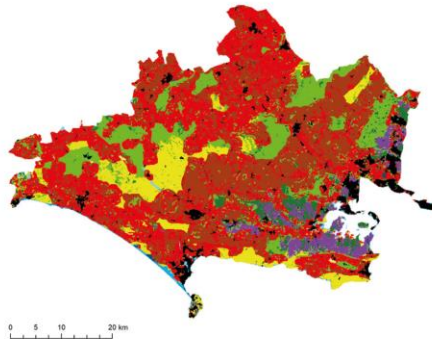
**4b** Habitat quality (BAP species) **4c** Habitat quality (for pollinators)

# Results

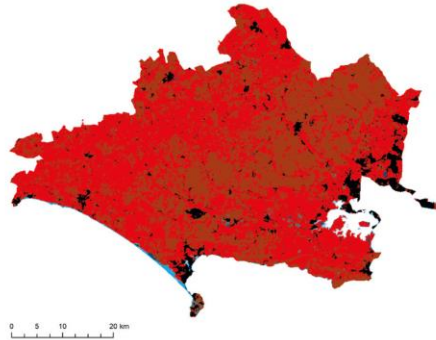
High Intensity Green Brexit (HIGB)



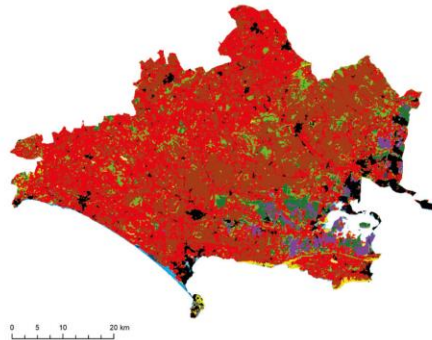
Low Intensity Green Brexit (LIGB)



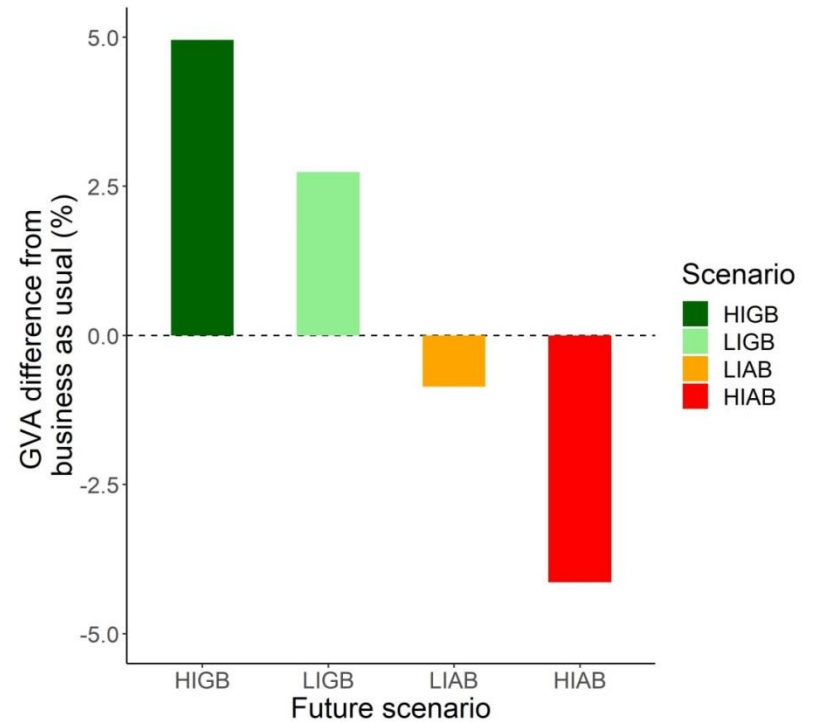
High Intensity AgriBrexit (HIAB)



Low Intensity AgriBrexit (LIAB)



Total GVA difference between the future TPAL scenarios



# Policy recommendations

- Provide incentives for farmers to produce ecosystem services. This would provide greater benefits to the economy than increasing the production of food.
- Incorporate the value of ecosystem services in economic analyses. The value of these services can exceed the economic value of the agricultural sector.
- Invest in natural capital by large-scale habitat creation and restoration (e.g. rewilding). This can provide significant economic benefits, and reduce the risks of abrupt decline in ecosystem service provision.

# Identifying potential tipping points in the benefits derived from the UK's land ecosystems

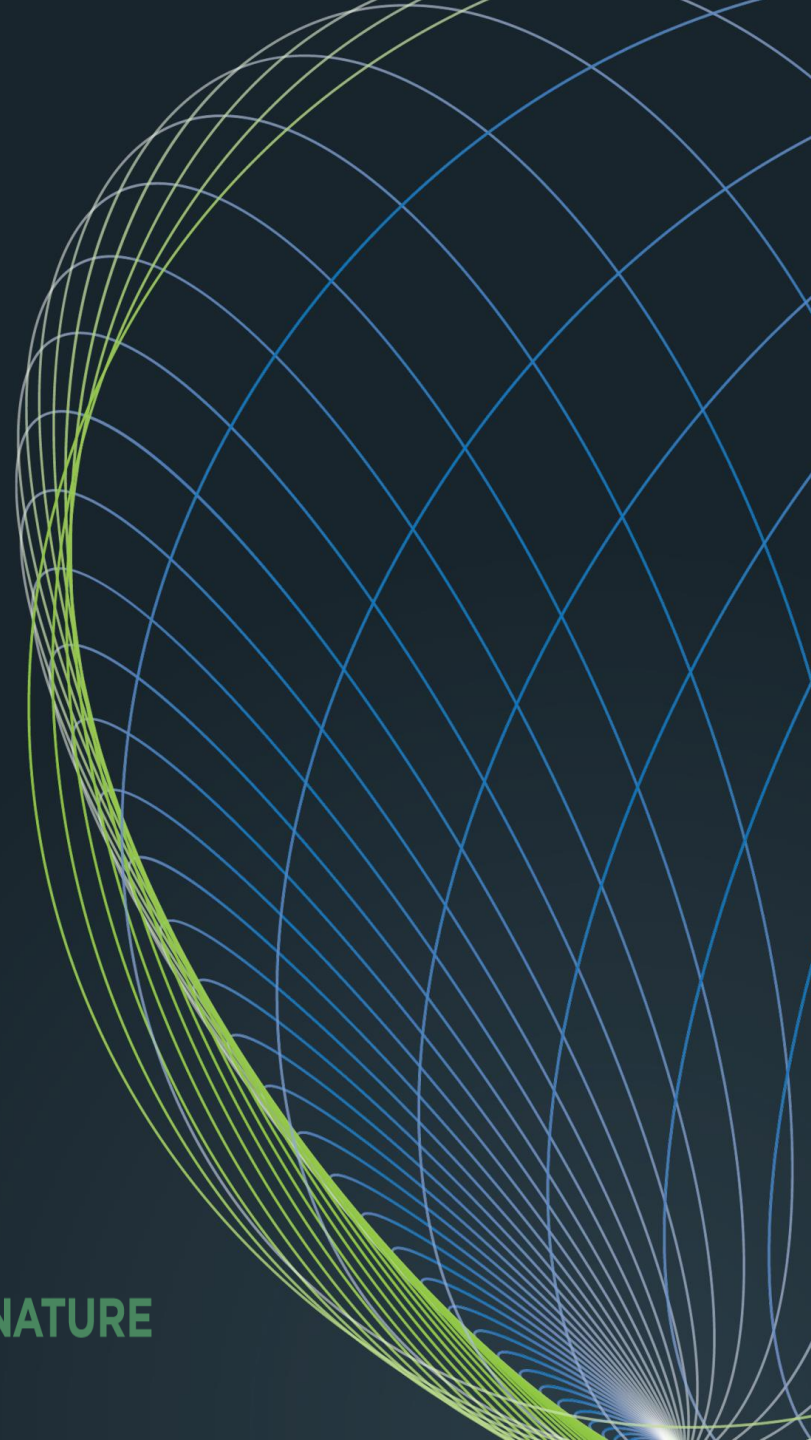
**Tim Lenton**, Ian Bateman, Amy Binner, Brett Day, Chris Boulton, Katrina Davis, Carlo Fezzi, Angela Gallego-Sala, Solmaria Halleck-Vega, Anna Harper, Stephen Sitch, Paul Ritchie, Greg Smith

[t.m.lenton@exeter.ac.uk](mailto:t.m.lenton@exeter.ac.uk)

[exeter.ac.uk/gsi](http://exeter.ac.uk/gsi)



