

Socio-Economic Impacts of Climate Change

14th Nov 2007, delivered as part of the Paying for Welfare Lecture Series

(Thanks to Prof Alan Ervine for slides on population growth, CO₂ and developing countries)

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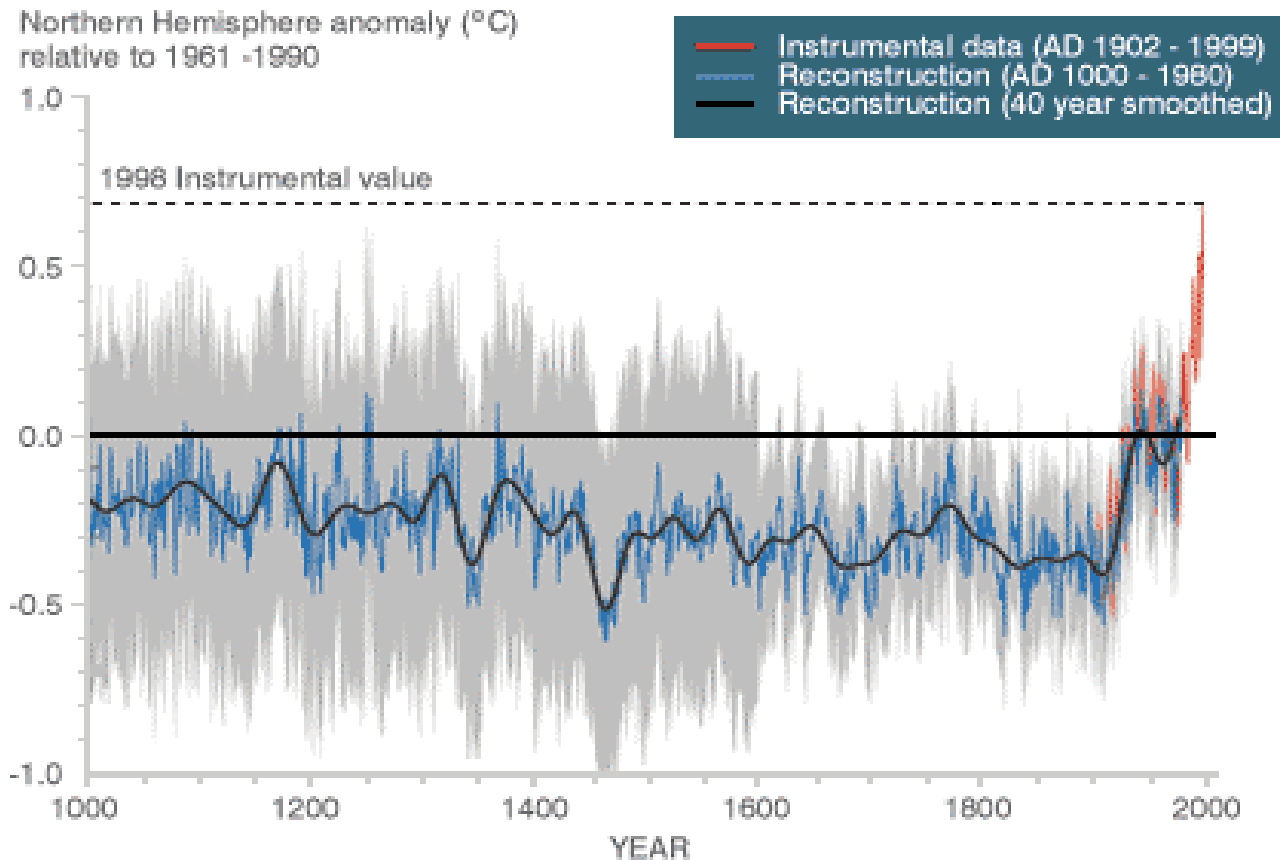
Plan:

- I. What is Climate Change?
- II. Why has it been described as the biggest single threat to human civilisation?
 1. Global Physical implications
 2. Physical Implications for the UK
- III. UK Socio-Economic Impacts:
 1. In-Migration
 2. National Security
 3. Employment
 4. Housing
 5. Financial/Insurance sector
 6. Regional/Spatial Inequality
 7. Future of the welfare state
- IV. Summary

