



Vulnerability to Climate Change - Cheshire's Natural Environment

'Cheshire's Changing Climate'

23rd Oct. 2009

The Overview



The depressing bit! – brief outline on Climate Change

The guiding principles of

'Conserving Biodiversity in a Changing Climate'.

'Climate Change Adaptation principles'

Cheshire's likely vulnerability to climate change

ECOSYSTEMS

Increasing amphibian
extinction⁴

About 20 to 30% species at inc-
reasingly high risk of extinction⁴

Major extinctions around the globe⁴

Increased coral bleaching⁵

Most corals bleached⁶

Widespread coral mortality⁶

Increasing species range shifts and wildfire risk⁷

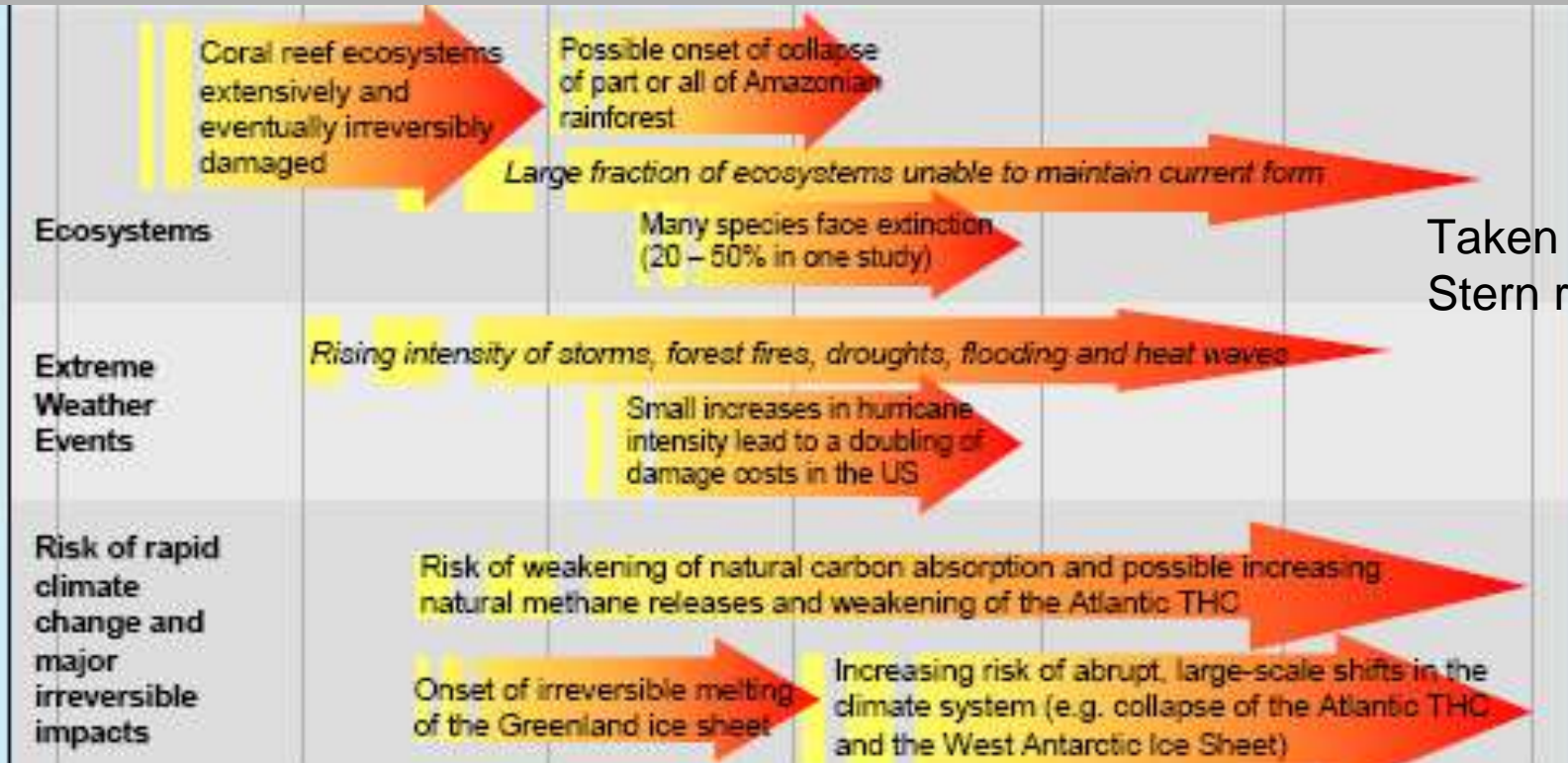
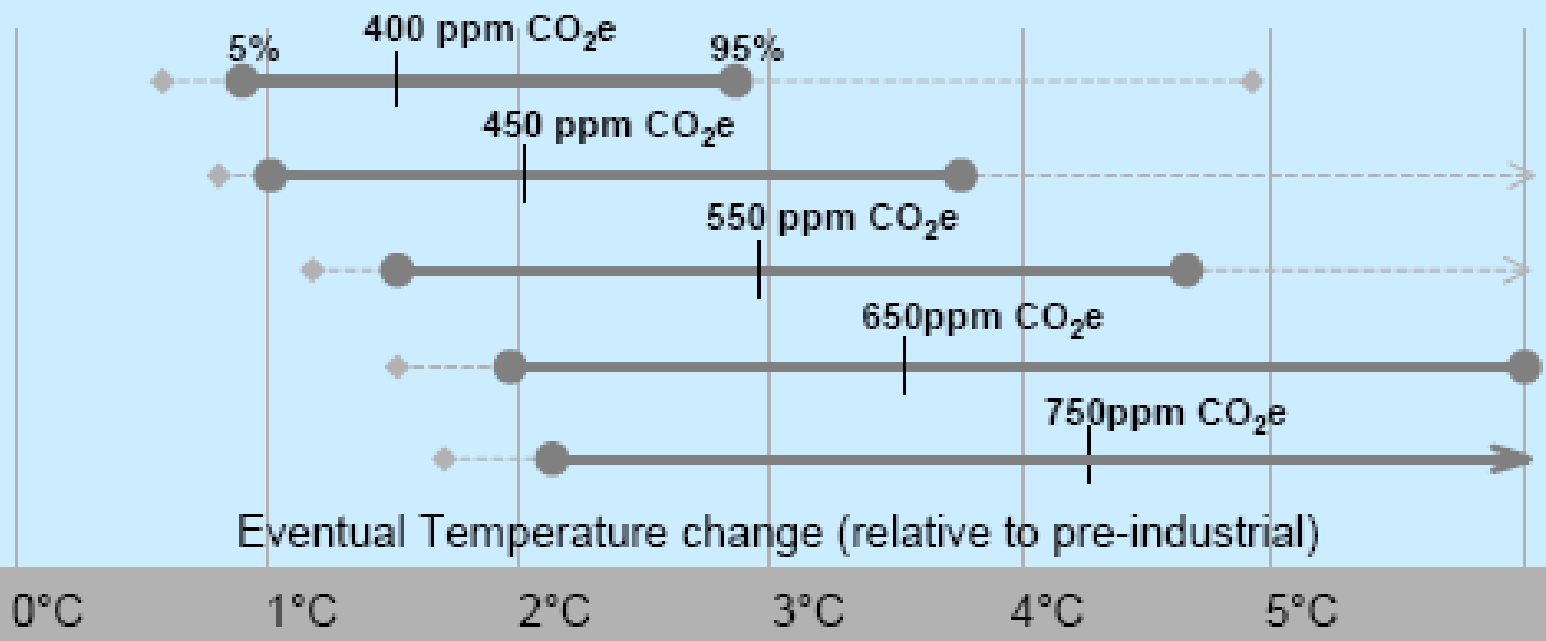
Terrestrial biosphere tends toward a net carbon source, as:⁸
~15%