**VALUING NATURE**

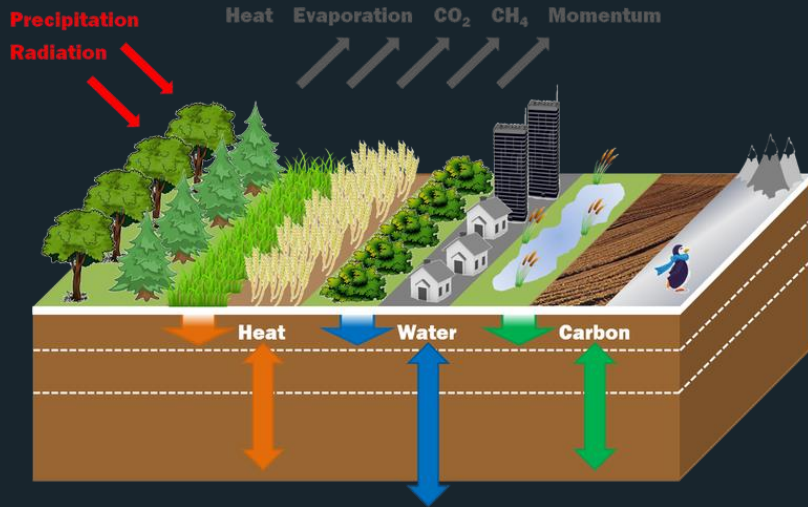


# Key questions

1. Can we detect tipping points and do they carry early warning signals?
2. Could *smooth climate change* cause abrupt shifts in UK land ecosystems and the services they provide?
3. Could a *climate tipping point* cause abrupt shifts in UK land ecosystems and the services they provide?



# Models used



'ECO-AG'/NEVO

DATA



ENVIRONMENT

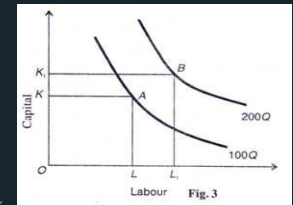


POLICY



MARKET

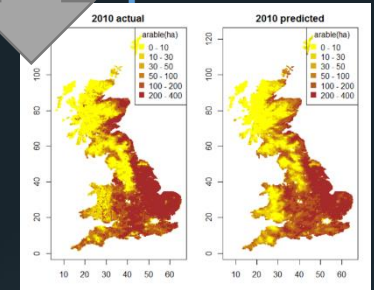
ECONOMIC THEORY



ECONOMETRIC MODEL



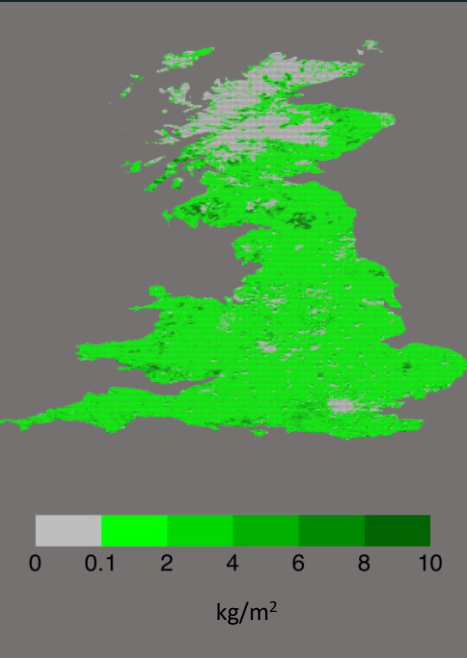
OUTPUT





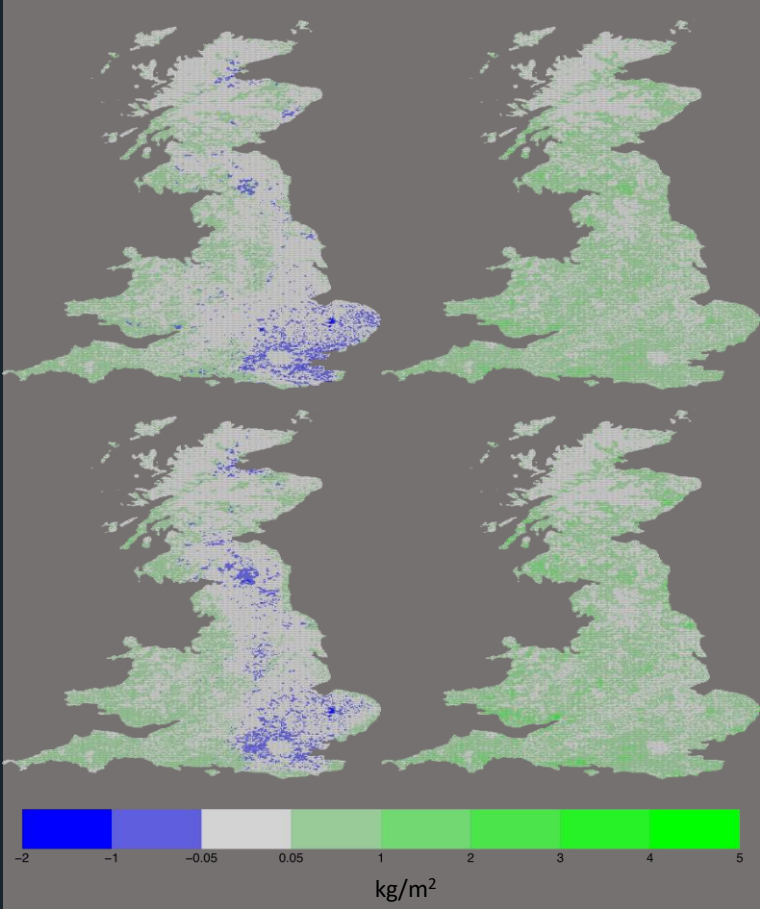
# Vegetation carbon

JULES initial (1998-2007)

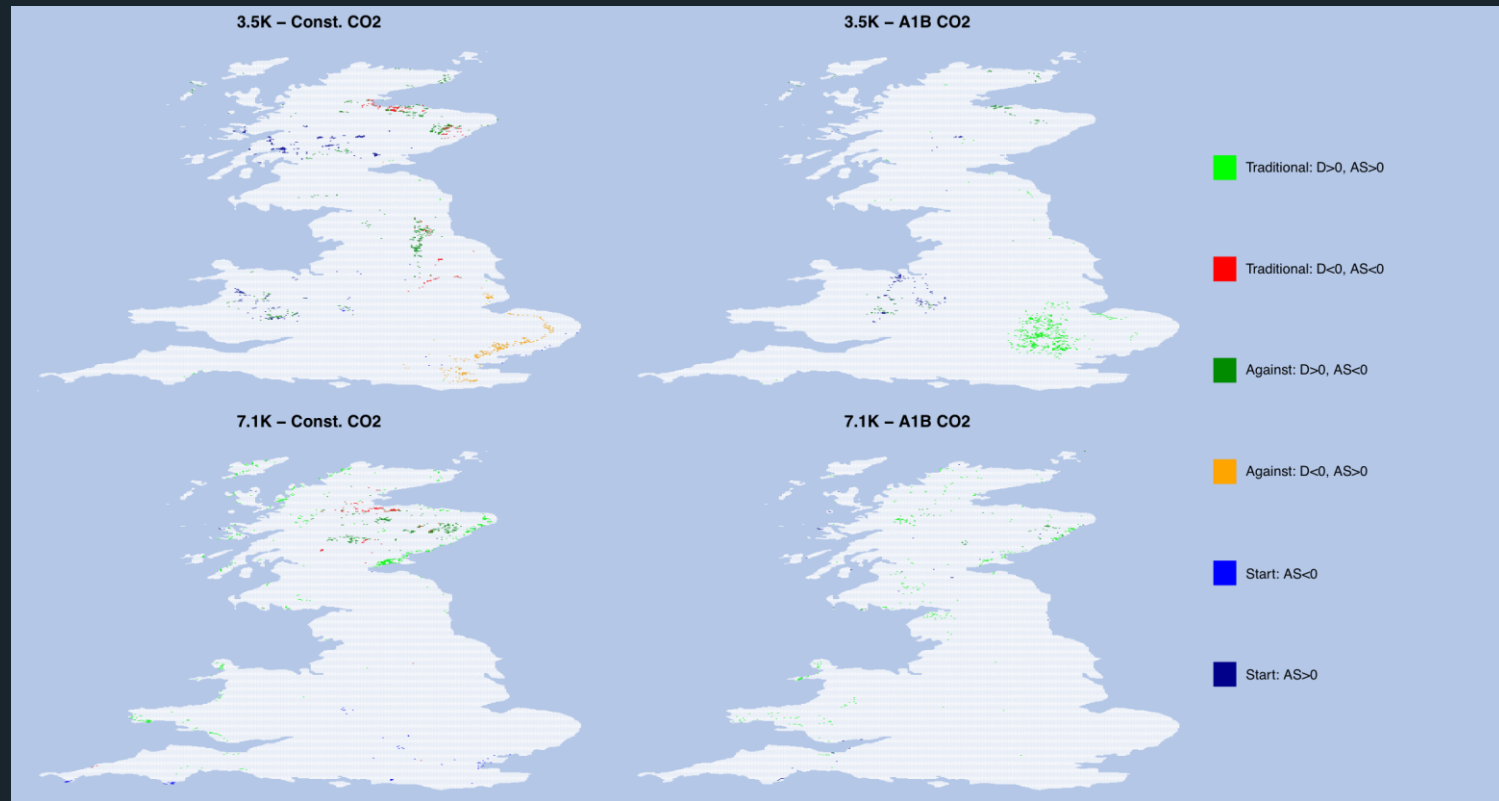


Boulton, Ritchie, Lenton (submitted)