I. What is Climate Change?

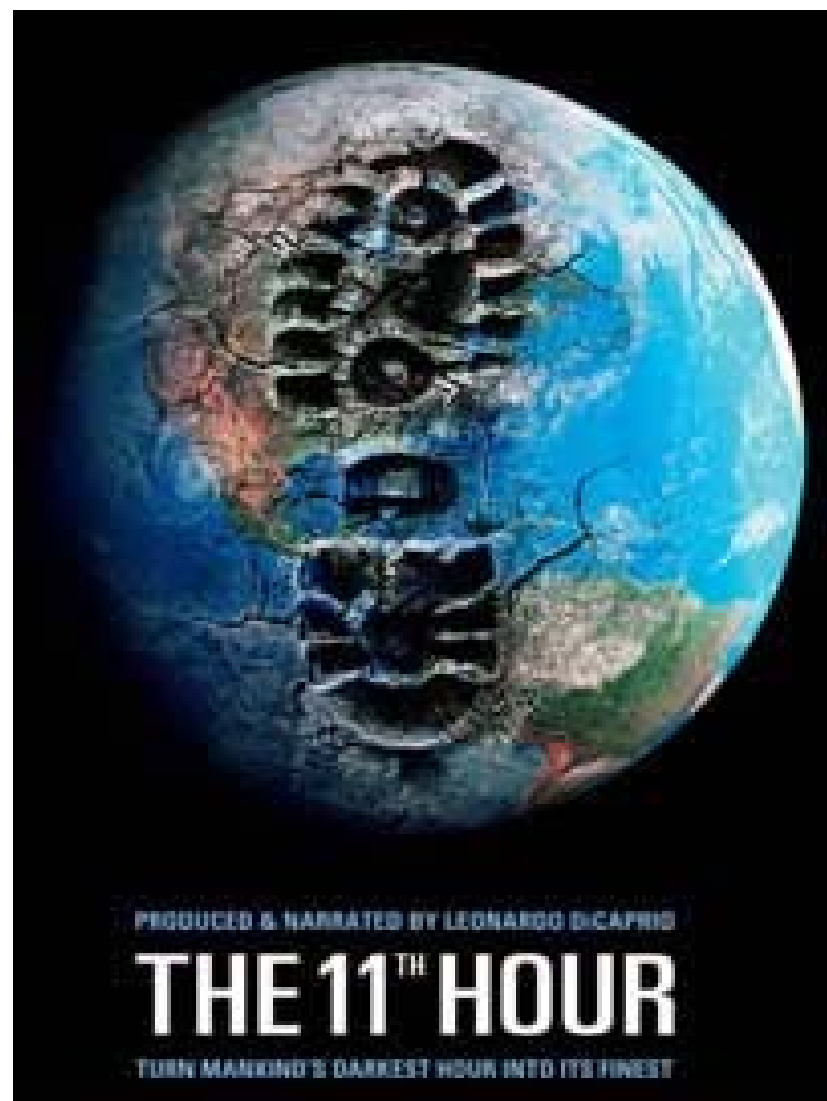
- Long-term changes to global and local weather patterns
 - Changes in average levels and/or in variability of:
 - Temperature, Precipitation, Wind, Humidity etc.
- Caused by
 - natural forces
 - e.g. sunlight intensity, volcanic activity
 - human activity
 - e.g. CO₂ emissions
- Growing scientific consensus that the earth is heating up and will continue to do so
 - Spectrum of predicted scenarios ranging from the inconvenient to the catastrophic
 - Depending on assumptions about human activity, causes etc.

'Hockey-Stick Graph'