~40% of ecosystems affected

The Six Degrees of Climate Change



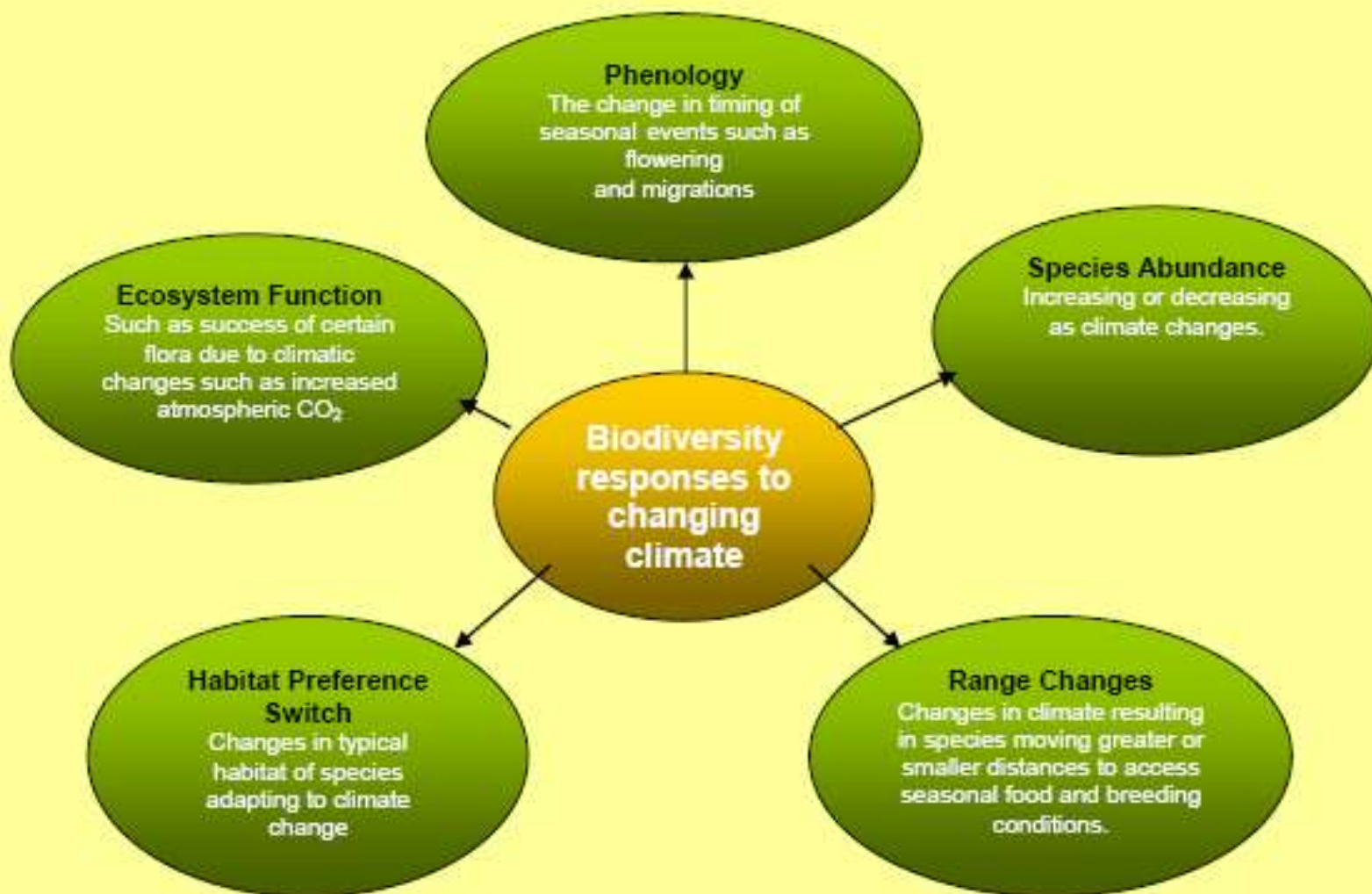
Degree Change	Actual temperature (°C)	Action Needed	CO ₂ Target
One	0.1 -1.0 °C	Avoidance Not Possible	350 ppm (at 380 ppm today)
Two	1.1-2.0 °C	Peak Global Emissions By 2015	400ppm
Threshold for	Carbon Cycle feedback?		
Three	2.1 -3.0 °C	Peak Global Emissions By 2030	450pm
Threshold for	Siberian methane	feedback?	
Four	3.1 -4.0 °C	Peak Global Emissions By 2050	550ppm
Five	4.1 – 5.0 °C	Allow Constantly rising emissions	650ppm
Threshold for	Oceanic methane hydrate	becomes possible	
Six	5.1- 5.8 °C	Allow very High emissions – China & India live our high carbon lifestyle.	800ppm



Taken from the Stern review

Natural England puts climate change as one of its major policy priorities and will focus on adaptation in the light of climate change, while still playing a key role in mitigation to reduce the future emissions of Carbon Dioxide and other greenhouse gases.





The Natural Environment is Interlinked

– we need to understand the whole system.