Change by 2090s under UKCP09  
Const. CO<sub>2</sub>      A1B CO<sub>2</sub>



# Abrupt shifts in vegetation C under climate change

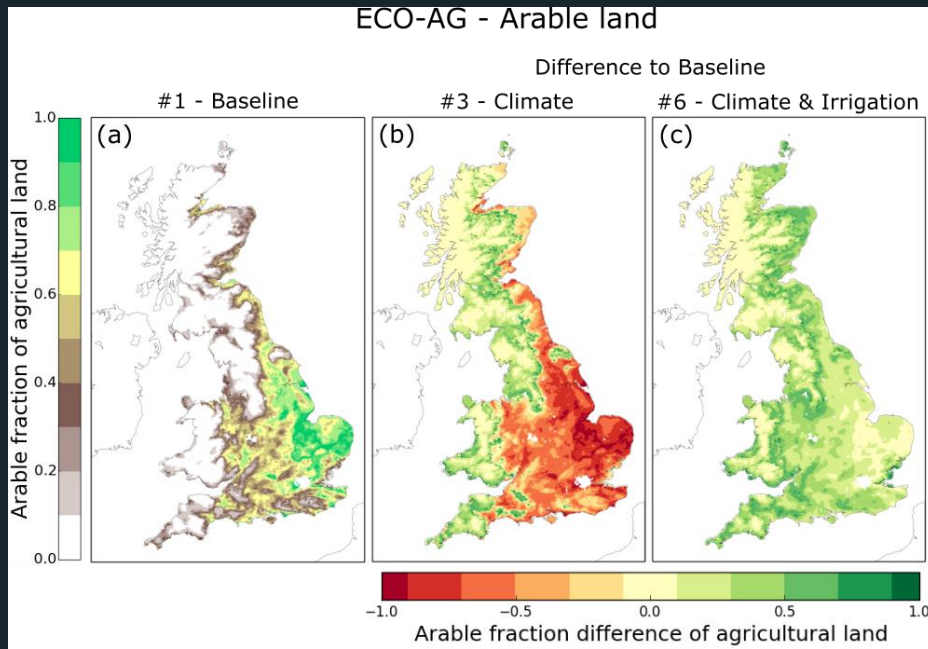


Boulton, Ritchie, Lenton (submitted)

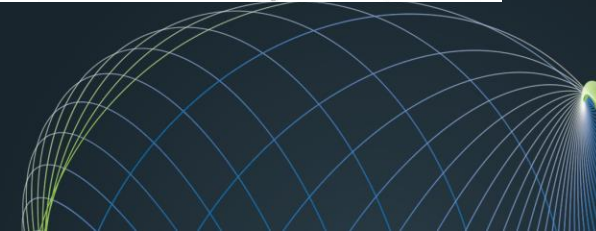
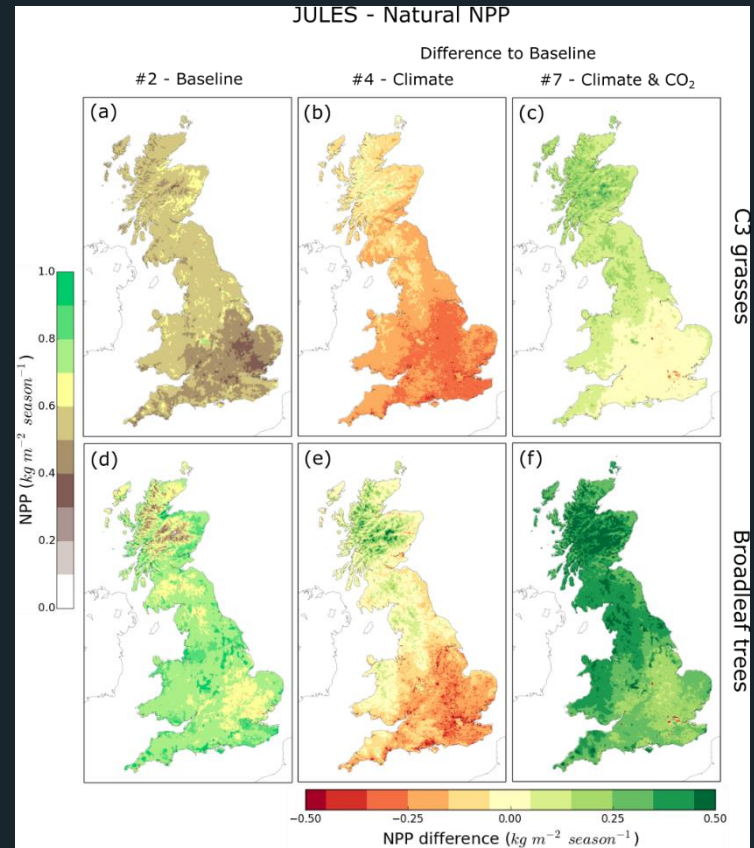
See Chris Boulton's talk in session C3



# Response to high-end RCP8.5 climate change (@1.5km resolution)

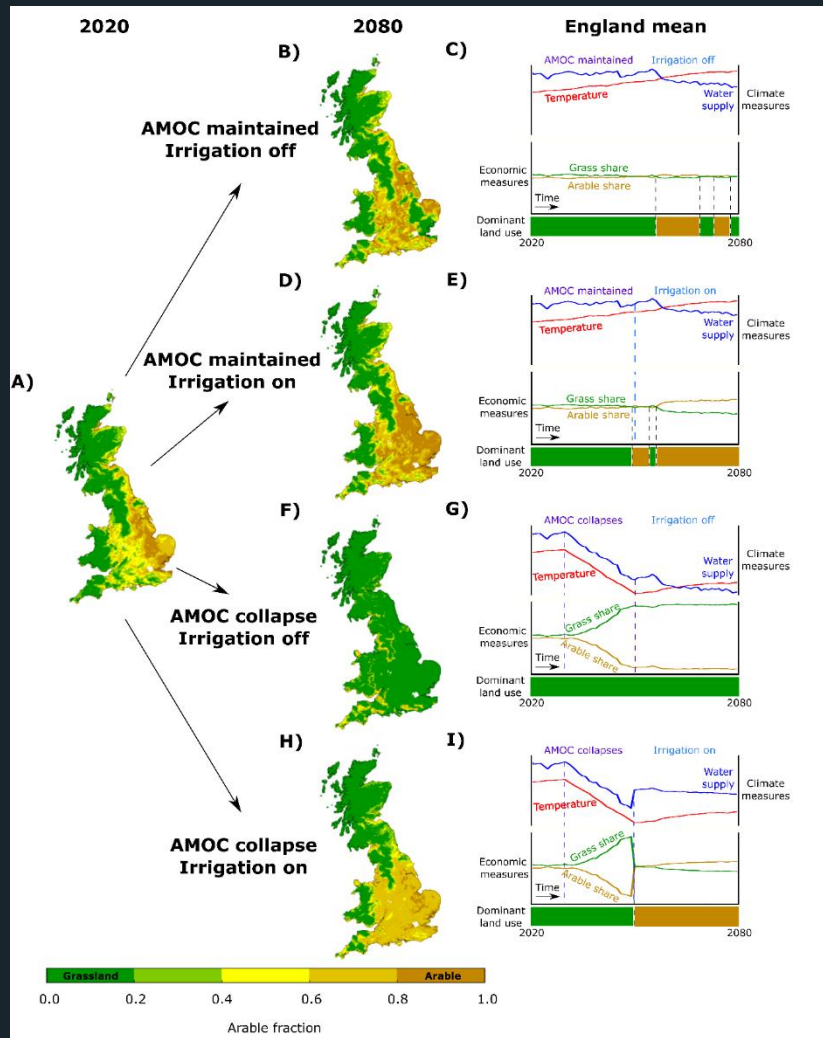
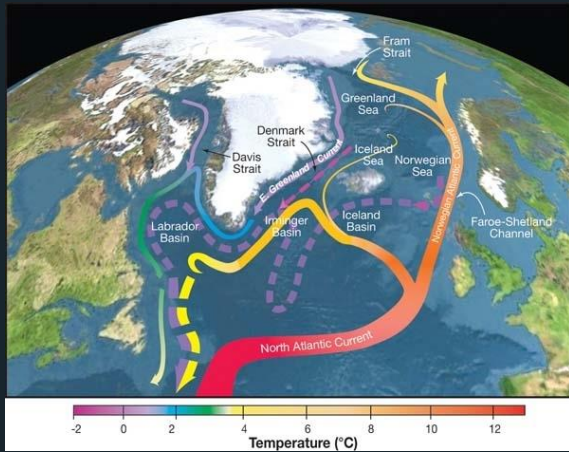


