

Building Resilience to Climate Change

What are the Risks?

Summary of the UK Climate Change Risk Assessment 2012 &

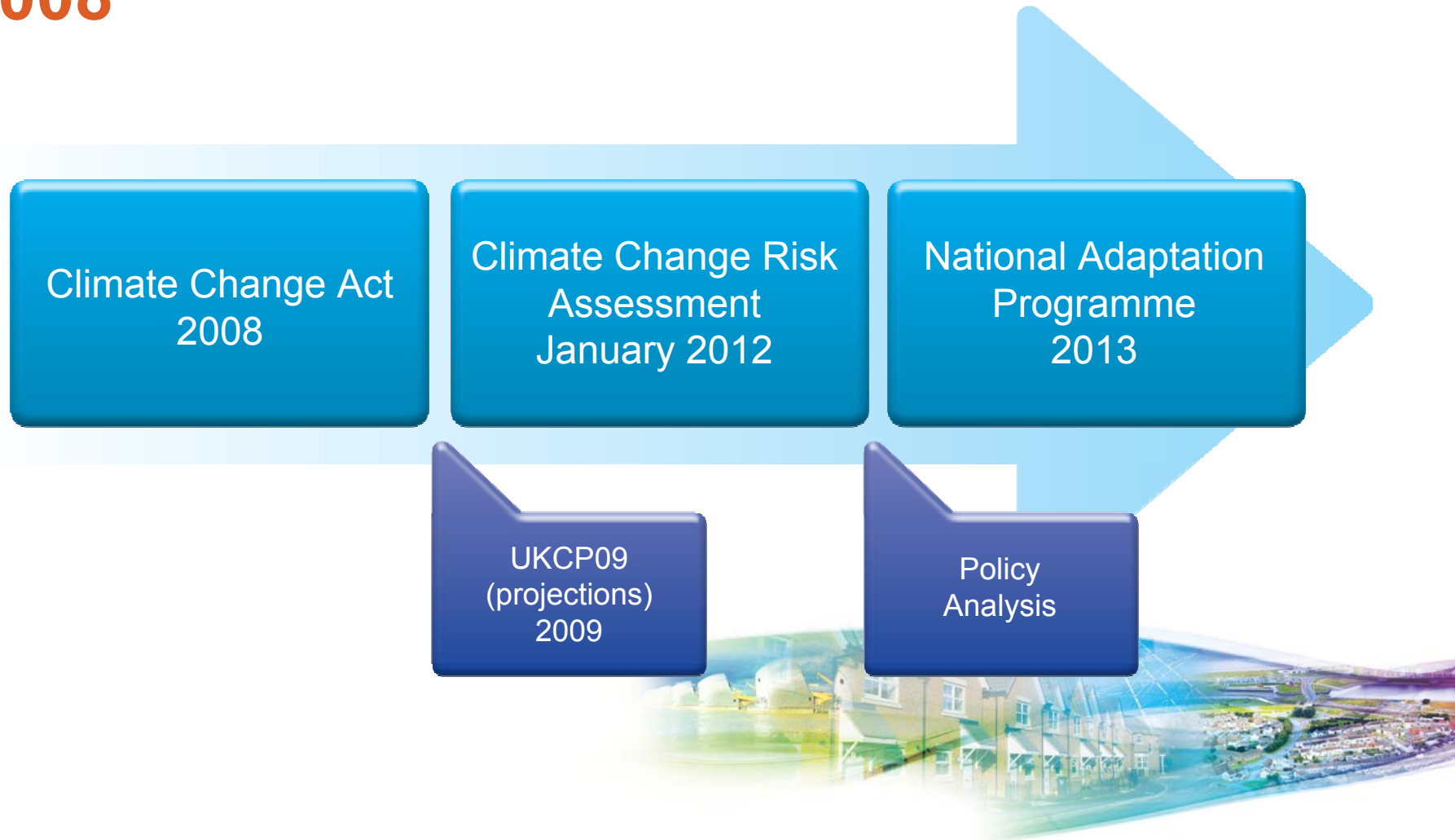
Reflections on methods and tools for addressing social and environmental impacts

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Legislative Framework: the CCRA is one stage in a process that started in 2008



CCRA Outline

Purpose

- Assessment of potential risks and opportunities for the UK arising from climate change (current and future risk up to 2100)
- Help prioritise the National Adaptation Programme (due 2013)

Scope

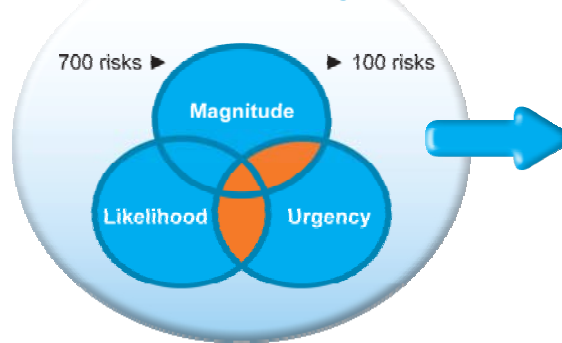
- Science and evidence base using existing data and new analysis
- Analysis of over 100 risks (prioritised from an initial list of over 700) from 11 different sectors
- Enabling comparisons between risks at national and regional scales
- Uses UKCP09 to explore different climate scenarios

Context

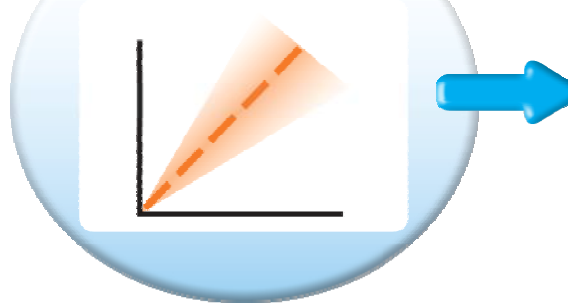
- CCRA **does not take full account of future or planned adaptation policies** - it provides a baseline level of risk on which to test different options
- First in a 5 year cycle
- Provides a framework for future research and prioritisation of where adaptation is needed.
- Paves the way for UK to ensure it is resilient to climate change, and to invest in adaptation technologies/skills (business opportunities)