Through
Access & Recreation
Ecosystem services

Which is used by people

Make up the Landscape

Historic Environment

Biodiversity

Geodiversity
& Hydrology

Things that affect resilience of Natural Environment to Climate Change



Flat = Vulnerable



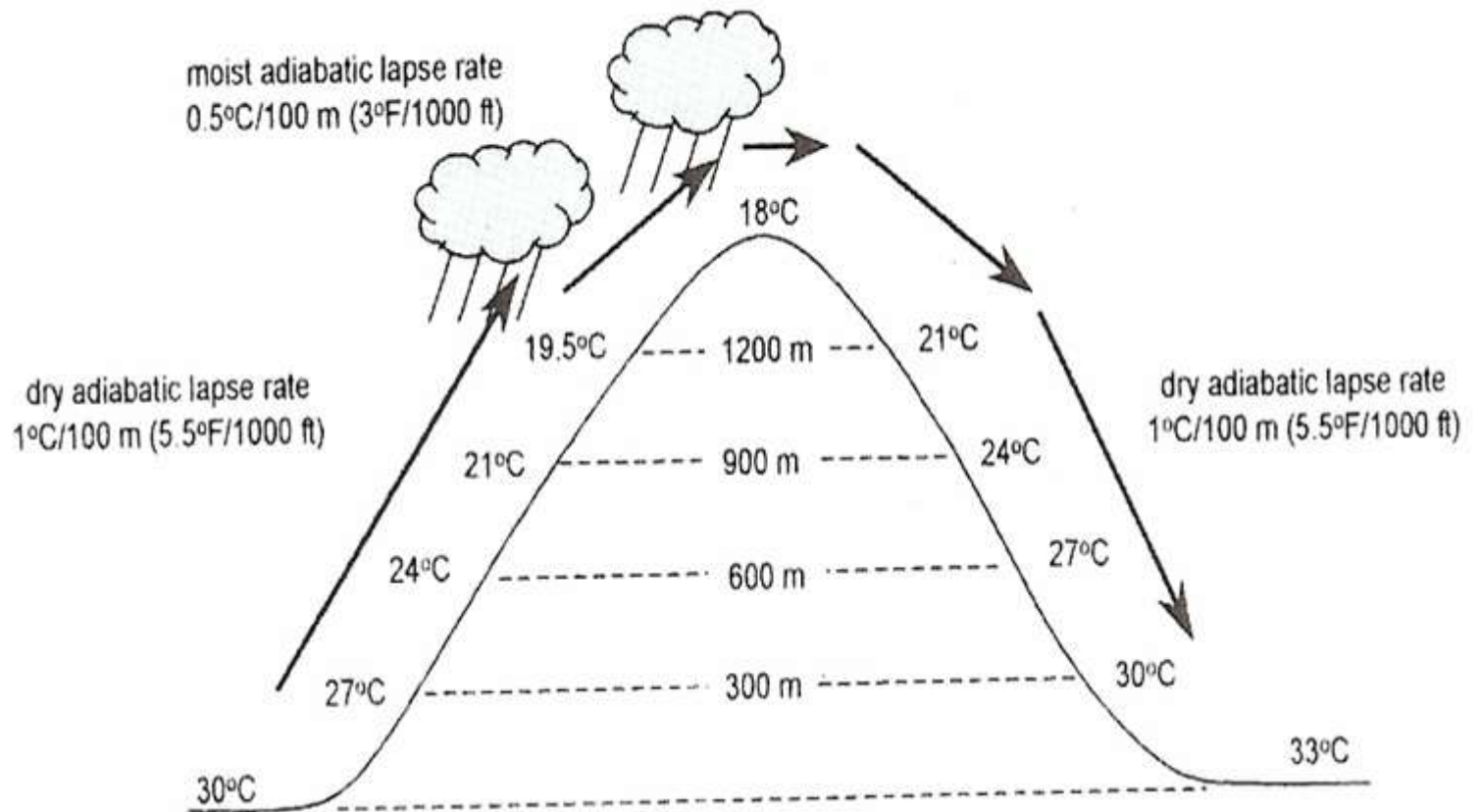
Hilly = Greater Resilience



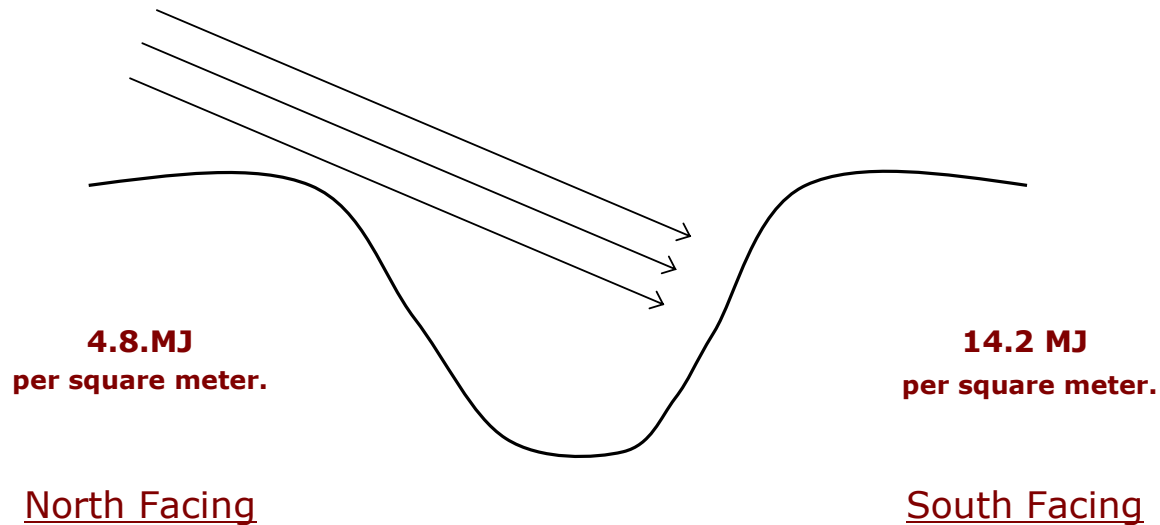
Restoration options need to be directed where needed to help deliver other multiple benefits.

E.g. Green Infrastructure, Recreational space, Connecting Habitat Networks, Ecosystems services, etc.