Ritchie, et al. (2019) *Environmental Research Letters: online early*



# Effect of a climate tipping point on GB agriculture

Collapse of the Atlantic Meridional Overturning Circulation (AMOC)



Ritchie, Smith, *et al.* (in revision) *Nature Food*



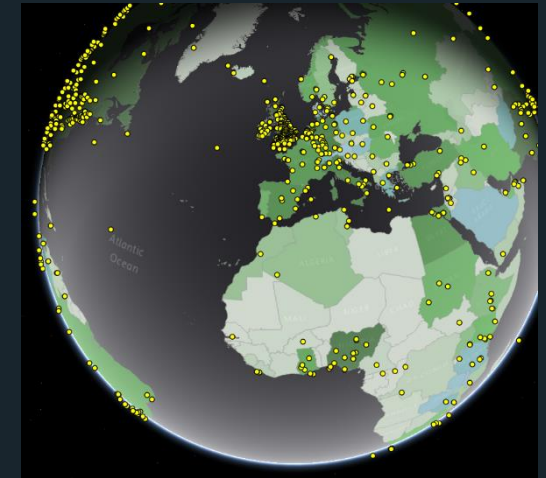
# Key predictions

- Under smooth climate change:
  - Numerous abrupt shifts in GB vegetation carbon
  - Arable farming predicted to advance west and north displacing livestock farming
  - Potentially large losses of arable production in the east and south east
- Under a climate tipping point (AMOC collapse):
  - Almost a complete loss of arable farming due to climate drying
  - Irrigation could in principle mitigate arable loss
  - But costs prohibitive, requiring national-scale water redistribution



# Outputs

- Defra policy engagement
- 3 new Massive Open Online Courses (MOOCs) on FutureLearn
  - 'Valuing Nature: Should We Put a Price on Ecosystems?' (2 weeks)
  - 'Tipping Points: Climate Change and Society' (2 weeks)
  - 'Invisible Worlds: Understanding the Natural Environment' (4 weeks) with the Eden Project
- Papers
  - Boulton C and Lenton T. (2019) A new method for detecting abrupt shifts in time series. *PLoS Research* 8: 746.
  - Boulton CA, Ritchie P and Lenton TM. (submitted) Numerous abrupt changes in Great Britain vegetation carbon projected under climate change. *Global Change Biology*.
  - Ritchie PD, Harper A, Smith G, et al. (2019) Large changes in Great Britain's vegetation and agricultural land-use predicted under unmitigated climate change. *Environmental Research Letters: online early*.
  - Ritchie PD, Smith GS, Davis KJ, et al. (in revision) Abrupt shifts in national land use and food production after a climate tipping point. *Nature Food*.



Global distribution of MOOC learners

<https://www.futurelearn.com/profiles/1652>

Global Systems Institute



VALUING NATURE





# VALUING NATURE



## Green Infrastructure and the Health and wellbeing Influences on an Ageing population (GHIA)

Lindley, S<sup>1</sup>, Ashton, J<sup>2</sup>, Barker, A<sup>3</sup>, Benton, J<sup>6</sup>, Cavan, G<sup>4</sup>,  
Christian, R<sup>8</sup>, Colton, R<sup>9</sup>, Cook, PA<sup>5</sup>, Dennis, M<sup>1</sup>, French, D<sup>6</sup>,  
Gilchrist, A<sup>3</sup>, James, P<sup>7</sup>, Macintyre, V<sup>6</sup>, O'Neill, J<sup>8</sup>, Phillipson,  
C<sup>9</sup>, Taylor, R<sup>2</sup>, Tzoulas, K<sup>4</sup> and Wossink, A<sup>10</sup>

1 Department of Geography, The University of Manchester (UoM)

2 Institute for Cultural Practices, School of Arts, Languages and Cultures, UoM

3 Planning and Environmental Management, The University of Manchester

4 Department of Natural Sciences, Manchester Metropolitan University

5 School of Health & Society, University of Salford

6 Faculty of Medical & Human Sciences, The University of Manchester

7 School of Science, Engineering and Environment, University of Salford

8 Political Economy Institute, Philosophy, School of Social Sciences, UoM

9 Sociology, School of Social Sciences, The University of Manchester

10 Department of Economics, The University of Manchester

[www.ghia.org.uk](http://www.ghia.org.uk)



University of  
**Salford**  
MANCHESTER



**Manchester  
Metropolitan**  
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@GHIA\_VNN

# Six Project Aims through six inter-connected Work Packages

How can urban green infrastructure *be best designed, enhanced, managed and promoted* to support its use as part of preventative and restorative therapies, and other health and wellbeing related activities?

To agree GHIA's multi-disciplinary foundation

1



2



To understand how older people can realise physical, social & mental wellbeing within GI spaces

- cultural participation & creative practice
- role for GI & volunteering
- involvement of people

3



To examine how GI influences the health and wellbeing of older people

- health & wellbeing & GI attributes
- urban greening, physical activity & overall well-being
- environmental exposures & GI

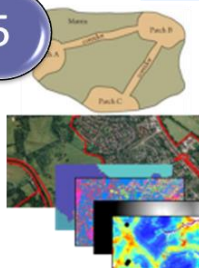
4



To value GI in the context of improving the health & wellbeing of older people

- participatory & equitable valuation
- limits of monetary valuation

5



To develop & apply a new methodology for representing the needs, provision and value of GI for older people

- Maps of provision of and need for GI in GM
- Variations with scale
- Inequalities

6

**Impact and KE**

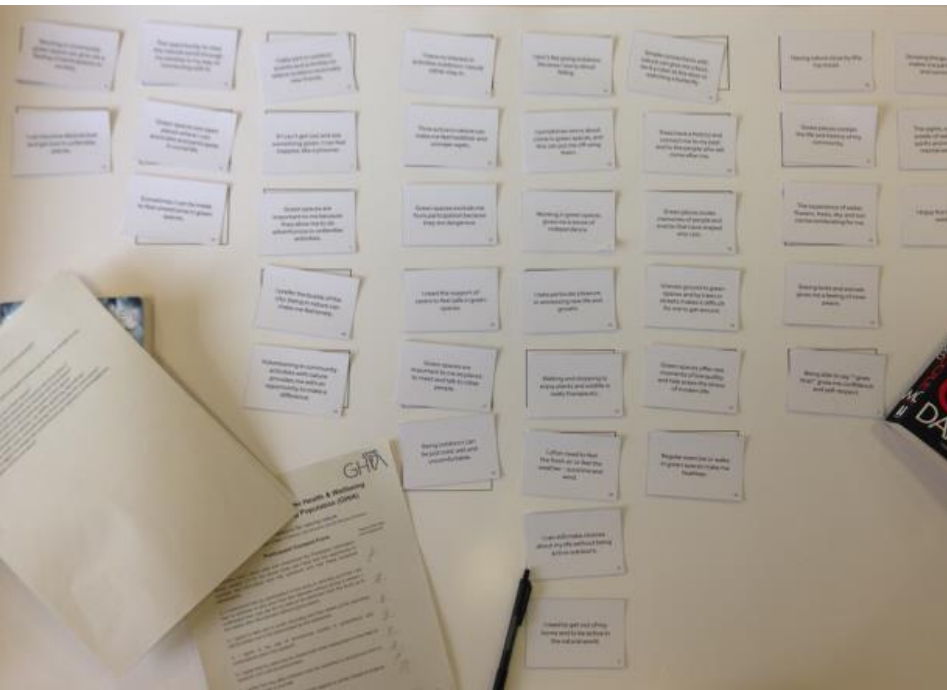
To co-develop a range of outputs and transferable deliverables



# Key Findings – a methodological cornucopia

- **Better health in neighbourhoods with greater abundance, better quality and closer green and blue spaces.**
  - In older low income neighbourhoods **only close proximity** to local green and blue spaces
- Older people told us that **they value** green and blue spaces because they
  - Embody personal and social memories.
  - Present opportunities to connect with nature and volunteer with others.
  - Present opportunities for active outdoor activity and adventure.
  - Present opportunities for social relationships, independence and personal growth.
- Older people showed us how some of these values are echoed in **motivations for engagement**
- **Analysing interventions**
  - Even very small scale interventions can have an impact for some elements of wellbeing, but not all.
    - Context is key – **whose space?**
  - *small scale intervention* within an area of existing green space showed no statistically significant change in older adults' physical activity
  - *Dementia walks* in UGS seem to be more about social and physical activity wellbeing outcomes than to contact with nature
  - *GI interventions* can also help to reduce outdoor exposures of UFPs – summer concentrations also lower than winter

# Participatory methods → online tools



The Value Tool Restart the tool

(11) Regular exercise or walks in green spaces make me healthier.