CCRA Method Overview

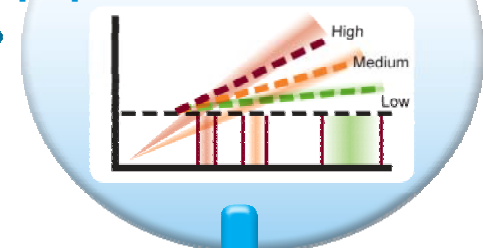
1. Choose priority risks



2. Assess sensitivity of each risk to climate



3. Add projections of future climate/population for each risk



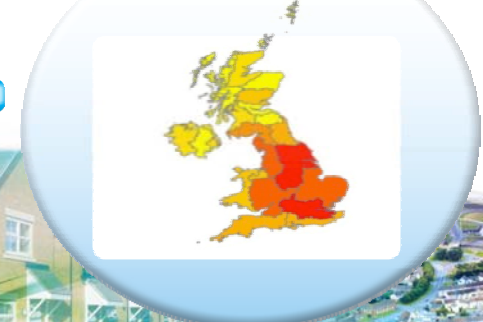
6. Compare scores of all risks



5. Assign magnitude (logarithmic scale) and confidence scores to each risk

| Magnitude | Low | Medium | High |
|-------------|-------|--------|----------|
| Social | 100s | 1000s | Millions |
| Economic | £1M | £10M | £100M |
| Environment | 100km | 100km | 10,000km |

4. Compare by area for each risk.



Key Findings

Results presented for 100+ risk metrics based on:

- a) magnitude of consequences for 2020s, 2050s and 2080s; and
- b) confidence in the evidence.

Key risks/opportunities include:



- **Flooding** (costs could rise from current £1.2 billion to £2-12 billion* by the 2080s).
- **Health risks** from hotter summers (580-5900 premature deaths in summer) but reduced cold-related deaths (3900-24,000 premature deaths avoided in winter) by the 2050s.



- Pressure on **water resources** (e.g. Potential supply/demand deficits of 940-2550 Ml/d in the 2050s for the Thames river basin).



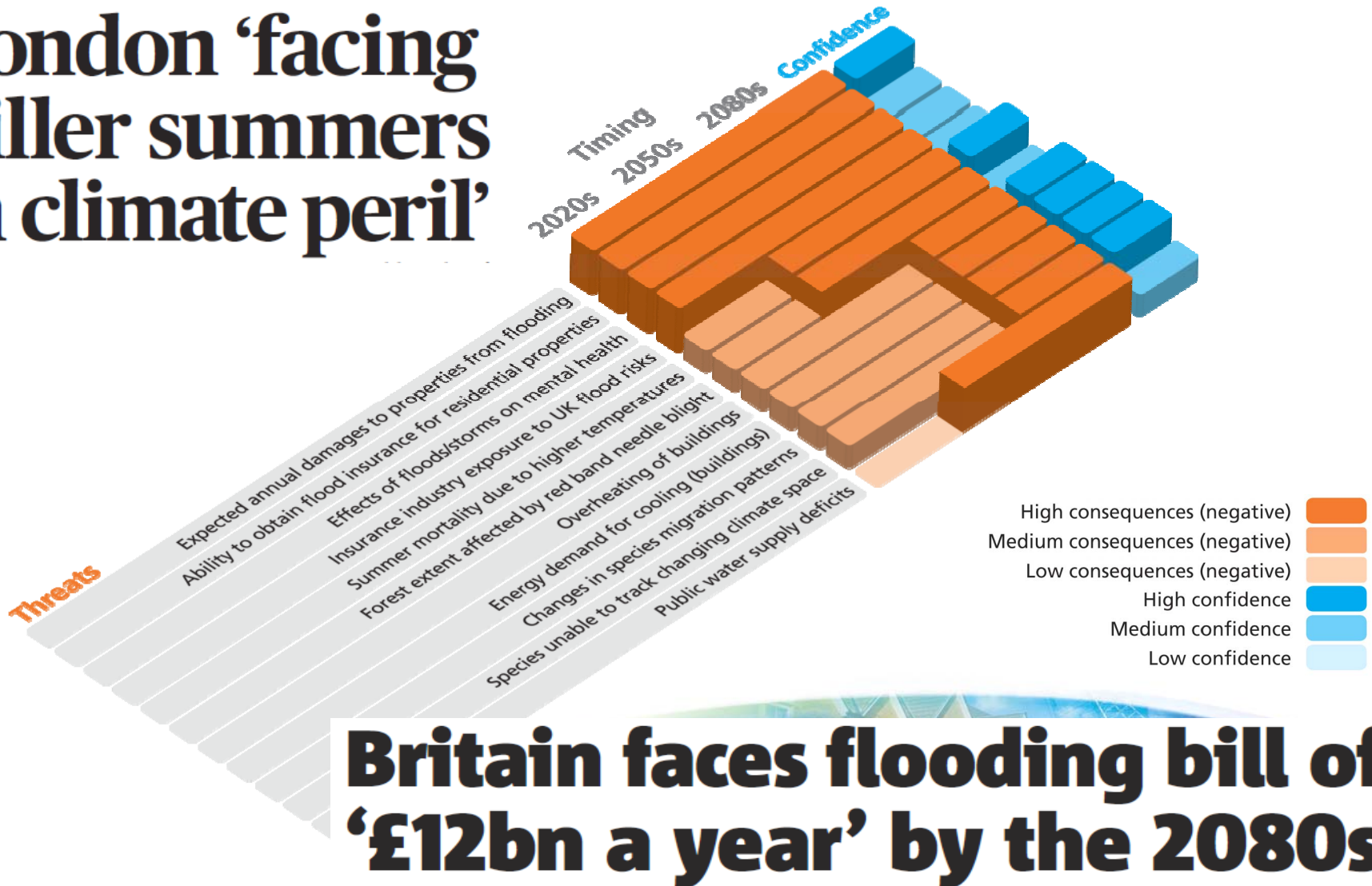
- **Ecosystem risks** (changes in timing of life cycle events, species distribution and ranges).