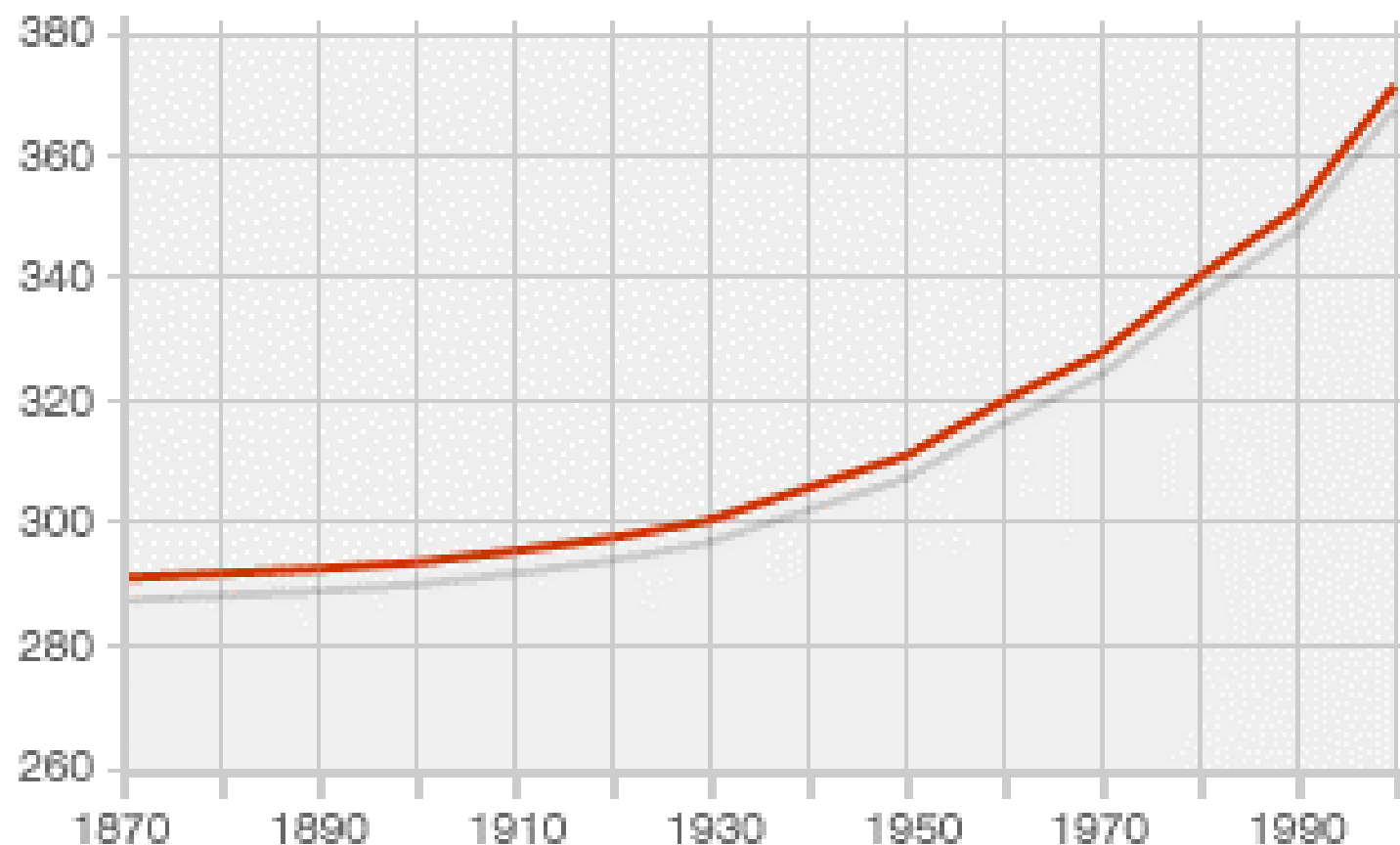
- Millennial Northern Hemisphere (NH) temperature reconstruction (blue – tree rings, corals, ice cores, historical records) and instrumental data (red) from AD 1000 to 1999. A smoother version (black), and two standard error limits (grey) are shown.
Source: IPCC Third Assessment Report

Causes of temperature rise: the Carbon Debate?



Global concentration of CO₂ in the atmosphere

Parts per million (ppm)