11/15

Disagree (#1) Neutral (#2) Agree (#3)

(10) Green places evoke memories of people, events and adventures that have shaped who I am.

(4) Green spaces are

(15) Green spaces are places to learn and share knowledge of nature.

(2) Being outdoors can be just cold, wet and uncomfortable.

(13) Green spaces offer rare moments of tranquility and help erase the stress of modern life.

(12) I often need to feel

Back 30% Help me!

## Dimensions of wellbeing for valuing GI

Positive (negative) role via opportunities for:

1. Adventure/activities/mobility
2. Autonomy/independence/self respect
3. Participation
4. Relations to nature
5. Relations to other people
6. Security and safety
7. Memory/heritage/legacy/place & other ties
8. Health
9. Sensory experience
10. Mood

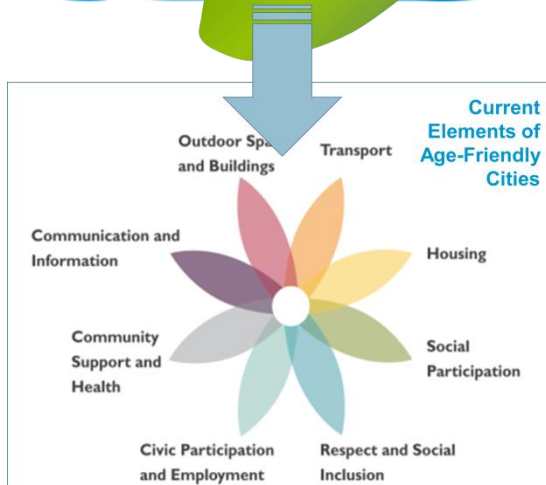
# Who Cares? co-research with older adults



# Implications



Evidencing the role of the natural environment for the development of age-friendly cities



- One size does not fit all - motivations, needs, provisions and values vary
- Consider
  - Role of participatory, co-research and creative practice
  - Full range of values & motivations
    - H&W not a primary motivation
  - 'Easy wins' through enhancements to existing H&W interventions
  - Role of contexts in GI & HW interventions
  - Wider benefits, e.g. how hazards and stresses can be mitigated more widely
- Recognize
  - negative H&W impacts of losing spaces and 'wild places' valued by and cared for by communities

GI Engagement Impact	GI Benefits Impact	GI Values Impact
Identifying older people's motivations for engaging with GI	Evidencing how GI influences older people's health and wellbeing	Developing mixed methodologies to communicate the non-monetary value of GI
Identifying the opportunities and barriers for engagement in GI within diverse groups	Demonstrating opportunities for wellbeing interventions and their relevance to health and social care devolution	Encouraging more holistic approaches to valuation and its relevance to policy and practice

More information Session C2

Dissemination Event → Jan 9<sup>th</sup> 2020



# VALUING NATURE



The  
University  
Of  
Sheffield.



**IWUN**

Improving wellbeing  
through urban nature

## Improving Wellbeing through Urban Nature (IWUN)

Professor Anna Jorgensen ([a.jorgensen@sheffield.ac.uk](mailto:a.jorgensen@sheffield.ac.uk))

Department of Landscape Architecture

The University of Sheffield



CENTRE for  
SUSTAINABLE  
HEALTHCARE

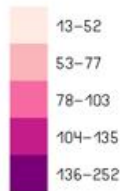


## POOR GENERAL HEALTH

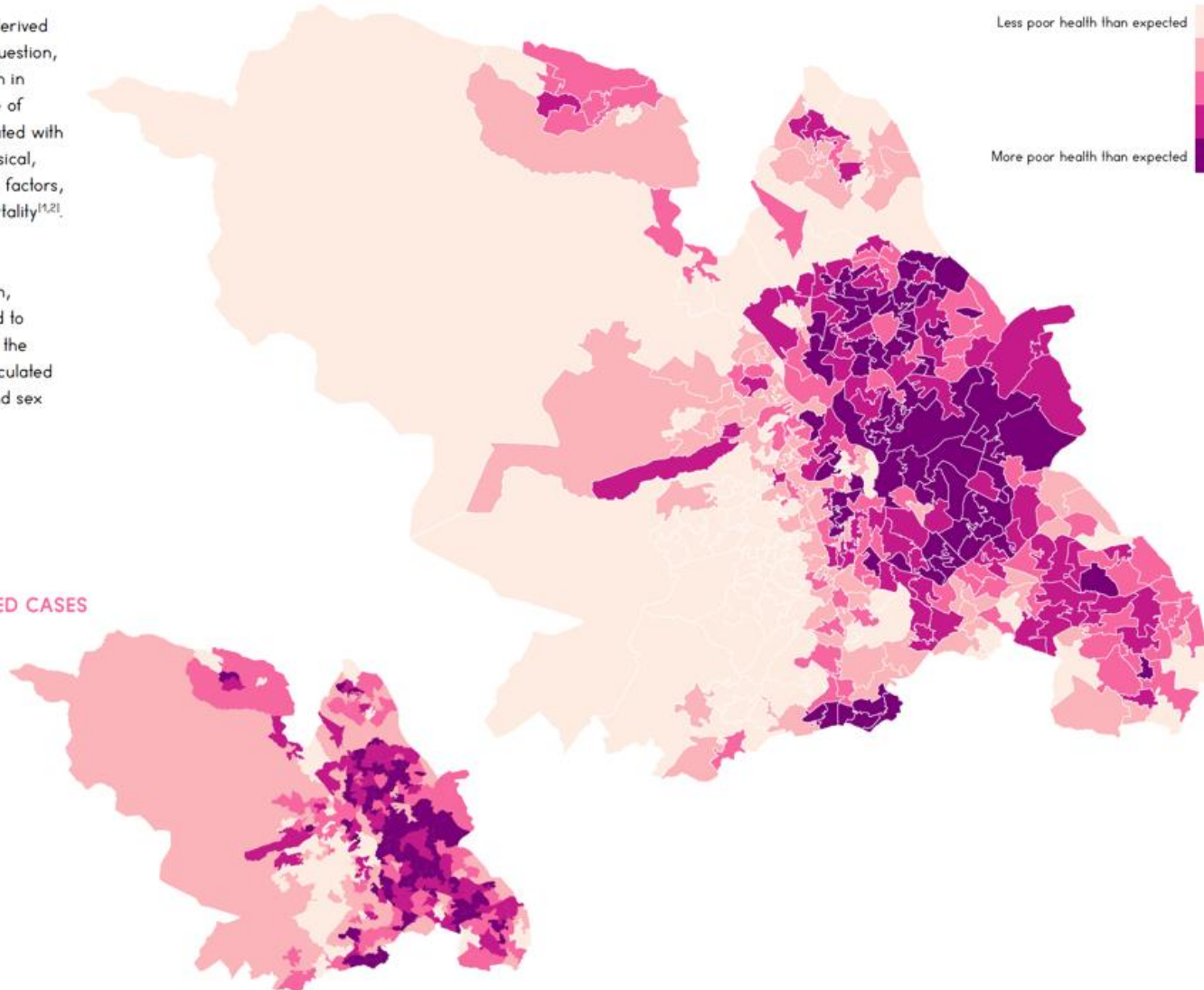
This health outcome is derived from the 2011 census question, "How good is your health in general?". This measure of general health is associated with objectively assessed physical, mental and social health factors, as well as all-cause mortality<sup>19,21</sup>.

The main map shows standardised poor health, i.e. the ratio of observed to expected counts, where the expected counts are calculated from the LSOA's age and sex distribution.