* this estimate takes into account population growth as well as climate change, and includes costs from fluvial and tidal flooding (not surface water flooding)



Selection of Key National Threats

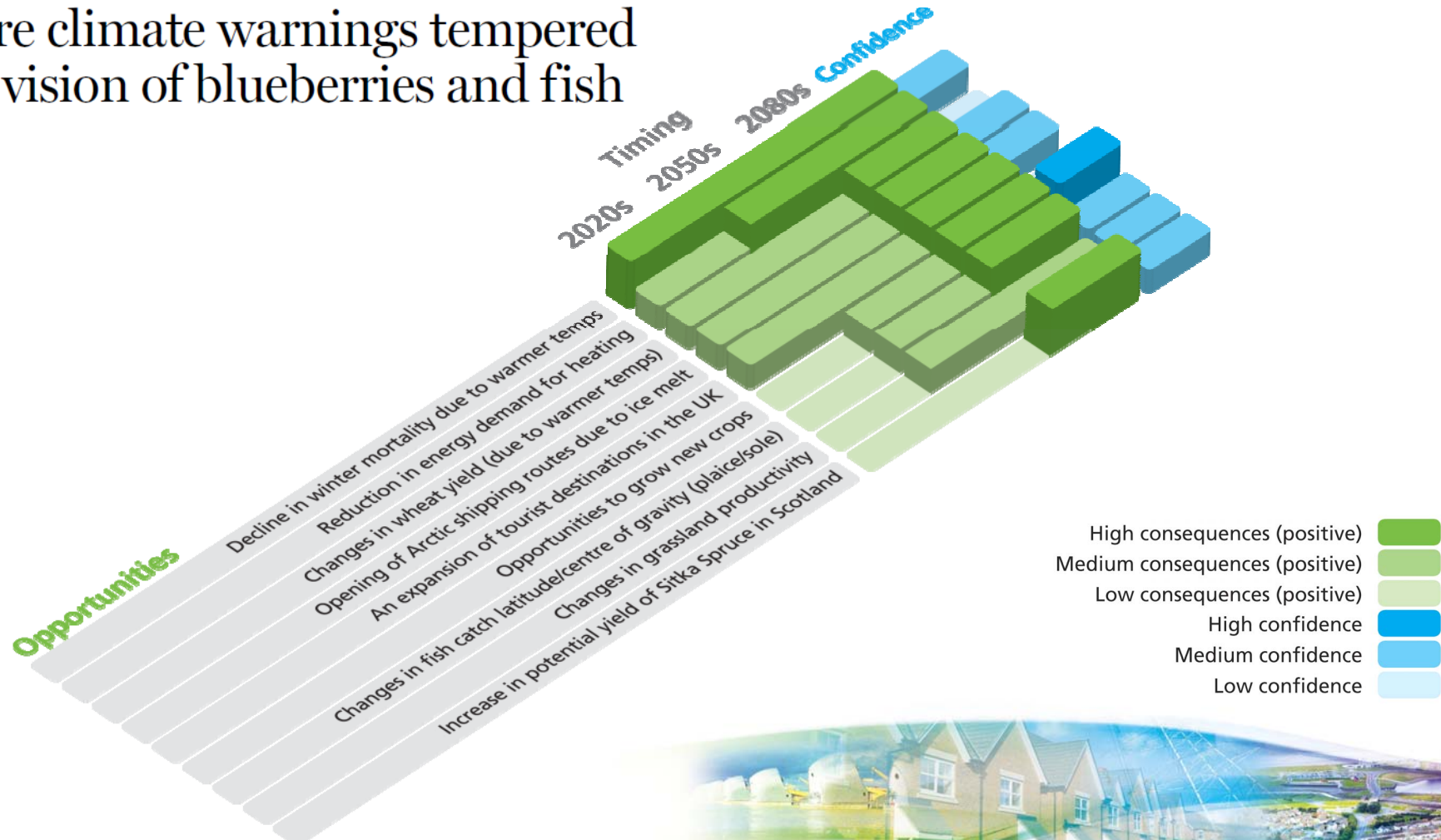
London 'facing killer summers in climate peril'



Britain faces flooding bill of '£12bn a year' by the 2080s

Selection of Key Opportunities

Dire climate warnings tempered by vision of blueberries and fish



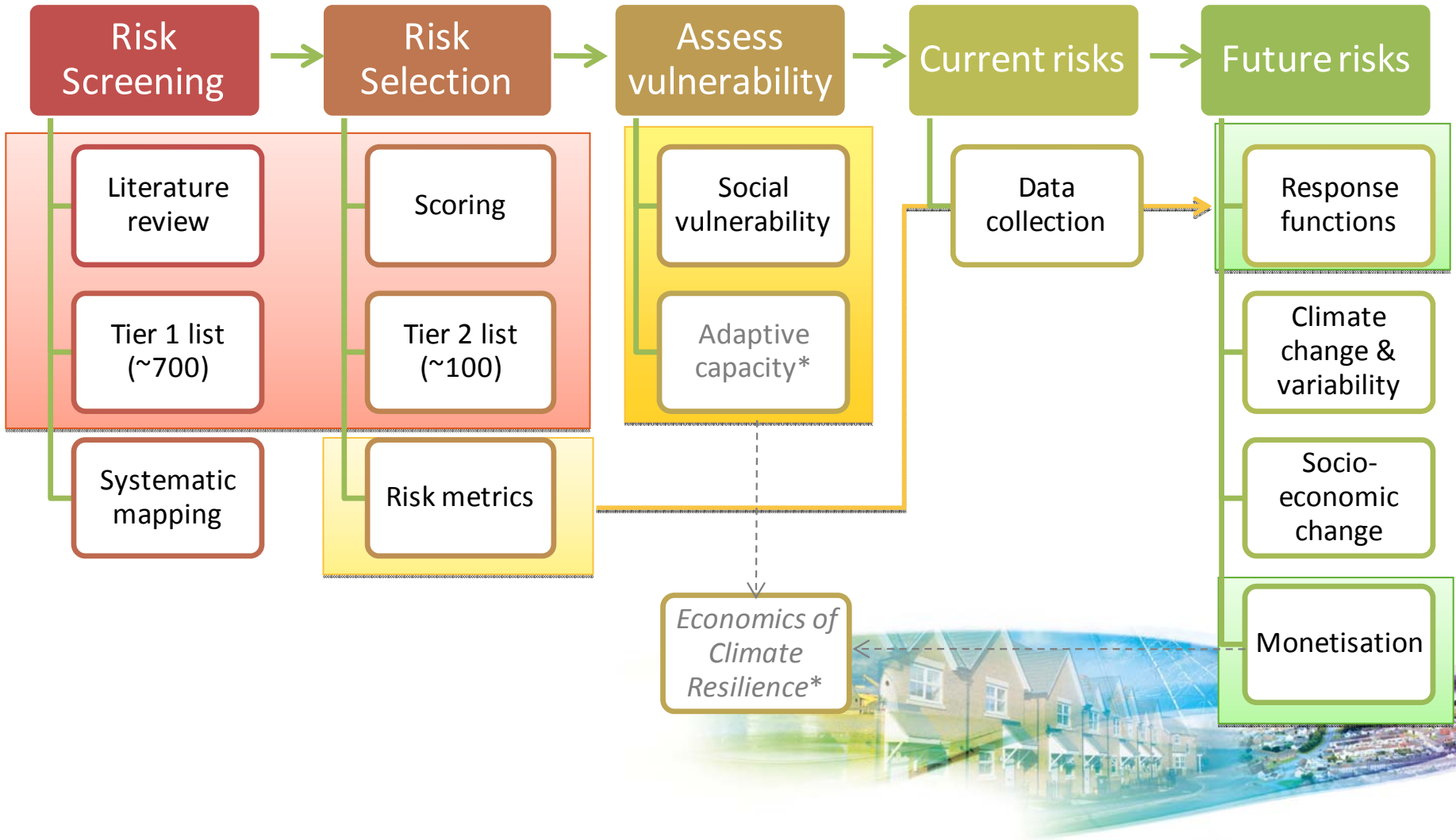
Threat and promise in global warming, says study