SOURCE: UNEP

Scotland's CO₂ Emissions

MAP 1
CO₂ EMISSIONS IN 2003

tonnes C per km²



From soils
and peat

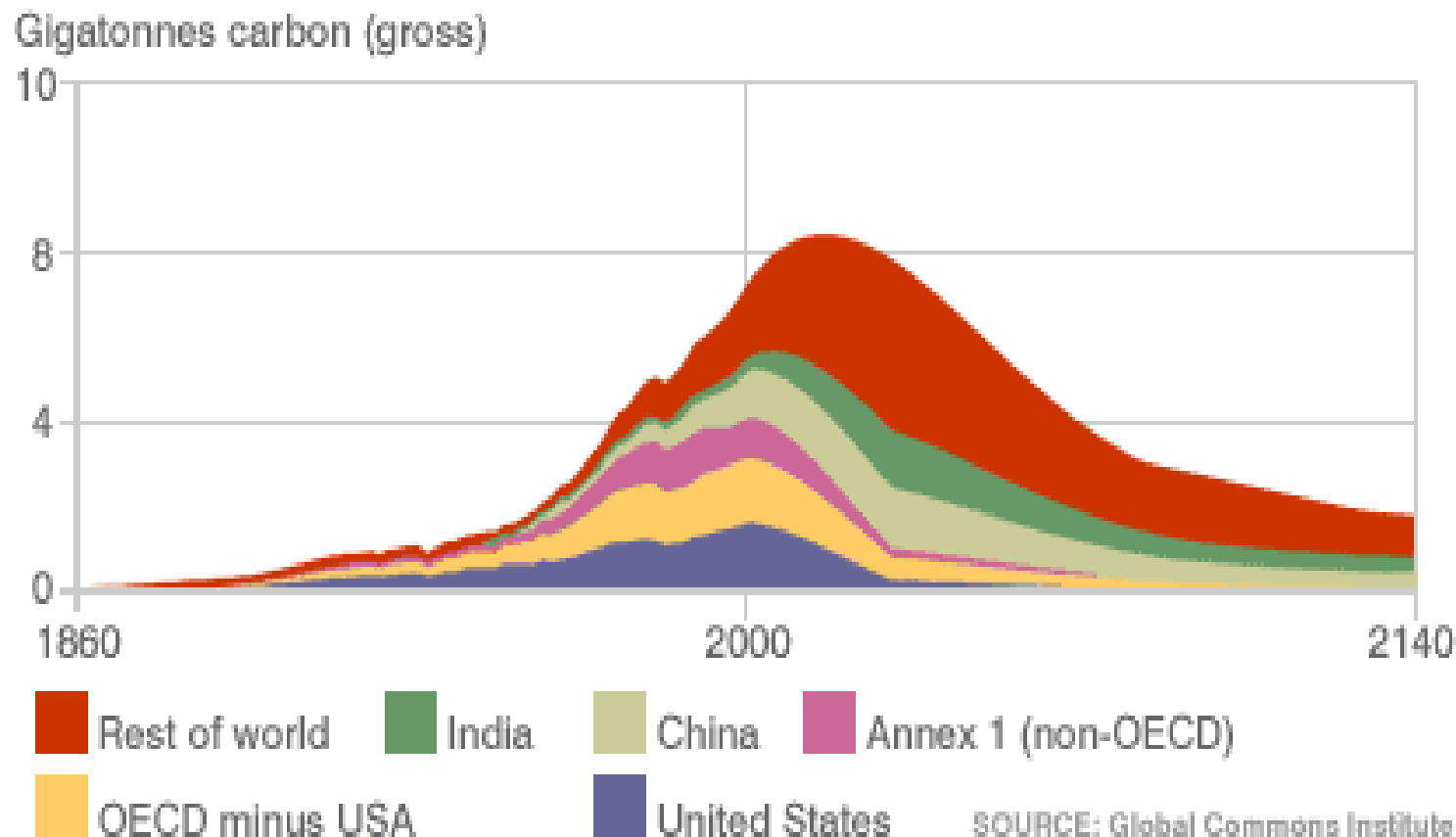
From urban
areas

Source: This data was developed by AEA Technology Environment, based on the National Atmospheric Emissions Inventory (<http://neei.aea.co.uk/>)

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Contraction and convergence proposal for Carbon