## COUNT OF OBSERVED CASES

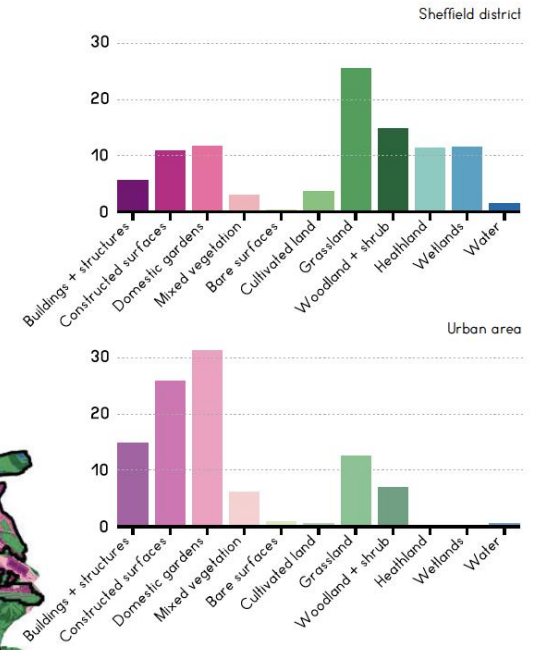
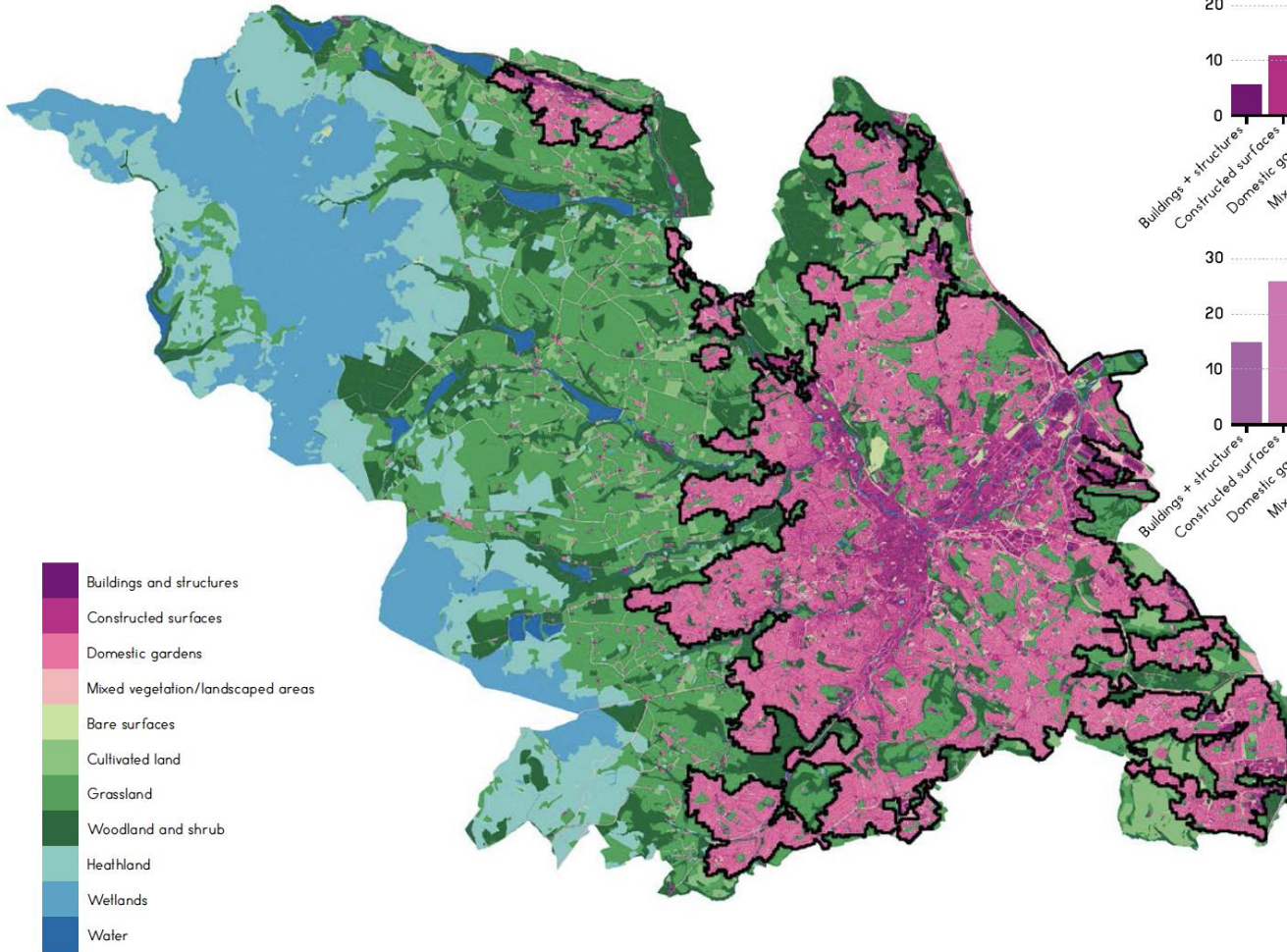


## RATIO OF OBSERVED: EXPECTED CASES



# LAND COVER

## PERCENTAGE LAND COVER



# IWUN aims



- Evaluate the ways in which the quality and quantity of urban green space impacts on the health and wellbeing of Sheffield residents
- Explore the cultures and values that influence how people of different ages and backgrounds interact with the natural environment
- Find out more about which aspects of the natural environment are beneficial for health and wellbeing
- Evaluate whether a smartphone app connecting people with nature can improve health and wellbeing
- Develop a method to measure the cost-effectiveness of interventions designed to boost health and wellbeing in urban natural environments
- Work out how health and wellbeing benefits of urban nature can be used to enhance local services e.g. parks and countryside, health and social care



# Findings

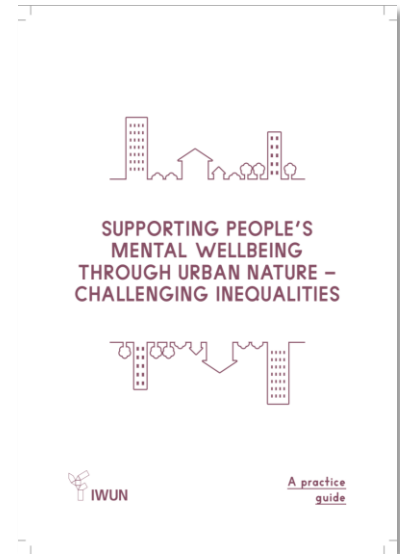
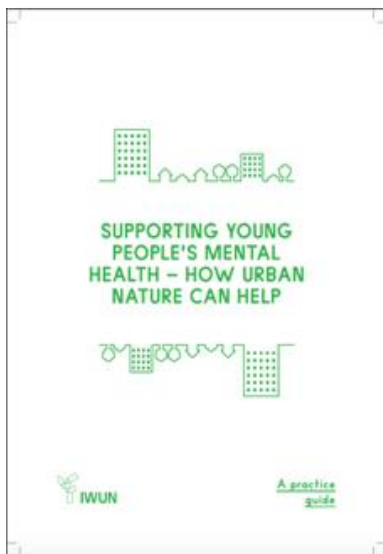
- Quality and accessibility of urban natural environments, may be just as important, if not more important, than quantity
- Our work on cultures and values produced a rich picture of lifelong, evolving connections, and disconnections, from urban natural environments
- Diversity, quality and facilities matter, but so do the social aspects of using greenspace
- A smartphone app connecting people with nature can improve health and wellbeing
- Green space interventions to boost health and wellbeing are cost-effective if enough people use them
- A joined up approach to health, wellbeing and green spaces is challenging in a time of austerity, but place based approaches offer a way forward

# 5 principles for policy makers

1. Green infrastructure is social infrastructure as well as physical
2. Noticing nature improves wellbeing
3. Diversity in design, plants and wildlife, facilities, and activities, attracts users across all generations and widens the availability of wellbeing benefits.
4. To deliver wellbeing benefits, we need sustained investment in the everyday physical and social infrastructure of urban natural spaces. Development and investment should support the quality of existing green spaces as well as providing new ones.
5. Better community infrastructure can help overcome inequalities in access to urban nature. Community infrastructure is the network of organisations and groups, formal and informal, that can connect people with the natural world.