Reflections on the methodology

Did it provide the tools to understand social and environmental impacts?



The CCRA methodology



Social vulnerability factors

Location and place

Poor mental and physical health

Fewer financial resources

Living and working in poor quality homes or workplaces

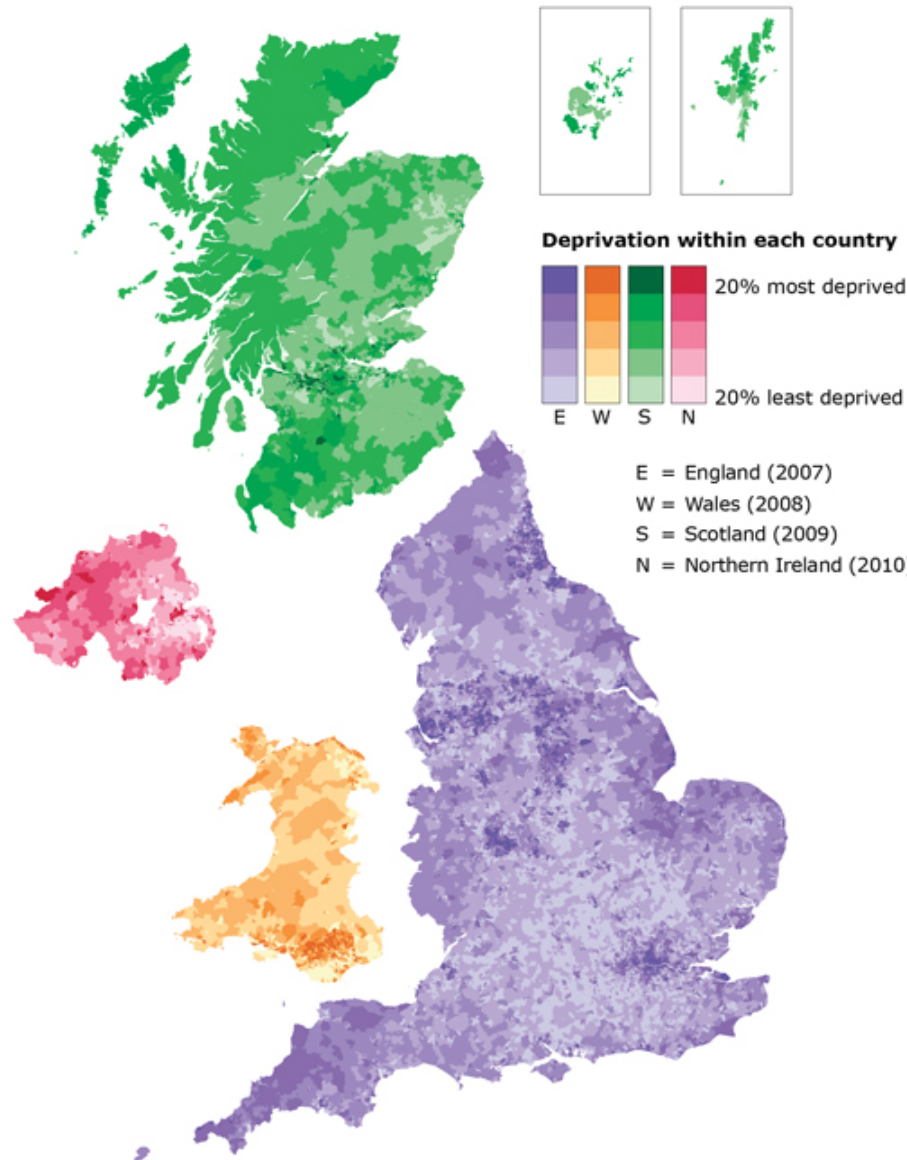
Limited access to public transport

Limited or lack of awareness of potential risks

Lack of social networks

Little access to systems and support services (e.g. health services)