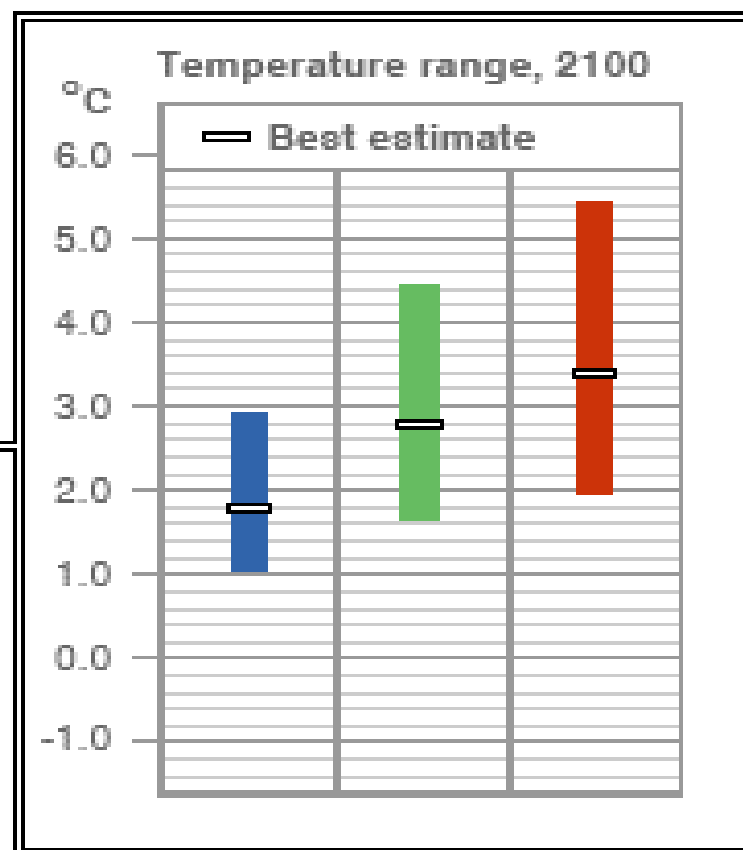
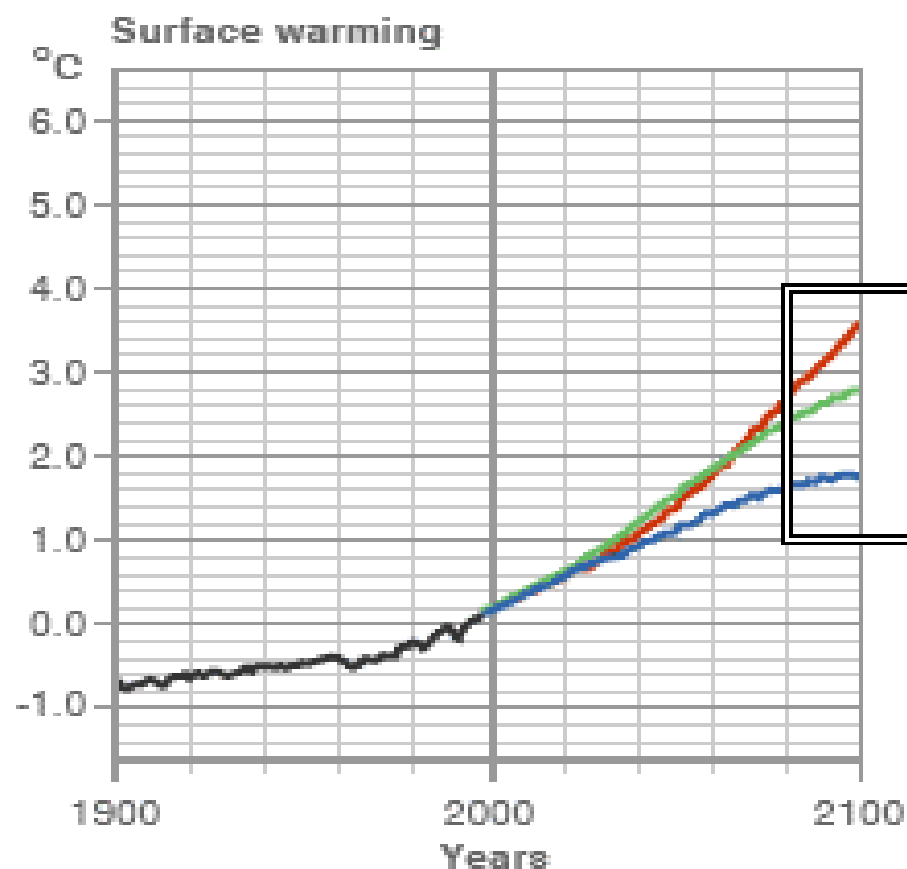


But what is the likelihood that will this actually be achieved?...

Will Temperature Continue to Rise Unabated?