# IWUN: Policy and Practice briefs

<http://iwun.uk/publications/>





# VALUING NATURE

## WetlandLIFE



[www.wetlandlife.org](http://www.wetlandlife.org)

@wetlandlife

#wetlandlife

Tim Acott PI

University of Greenwich: Tim Acott, Adriana Ford

Natural Resource Institute: Gay Gibson, Frances Hawkes, Bob Cheke

University of Bristol: Peter Coates

Cranfield University: Anil Graves, Joe Morris, Sharanya Basu Roy

University of Brighton: Andrew Church, Neil Ravenscroft, Mary Gearey

Public Health England: Jolyon Medlock, Alex Vaux

Forest Research: David Edwards

Independent artists: Helmut Lemke, Kerry Morrison, Victoria Leslie

Art consultant: Chris Fremantle



# Key Reflections

- **Conceptual Framework** of 'Nested Ecosystem Services': a relational perspective replacing linear logic of cascade model.
- **Epistemological Equality**: The importance of multiple ways of knowing and interdisciplinarity as a foundational concept
- **Arts Based Research**: Creating new spaces for exploring (deliberative) values and creating new values. Wetlands on Wheels, Short Stories, Hide and Seek, Jenga and dice games.
- **Community Voice Method / Interviews**: Creating new spaces for dialogue; increased our understanding of perceptions of mosquitoes and links to wellbeing in wetlands. Some unease about future disease risk but people felt they would adapt, some concern about perceptions of risk. Many health and wellbeing benefits including mental health, physical and relational. Wetlands as places for learning; places of wellbeing practice; places of memory
- **Wetland Representations**: English Wetlands: Spaces of Nature, Culture and Imagination, Palgrave Pivot Book in press.
- **Photo-essay**: Over 3000 images thematically analysed e.g. wetlands as places of authority and control, expansive and intimate places, places for creatures, places of texture, movement and colour.
- **Ecology**: using the results of over 30,000 mosquitoes collected and identified to prepare a practical decision making handbook for wetland practitioners which will be framed by the socio-cultural research.
- **Economics**: Wetlands benefits are sensitive to perceptions of environmental risk, managing actual and perceived risk is critical. Messages like 'Don't worry, mosquitoes are not a problem', not good enough. Difficult to investigate.
- **Historical**: The belief in the 1920s that mosquitoes, though not disease-carriers, were making resorts 'almost uninhabitable' is an antecedent of today's concern about mosquitoes as a disincentive to public use of wetlands and as a barrier to the more widespread appreciation of the cultural services they provide (in short, mosquitoes as an ecosystem disservice).

# Wetlands on Wheels



itching for understanding  
the sound of mosquitos



the sound of mosquitos  
the sound of mosquitos  
the sound of mosquitos



Hide and Seek initiative by Victoria Leslie

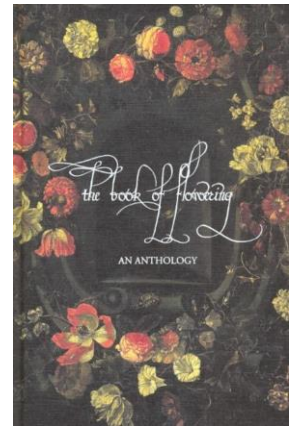
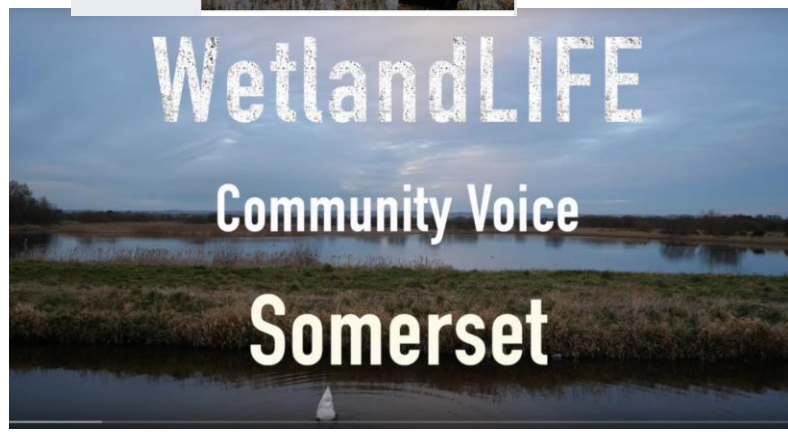
**Humans Of The Levels**  
@humansofthelevels

17 February · G

"I regularly cycle and walk around Ham Wall and this spot beside the lake, with Glastonbury Tor in the background, is one of my favourites. I feel like this is a very dynamic environment, changing from day to day with the seasons and the weather. I am a writer, and this environment inspires many of my pieces for my blog, Normal For Glastonbury. I come here in Winter to watch the starlings come in to roost. Being so close to the need bed, they fly in around and just above me... See more



Marginal Species by Victoria Leslie



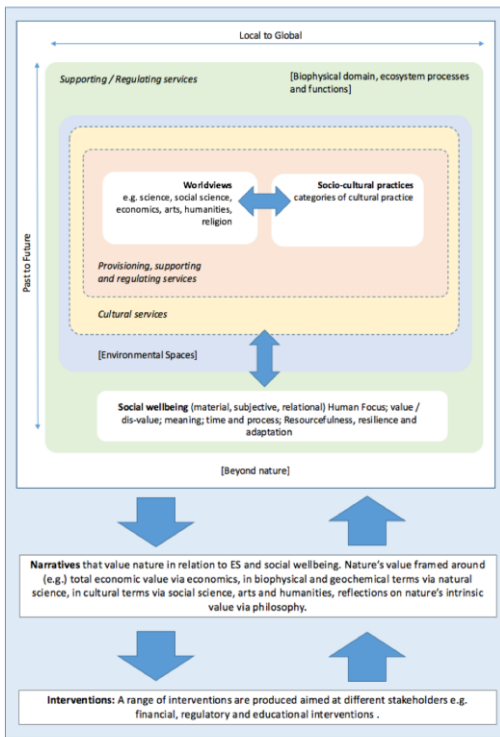
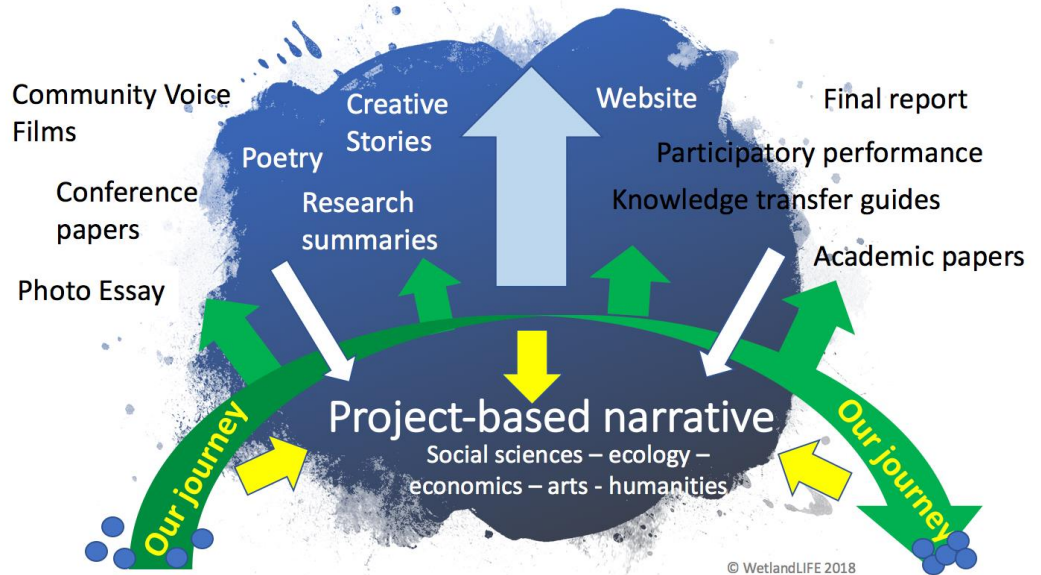


Fig. 5 Nested ecosystem services framework

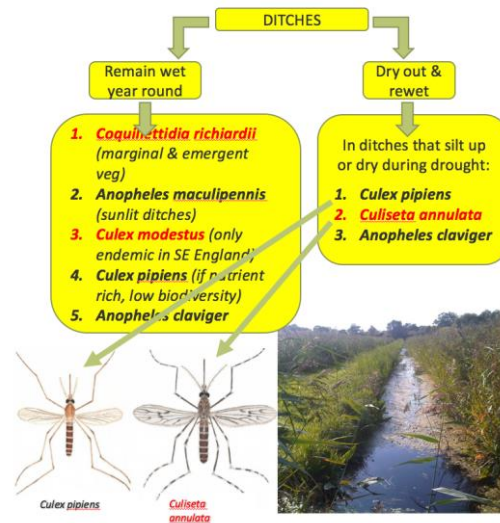
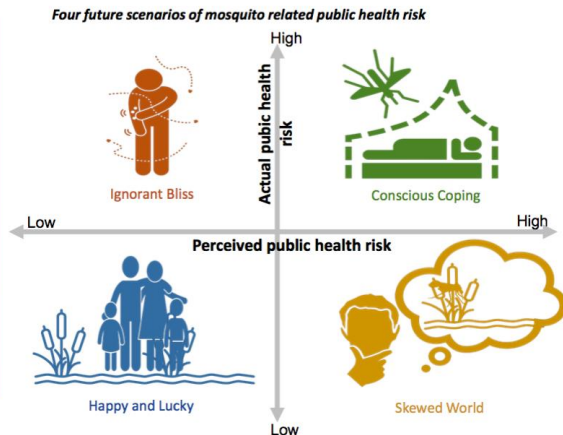
● Wetland managers ● Wetland Users ● Local communities ● Academia  
 ● Wetland Advocates ● Environmental decision-makers ● Ramsar



## Wetland Futures and Mosquito Risk



What's the impact on wetland benefits of possible future mosquito nuisance and disease risks?