Indices of multiple deprivation (rank) for each constituent country of the UK



Considering population growth & other socio-economic changes

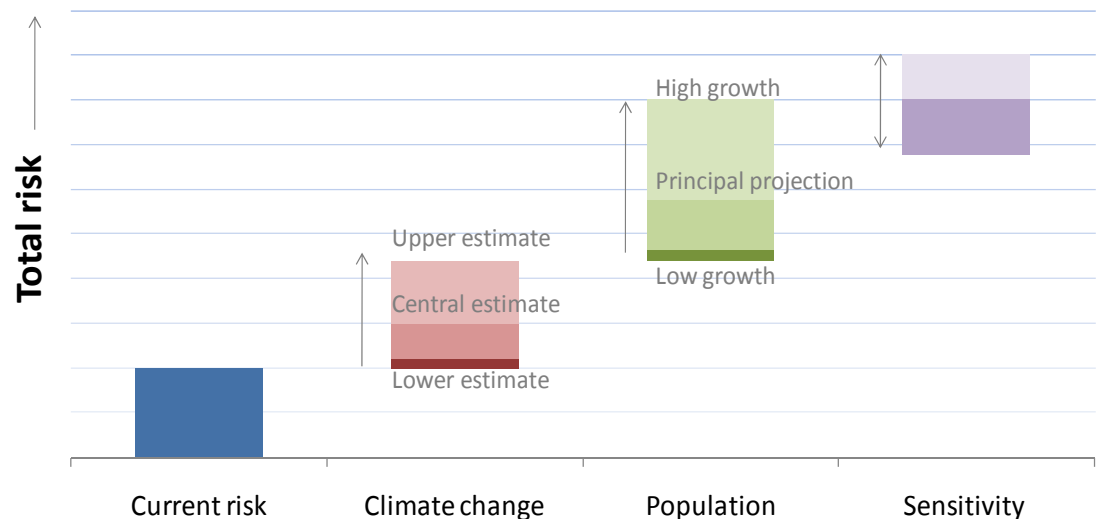
Population growth

Socio-economic dimensions

- Population demands
- Global stability
- Distribution of wealth
- Consumer values
- Government regulation
- Land use change

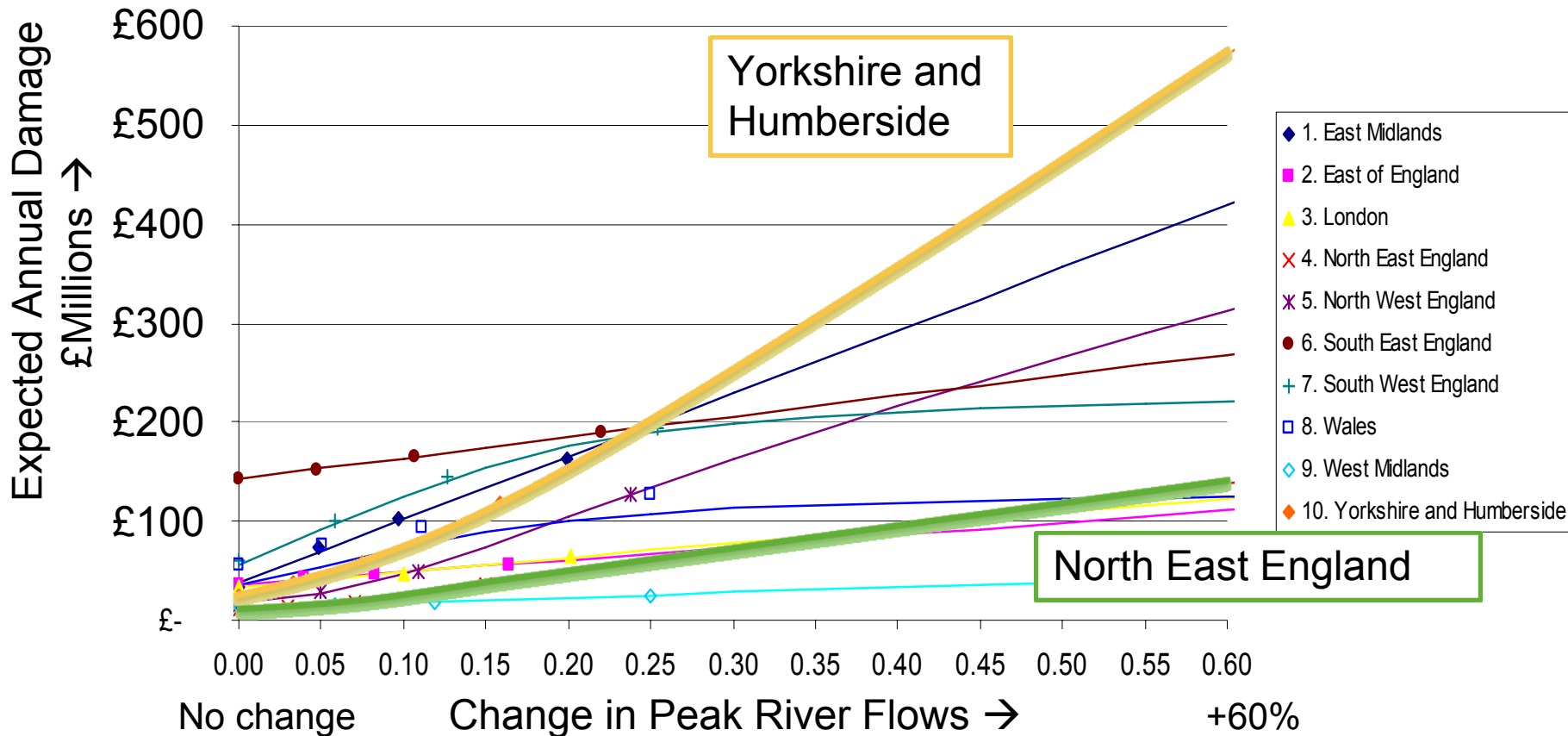
Build up of results →

| | Population in millions | | | | | | | | | |
|-------|------------------------|-------|-------|----------------------|-------|-------|-----------------|-------|-------|-------|
| | Low population | | | Principal projection | | | High population | | | |
| | 2008 | 2020s | 2050s | 2080s | 2020s | 2050s | 2080s | 2020s | 2050s | 2080s |
| Total | 61 | 66 | 66 | 63 | 67 | 78 | 86 | 72 | 90 | 113 |



Application of response functions: An example for flooding from rivers

Expected Annual Damage to residential property (river flooding)