Temperature and altitude

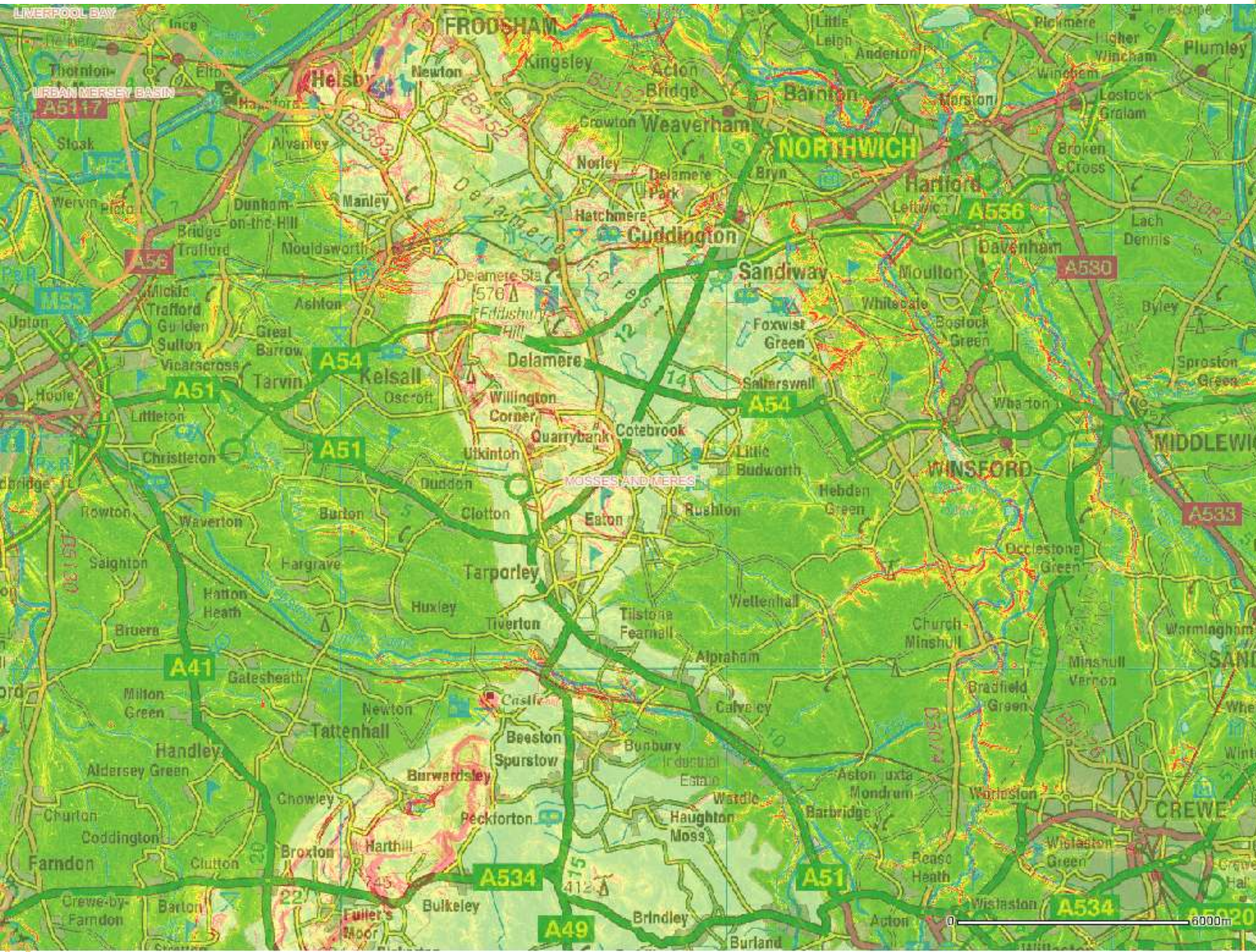


Slope and sunlight



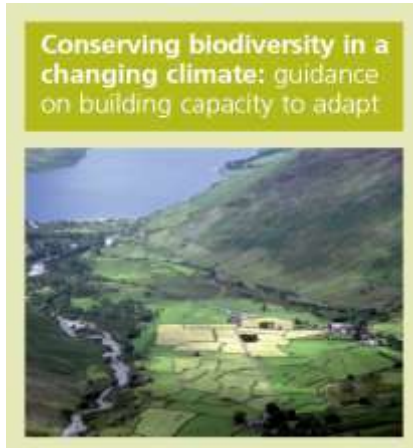
Valley at 30° N, 15 January

Cheshire's Slope Topography



UK Biodiversity Partnership Climate Change Guidelines

May 2007



<http://www.ukbap.org.uk/Library/BRIG/CBCCGuidance.pdf>

Starting principles

- **Actions we can start now** – not requiring new policy or legislation
- **No regrets** – they would be good things to do even if we did not face climate change
- Set the direction of change not the final destination

The Guidelines (page 10-11)



1 Conserve existing biodiversity

1a Conserve Protected Areas and other high quality habitats

1b Conserve range and ecological variability of habitats and species

2 Reduce sources of harm not linked to climate

3 Develop ecologically resilient and varied landscapes

3a Conserve and enhance local variation within sites and habitats

3b Make space for the natural development of rivers and coasts

4 Establish ecological networks through habitat protection, restoration and creation

5 Make sound decisions based on analysis

5a Thoroughly analyse causes of change

5b Respond to changing conservation priorities

6 Integrate adaptation and mitigation measures into conservation management, planning and practice



www.defra.gov.uk/wildlife-countryside/biodiversity/biostrat/index.htm

England Biodiversity Strategy Climate Change Adaptation Principles

Conserving biodiversity in a changing climate



England Biodiversity Strategy – Climate Change Adaptation Principles



Summary of England Biodiversity Strategy Climate Change Adaptation Principles (Smithers *et al.* 2008)



Take practical action now

Conserve existing biodiversity;

Conserve protected areas and all other high quality habitats;

Reduce sources of harm not linked to climate;

Use existing biodiversity legislation and international agreements.