An algorithm for identifying mosquito species associated with specific habitat characteristics, whether these present a potential nuisance/ future disease risk, and information on how these may be managed within the context of healthy biodiverse wetland environments.



# Implications

Reclaiming Wetland Values: Mud Marsh and Wonder. Exhibition by WetlandLIFE and CoastWEB at the Royal Geographic Society Jan 27<sup>th</sup> – 2<sup>nd</sup> Feb 2020

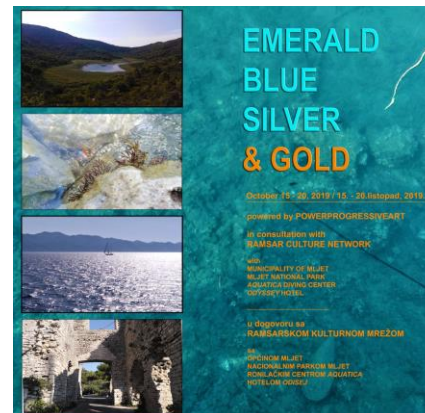
1. Mosquito Handbook for use by Public Health England and Wetland Stakeholders including those with responsibility for managing wetlands, planning wetland creation, expansion and restoration and setting policy around public health and the environment
2. Rethinking relational associations between people and nature through Nested Ecosystem Services and multiple approaches to knowledge
3. Moving on our socio-cultural and economic understanding of wetlands and how to assess their values – including use of art based research
4. Creating and helping others to create new values and positive narratives around the importance of wetlands

Geary, M., Church, A. and Ravenscroft, N. in press, *English Wetlands: Spaces of Nature, Culture and Imagination*, Palgrave Pivot Series.

Endorsements:

”This book is warmly welcomed. I have been waiting for such a book on this topic for 25 years since I began researching and writing about wetlands from a conservation, cultural, human and historical point of view in the early 1990s”.

Rod Giblett (Author of Canadian Wetlands, Postmodern Wetlands, Cities and Wetlands, etc.,:





# VALUING NATURE



@Coastwellbeing

@nicolabeaumont17

CoastWEB: Valuing the contribution which saltmarshes make to human health and wellbeing

PI: Nicola Beaumont



# CoastWEB: multiple value types at multiple scales

Local



Qualitative

## WP1

Historical context of health and wellbeing value of salt marsh

## WP2

Linking coastal habitats to coastal defence

## WP3

Valuing changes in human health and wellbeing as a result of saltmarsh interventions

## WP4

Local to national interventions and integration

A framework linking ecosystem services and human well-being (Rendon et al 2019)



Quantitative



National



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@nicolabeaumont17

# What role do Saltmarshes play in flood risk management?

## 1 in 100 year storm event: Loughor Estuary preliminary results

### With Vegetation

927 buildings: (646 residential, 268 private business, 13 public)

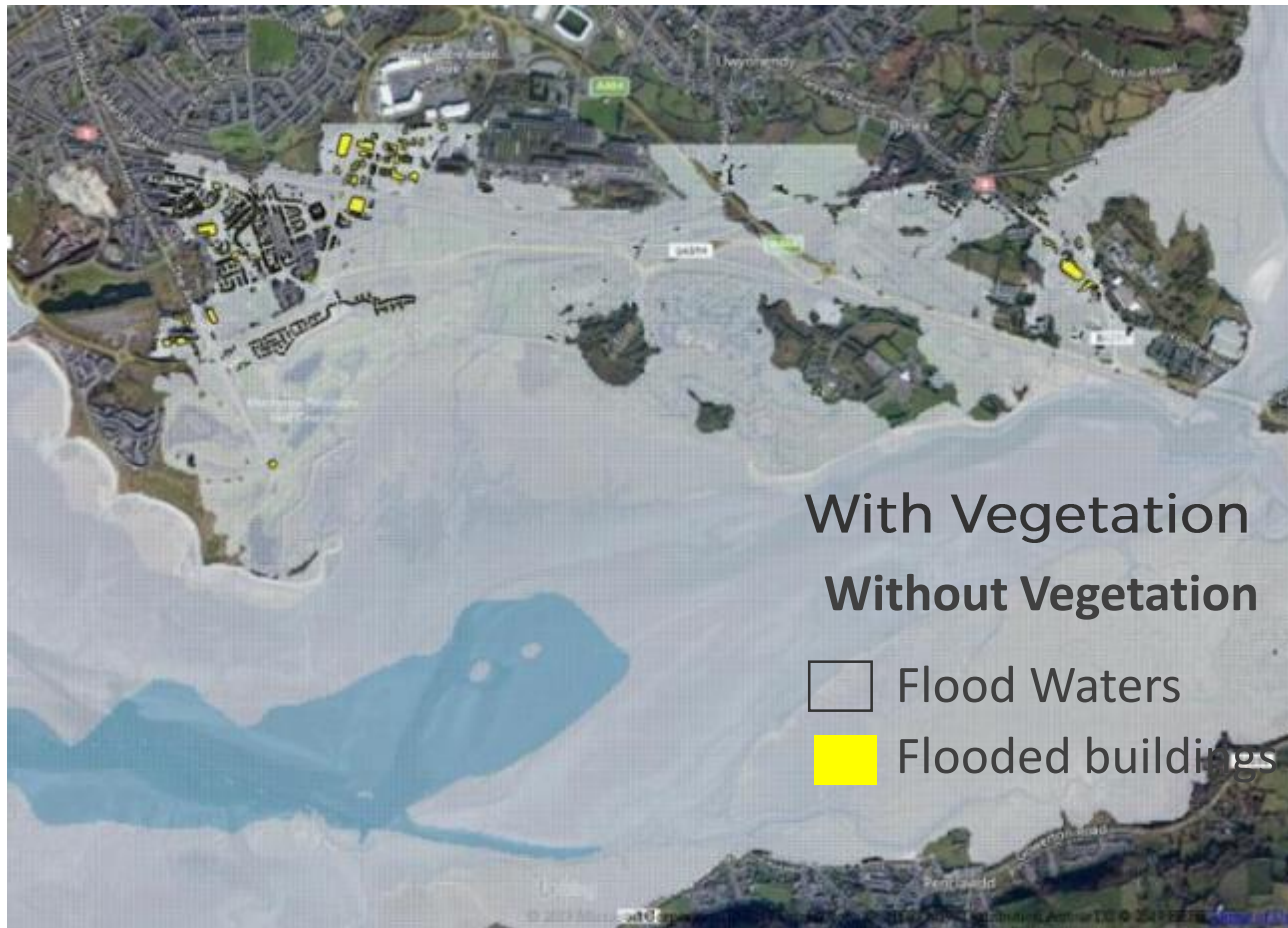
**£102Million**

### Without vegetation

1434 buildings: (1039 residential, 379 private business, 16 public)

**£155Million**

**1/3 reduction in economic costs of flooding in the Loughor estuary from the natural flood control of saltmarsh vegetation**





@Coastwellbeing  
@nicolabeaumont17

# Multiple value types

## 'This is a wake-up call': the villagers who could be Britain's first climate refugees

As sea levels rise, Fairbourne, sandwiched between mountains and the beach, is being returned to the waves. But where will its residents go?



Session F4  
Planning the Landscape  
1000 Tuesday Wolfson Room 2

Alternatives

	No action	Programme 1	Programme 2
Coastal erosion	13% of coast, no change	Increase to 26% of coast	13% of coast, no change
Coastal flooding	15% of coast, no change	Increase to 23% of coast	15% of coast, no change
Loss of salt marsh	20% of salt marsh with high vegetation, no change	Increase to 40% of salt marsh with high vegetation	Increase to 30% of salt marsh with high vegetation
Cost	£0	£11	£2



in Changing Ecosystems  
Room 1



# Interdisciplinary working

“The result are several collaborations, that were not even in the project call, but that are truly interdisciplinary and exciting – This wouldn’t have occurred to us, if it hadn’t been for the different views I have as a natural scientist (and a bit idealistic natural scientist) compared to the pragmatic views of the social fellow.”

“I have just submitted a marie curie application that has a strong natural but also a strong social component. I would have never done it before, if I hadn’t been interacting with social scientists.”





# Key messages

1. Different disciplines revealed
2. The Saltmarshes can attenuate flooding and help to reduce flooding
3. People attach value to coastal values are incredibly important moral responsibilities
4. Involving local communities in place-based decisions
5. Need stronger wellbeing agenda in V



s and coastal landscapes  
vels further up the estuary, and  
nes in different ways. Relational  
social cohesion, social and  
to embed these values in

Final Event at the Royal Geographic Society  
Art Style Exhibition  
CoastWEB and WetlandLIFE  
27<sup>th</sup> January – 2<sup>nd</sup> February 2020

& the Well-