Bringing the results of 11 sectors together to provide a Synthesis Report

Biophysical impacts

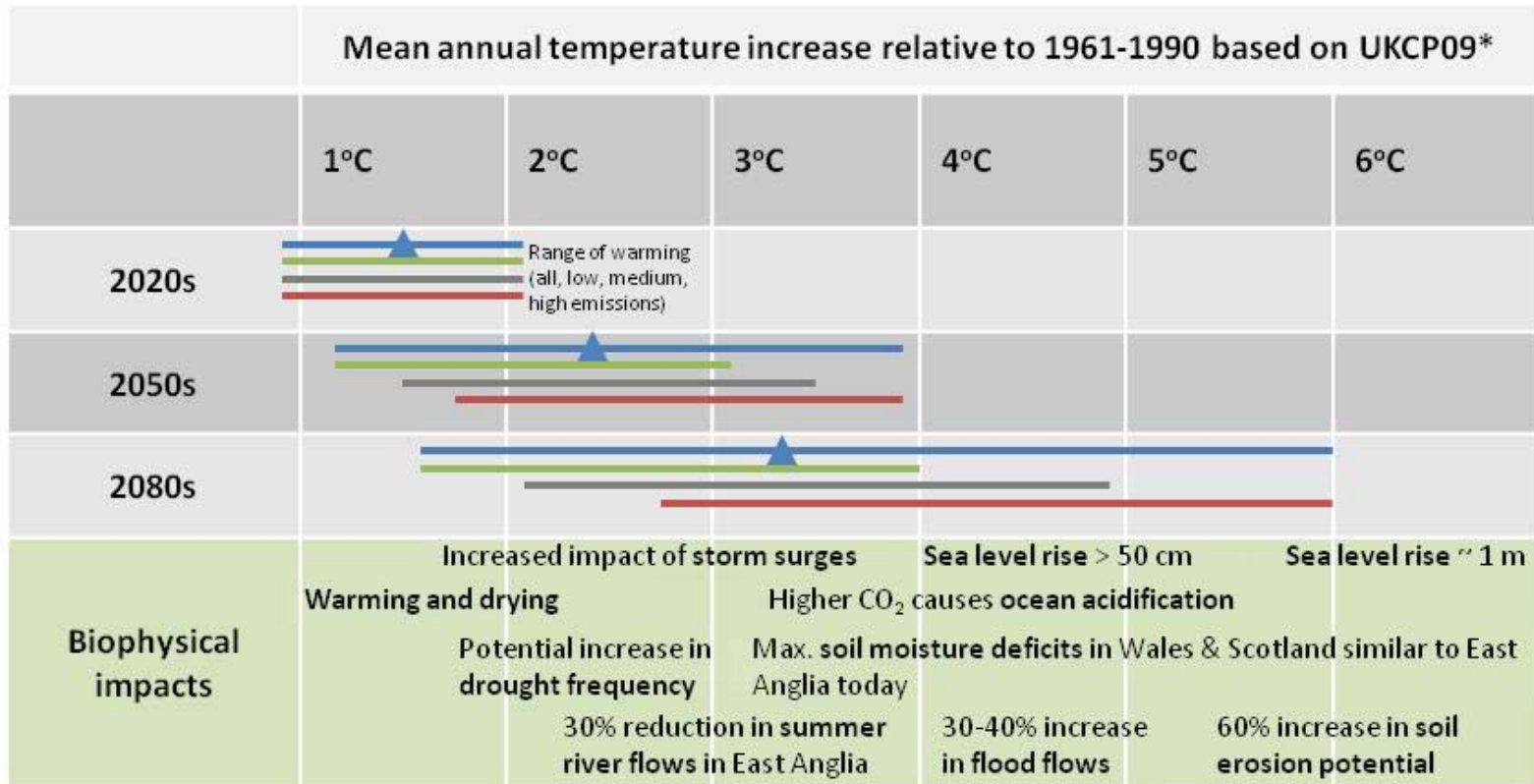
Natural Ecosystems

Agriculture & Forestry

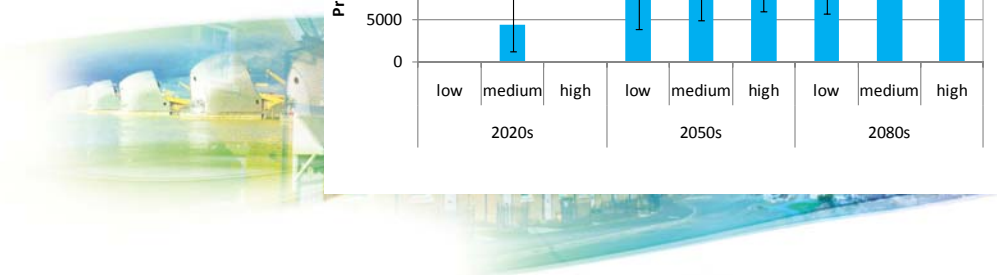
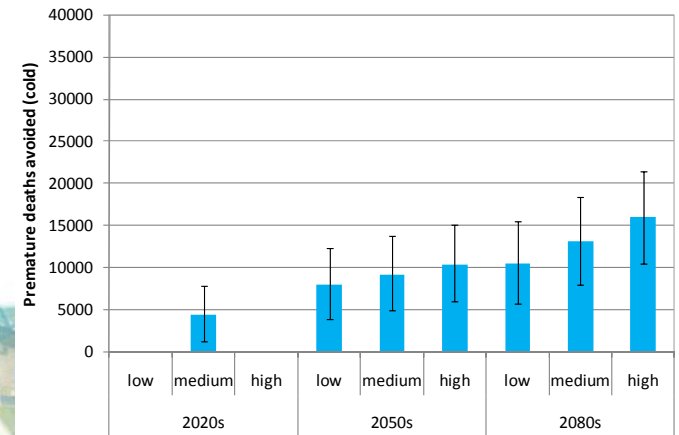
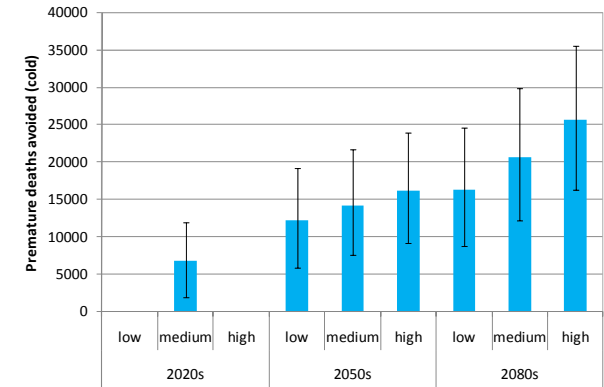
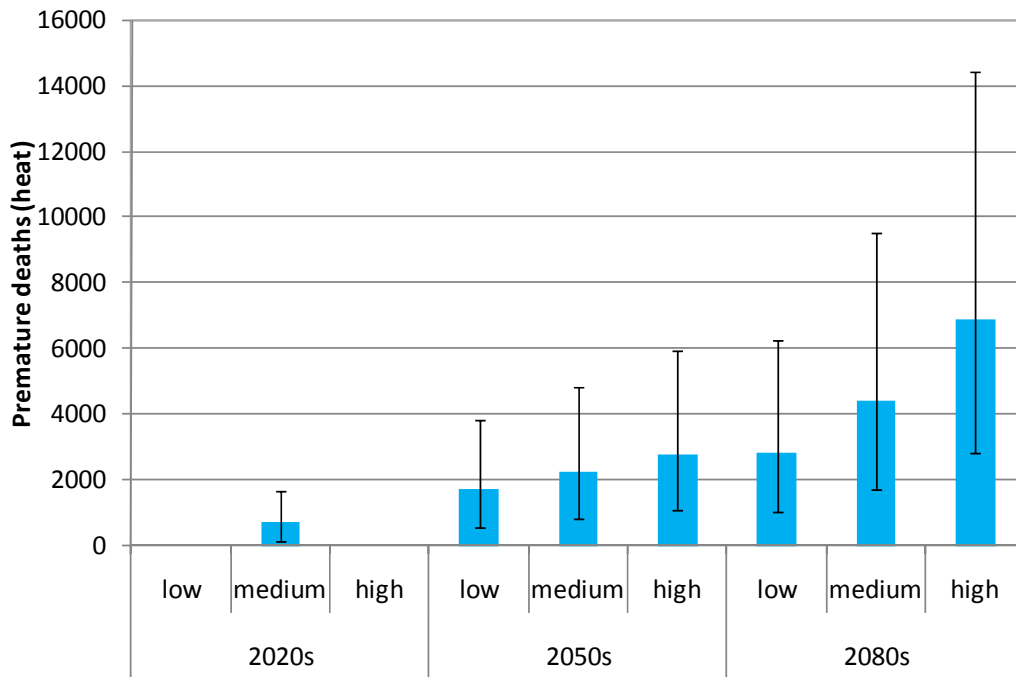
Buildings & Infrastructure

Health & Wellbeing

Business



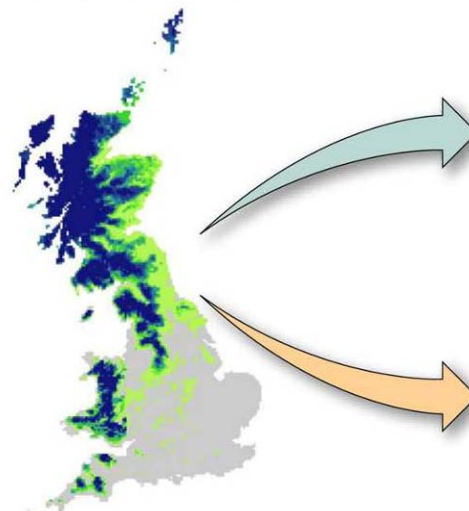
There are potential health risks related to hotter summer conditions as well as benefits due to warmer winters



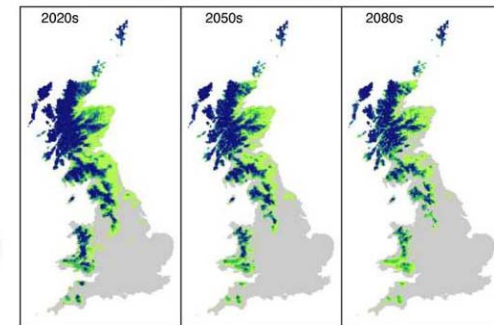
Sensitive ecosystems already threatened by land use change may face increased pressure

- National Ecosystem Assessment 2011
- Changing hydrological cycle
- Phenological changes – timing, asynchronicity.....
- Some species gaining and others losing 'climate space'
- Peat forming conditions may decline
- Generalist species v specialist species

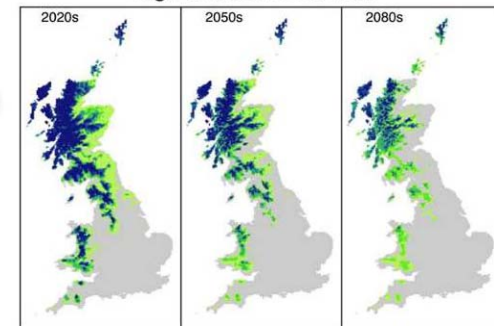
Climate envelope for current peat distribution



Low emissions scenario



High emissions scenario



The number of models in each grid cell that project a climate suitable for blanket peat