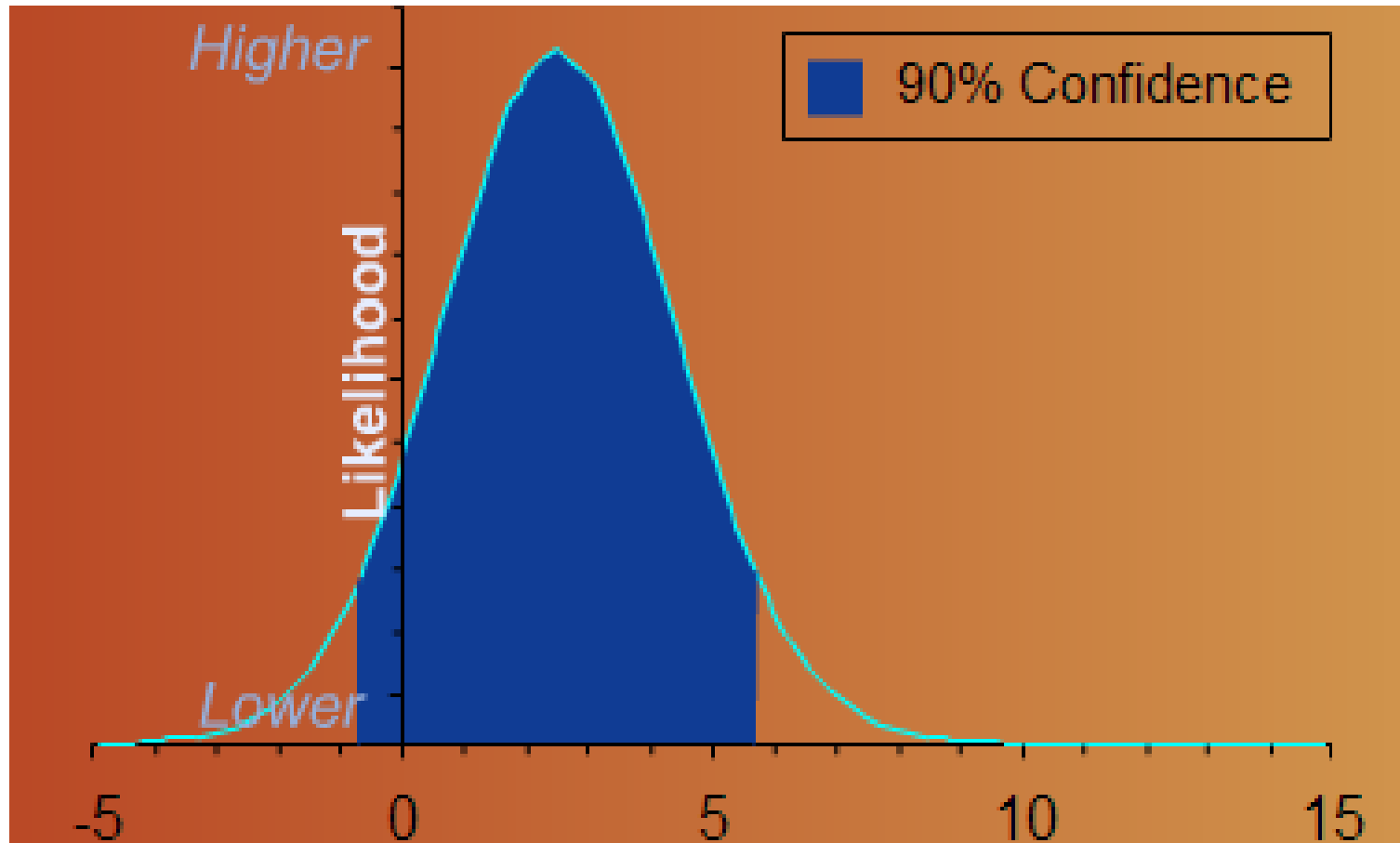
GLOBAL WARMING SCENARIOS

- Scenario A2
- Scenario A1B
- Scenario B1
- 20th century



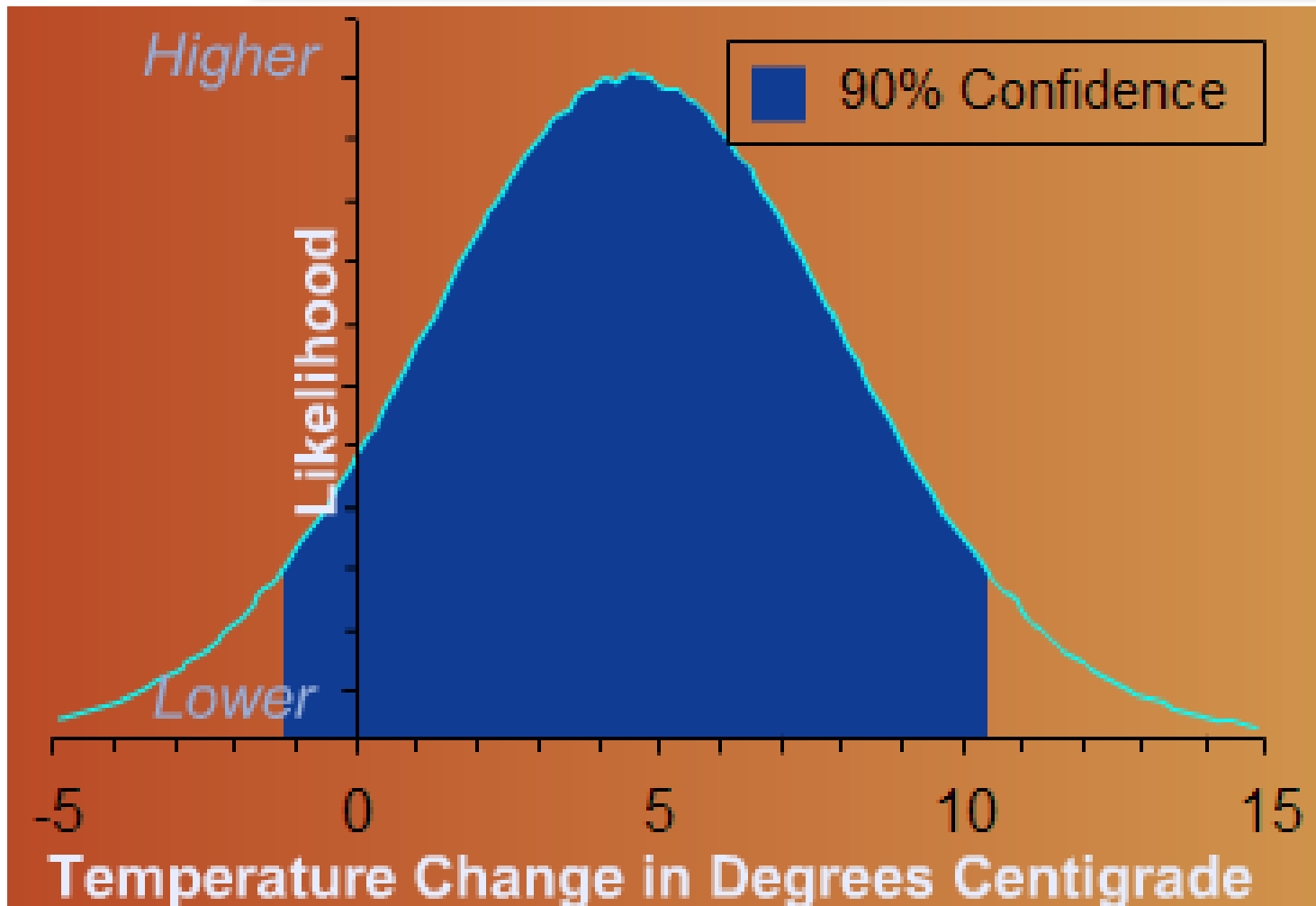
SOURCE: IPCC

Europe in 2100: Low Emissions



Source: Dr Sylvia Knight, Open University, climateprediction.net & open2.net projects.

Europe in 2100: High Emissions



Source: Dr Sylvia Knight, Open University, climateprediction.net & open2.net projects.

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Why is Climate Change described as the biggest single threat to human civilisation?