Maintain and increase ecological resilience

- **Conserve the range and variability of habitats and species**

Maintain existing ecological networks;

Create buffer zones around high quality habitats;

- ? **Take prompt action to control spread of invasive species.**

Accommodate change

Understand change is inevitable;

? Make space for the natural development of rivers and coasts;

Establish ecological networks through habitat restoration and creation;

Aid gene flow;

Consider the role of species translocation and ex-situ conservation;

Develop the capacity of institutions and administrative arrangements to cope with change;

? Learn from experience and respond to changing conservation priorities.

Integrate action across partners and sectors

Integrate adaptation and mitigation measures;

Conservation contributes to carbon management through peat bog or native woodland creation. Mitigation actions should not harm the biodiversity & recognise opportunities for biodiversity and so contributing to adaptation.

Integrate policy and practice across relevant economic sectors;

? Build and strengthen partnerships;

Raise awareness of benefits of the natural environment to society

Develop knowledge and plan strategically

Undertake vulnerability assessments of biodiversity and associated ecosystem goods and services without delay;

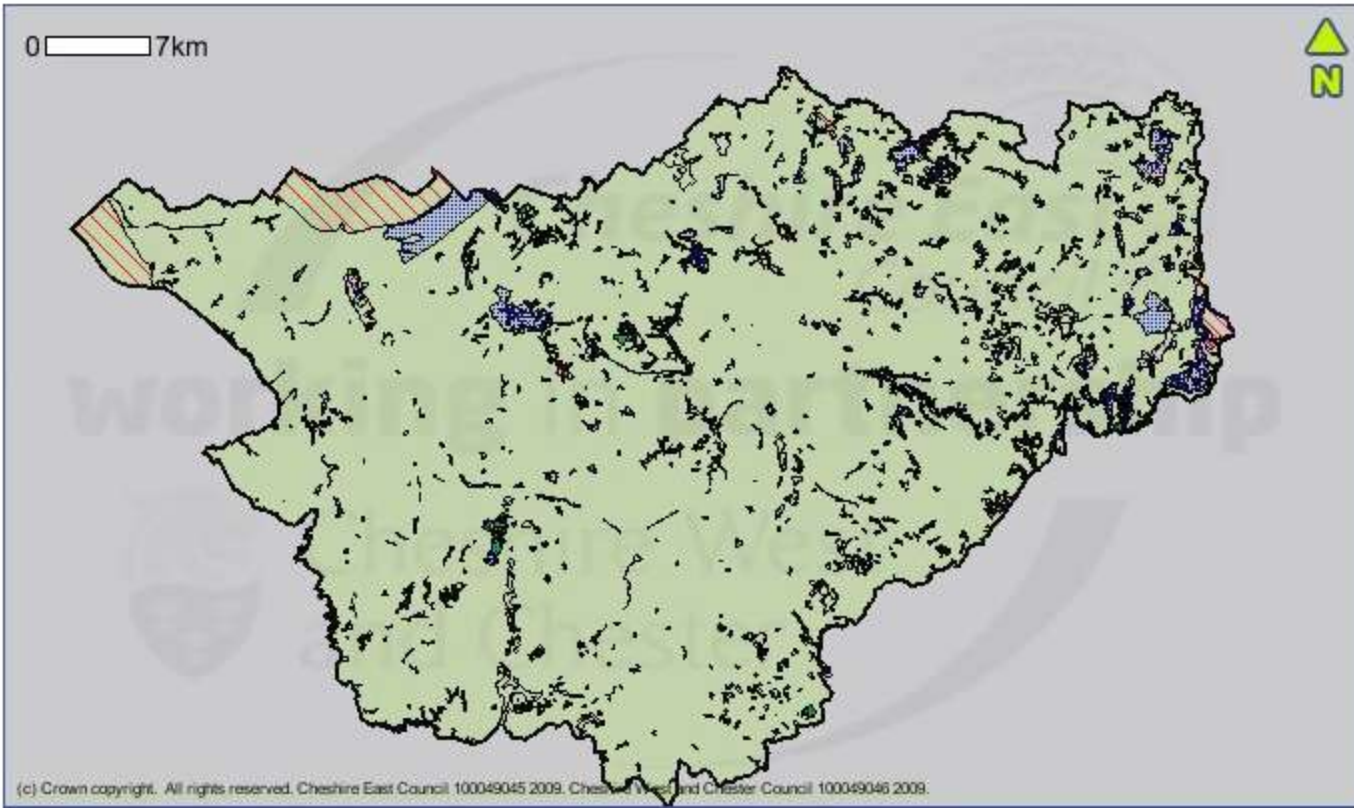
Will come back to what we are doing in NW