Comparing very different risks

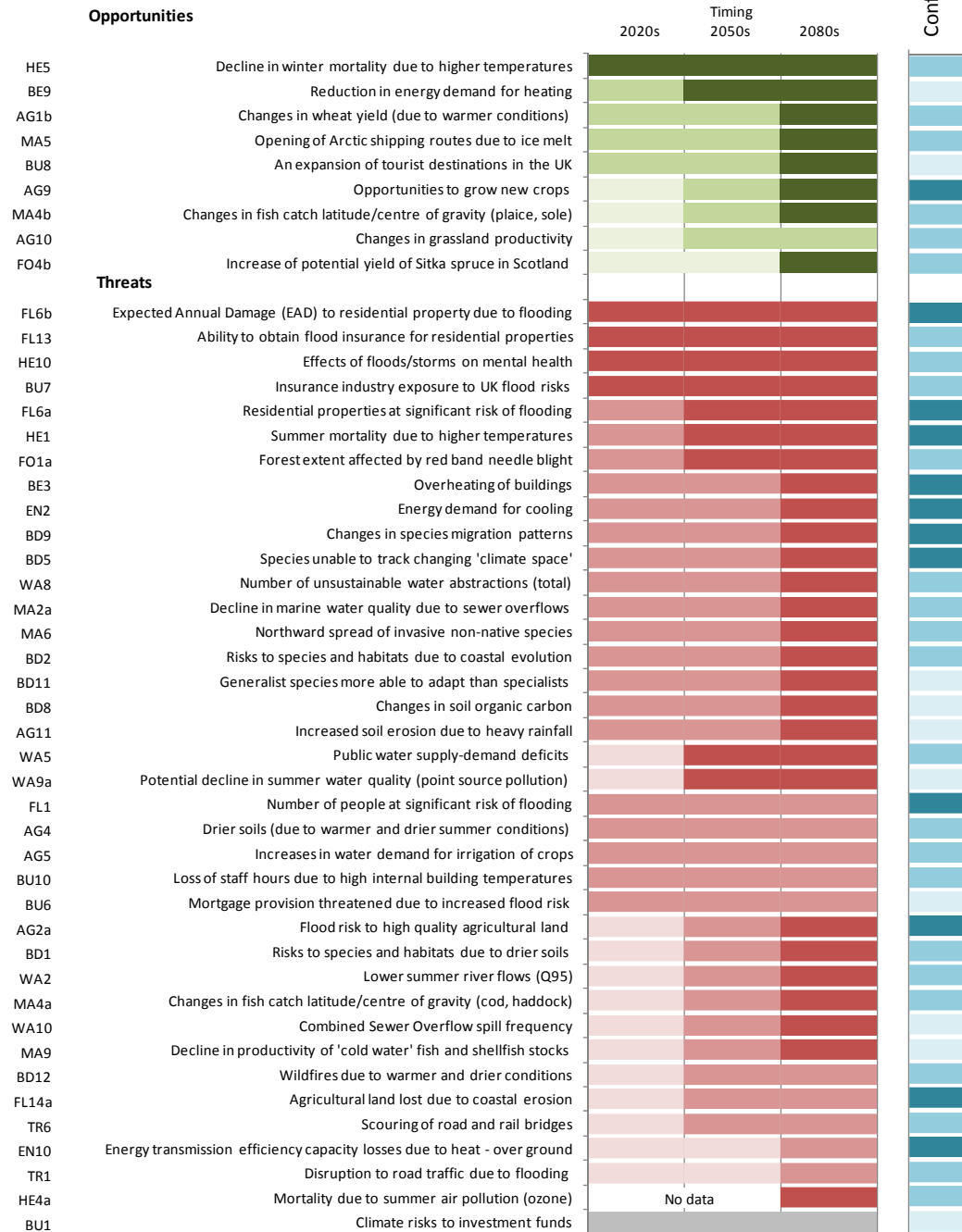
e.g. river flooding, heat-related fatalities and drying peat bog

| Class | Economic | Environmental | Social |
|--------|---|---|--|
| High | Major damage and disruption <i>~ £100 million per year</i> | Major or widespread loss or decline in long-term quality of valued habitats <i>~ 5000ha lost/gained</i> <i>~ 10000km river water quality affected</i> | Potential for many fatalities or serious harm or major disruption <i>~million affected</i> <i>~1000s harmed</i> <i>~100s fatalities</i> |
| Medium | Moderate damage and disruption <i>~ £10 million year</i> | Medium-term or moderate loss <i>~ 500 ha lost/gained</i> <i>~ 1000 km river water quality affected</i> | Significant numbers affected <i>~100s thousands affected,</i> <i>~100s harmed</i> <i>~10 fatalities</i> |
| Low | Minor damage and disruption <i>~ £1 million per year</i> | Short-term/reversible/local effects sites <i>~ 50 ha of highly valued habitats, etc.</i> | Small numbers affected/within 'coping range' <i>~10s thousands affected, etc.</i> |

Which potential risks require early action?

Overall, the findings of the CCRA indicate that the greatest need for early adaptation action (i.e. within the next 5 years) is in the following areas:

- Flood and coastal erosion risk management;
 - Specific aspects of natural ecosystems, including managing productivity and biodiversity;
 - Managing water resources, particularly in areas with increasing water scarcity;
 - Overheating of buildings and infrastructure in the urban environment;
 - Health risks associated with heat waves and other risks that may affect the NHS; and
 - Opportunities for the economy, particularly to develop climate adaptation products and services.
- These findings should only be considered as preliminary, as the rationale for Government action is subject to another ongoing study, the Economics of Climate Resilience (ECR).



What tools worked? Which didn't?

Where we can we improve?

Under consideration as part of our 'lessons learned' report

| Method or tool | Performance | Recommendations |
|---------------------------------|---------------------------|---|
| Risk screening and selection | Good | Build on & review (700+) |
| Social Vulnerability Checklists | Medium | Mapping & bottom-up assessment |
| Adaptive Capacity Assessment | Medium | Integration with risk assessment |
| Response functions | Dependent on sector | National IAMs or systems models |
| Climate models (UKCP09) | Medium to Good | Extremes, H++, low probability/high consequence scenarios |
| Socio-economic scenarios | Medium | Full SES (Build on NEA) |
| Risk assessment | Good (within constraints) | Integrate anticipated adaptation |
| Risk scoring (& monetisation) | Medium | Stronger decisions focus |

Conclusions

How relevant is the UK experience for other countries?

Many conceptual models on CCAV assessment but fewer practical examples of national studies

- The CCRA was a practical 'rapid assessment', which incorporated impacts, risk, vulnerability and adaptive capacity methods

No single method will suit all countries – methods need to fit existing legislation, planning cycles, capacity, data and information...

- Many tools used in the CCRA could be used elsewhere when evidence is needed to influence policy decision making

Clearly presenting and communicating risks to policy makers is important

- The CCRA invested significant time with stakeholders to determine what level of information was needed and with other users on how best to present future risks

National risk assessment should not be a pre-requisite for urgently needed investment in water and other sectors

- In the UK the CCRA will influence future adaptation policy but funding is not directly dependent on the outcome

More detailed studies may be needed for specific sectors or risks

- The CCRA was primarily for policy makers and at a national scale – investment planners may need more focused decision support tools

Questions

More information

<http://www.defra.gov.uk/environment/climate/government/risk-assessment/>

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<http://www.hrwallingford.com/climate-change/>