- ? Undertake scenario planning and implementation of no regrets actions;**
- ? Pilot and monitoring new approaches;**
Identify potential win-win solutions and ensuring cross-sectoral knowledge transfer. *Are doing this through other work in the region.*
- ? Monitor actual impacts and research likely future impacts.**
- ? Improve understanding of the role of biodiversity in ecosystem services.**
- ? Research knowledge gaps with stakeholder participation.**

Meres & Mosses



- Zoom In 
- Zoom Out 
- Full Extent 
- Pan 
- Undo 
- Re-Do 
- Info 
- Toolkit 
- Help 



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 Minimize

Show / Hide Layers

- Places
- Habitat Li
- Core Areas for Wildlif
- Biological SSSI
- Sites of Biological Importance
- Ancient Woodland
- Grassland
- Glacial Me
- Heathland
- Peatland Sites
- Peatland Improvement Areas
- Developm Areas
- Cheshire ECOscapes

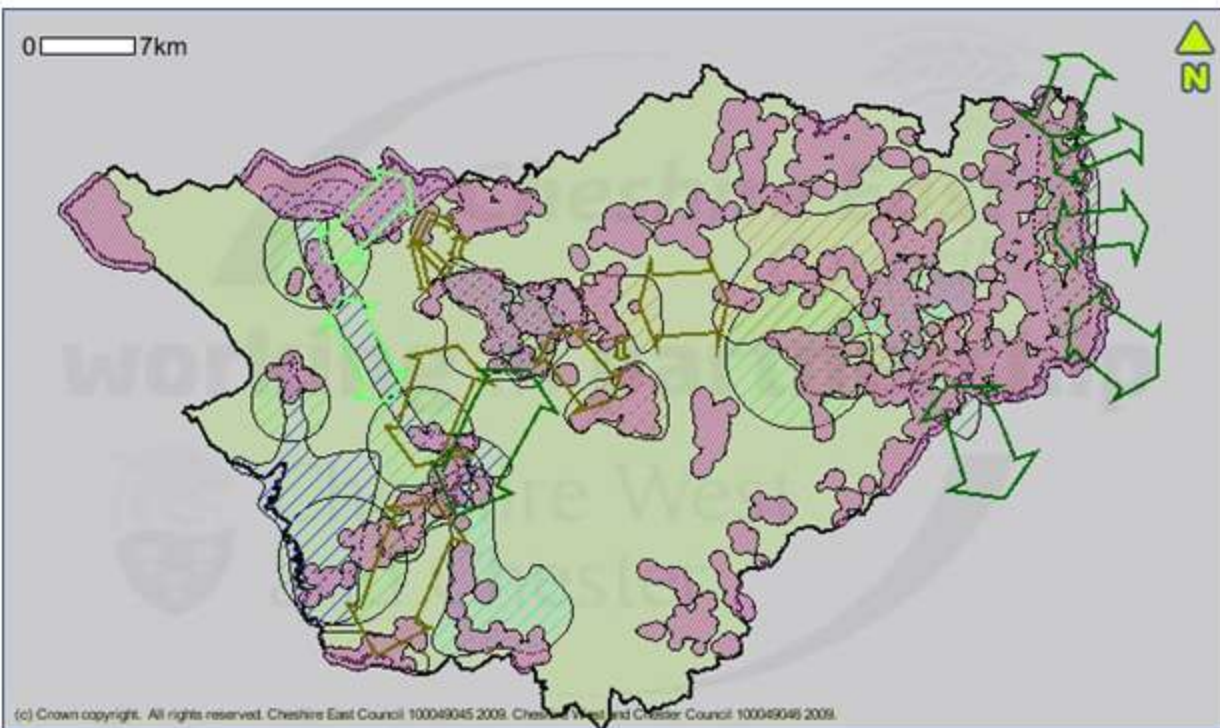
- | | | |
|--|--|---|
|  Biological SSSI |  Grassland |  Cheshire |
|  Sites of Biological Importance |  Glacial Meres |  Outside Cheshire |
| |  Heathland | |
| |  Peatland Sites | |

Enter Placename

Search

Greyscale

- Zoom In 
- Zoom Out 
- Full Extent 
- Pan 
- Undo 
- Re-Do 
- Info 
- Toolkit 
- Help 



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Current/Last Tool: Zoom Out
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- Peatland Sites
- Peatland Improvement Areas
- Development Areas
- Cheshire ECOscapes
- OS 1:50,000

Greyscale

Enter Placename

Search

Small Tools

- Habitat Links**
-  Heathland Links
 -  Grassland Links
 -  Woodland Links
 -  Core Areas for Wildlife

- Development Areas**
-  Grassland
 -  Heathland
 -  Meres-Mosses
 -  Rivers & Wetland (cont)

-  Woodland Moderate Ambition
-  Woodland High Ambition
-  Cheshire
-  Outside Cheshire

Refresh Map

Regional Vulnerability Approach

- The regional vulnerability approach is an assessment which assesses the exposure of an area to the impacts of climate change and its capacity to adapt. The approach involves a high level screening of the whole region to identify which areas and features of the region are most vulnerable to climate change.
- Following this, impact and adaptation assessment can be carried out at the chosen geographical scale.

What would a robust landscape be?

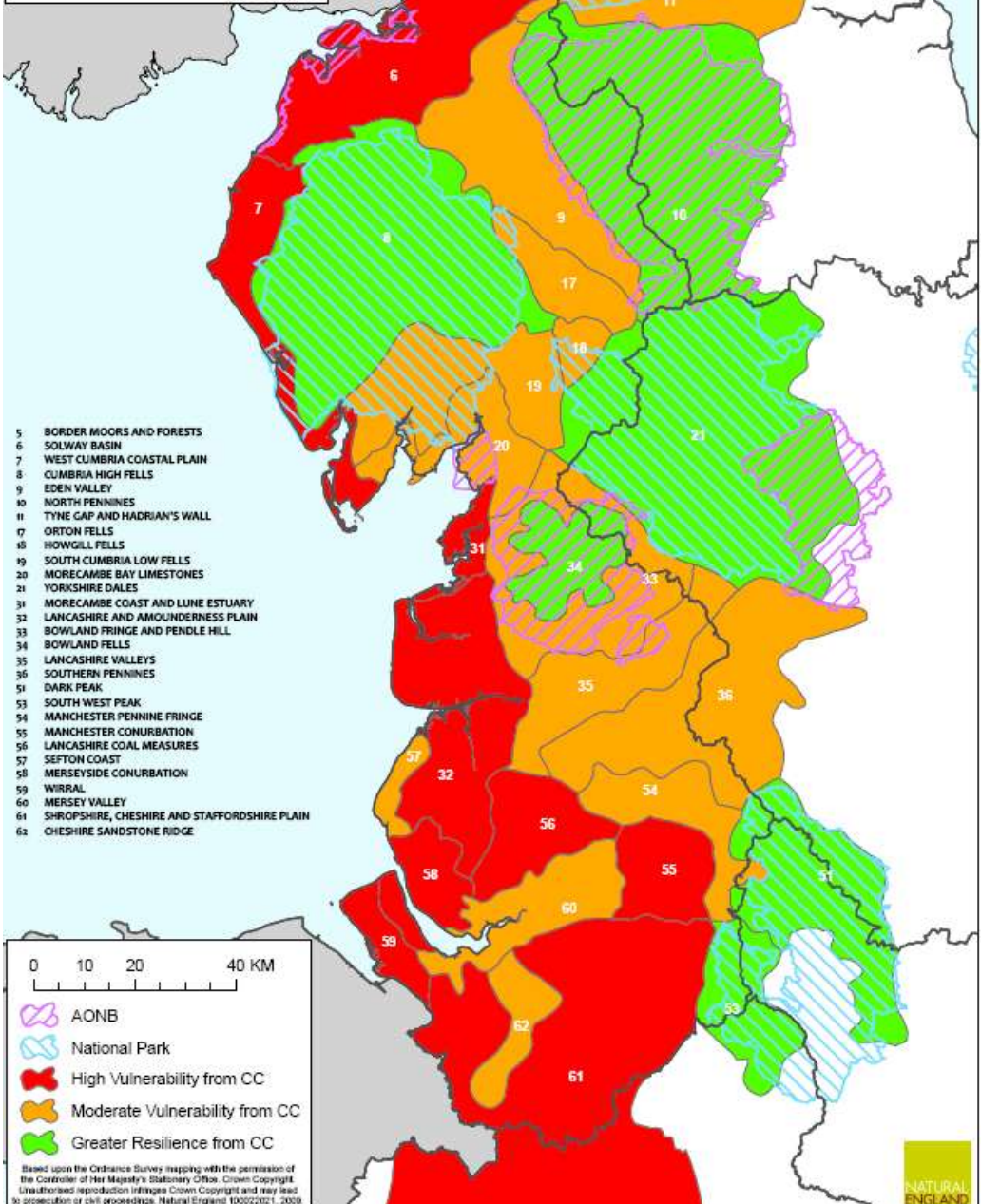
- **A robust landscape is likely to possess extensive, permeable habitat networks and exhibit heterogeneity within and between habitats. Landscapes robust to climate change are likely to possess the following features (Hopkins et al. 2007):**
 - **high permeability;**
 - **variation in topography – slope, aspect and height;**
 - **soil diversity;**
 - **numerous land cover types;**
 - **diverse and structurally varied vegetation;**
 - **diverse water regimes.**

At present this will split down into 3 character area types!



- **Highly at risk** – mostly coloured red (these areas probably have least resource input presently and hardest to fix)
- **Intermediate** – a mixture of red, green & white (might be able to move these from here to a better state than the high risk ones and quicker)
- **Lower risk** – mostly coloured green. (these are the areas of key assets & delivery- now)
Expect to be NP & AONB's etc.

Natural Environment Vulnerability to Climate Change - Qualitative Assessment North West Region



In Summary

Climate change is one of the biggest threats to Biodiversity.

TWO – good publications exist and are worth a more in depth read if this relates to your work.

To solve this effective partnership working is essential.

Climate change vulnerabilities can be investigated and geographically specific adaptation strategies implemented.