- Projected changes in temperature have potentially profound (but heterogeneous) implications for global and local climates
 - Precipitation
 - Sea levels
 - Storm surges
 - Storminess

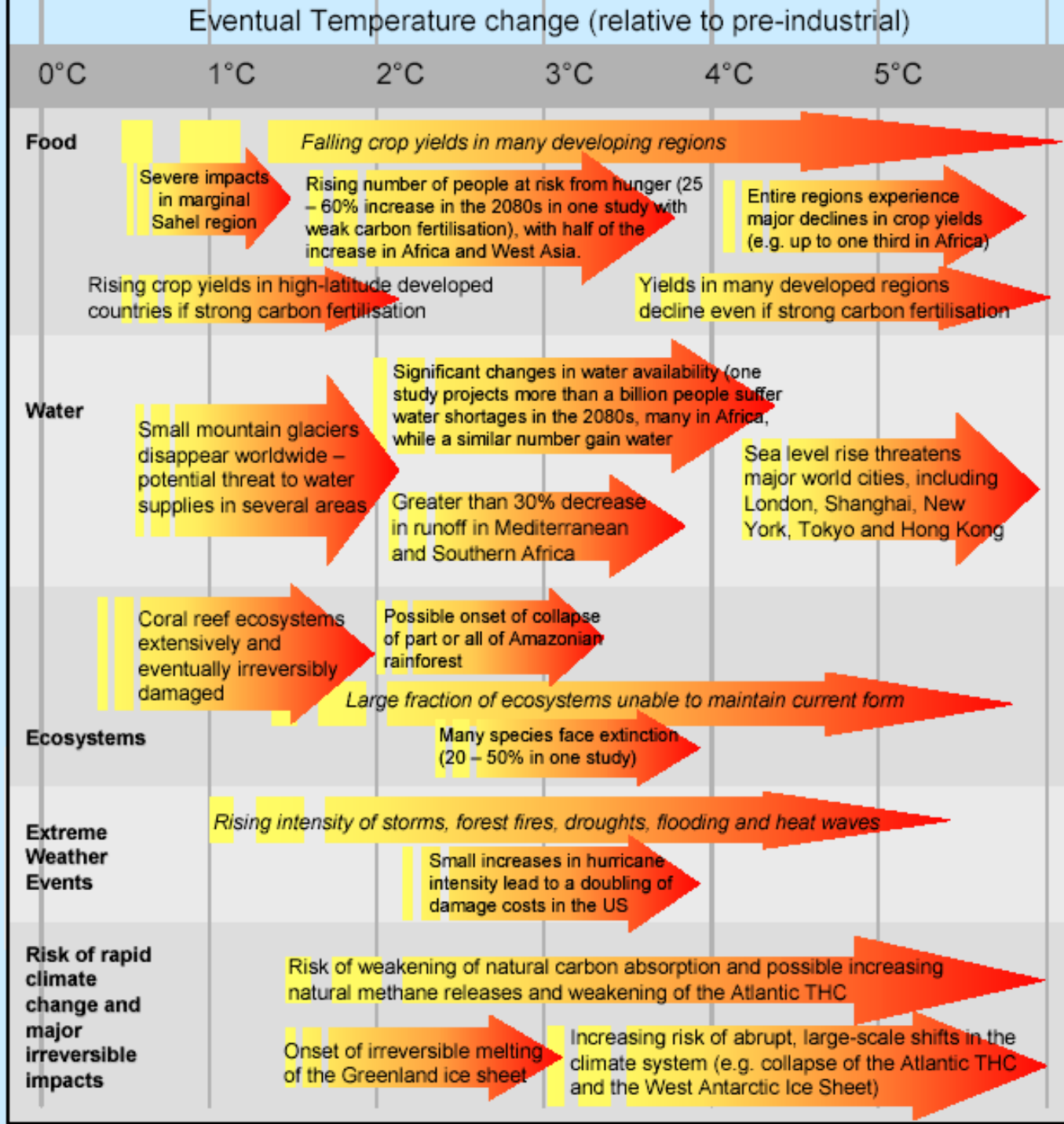
Physical Impacts:

- ↓ crop yields
- ↓ clean water
- ↑ foods/sea levels
- ↑ storms

"Such changes would transform the physical geography of the world. A radical change in the physical geography of the world must have powerful implications for the human geography - where people live, and how they live their lives."

(Stern, 2006, p.iv)

Impact on every area of human enquiry...



Physical Impacts Across the Globe:

- Increased temperature
- falling crop yields
- reduction in clean water
- rising sea levels
- increased storminess
 - frequency
 - severity

Overarching Question for Society:

- ***What are the socio-economic impacts of CC and how should society respond?***
 - = ***Perhaps the most fundamentally inter-disciplinary research question there is!***
 - ***Physical sciences:***
 - *Understanding & Predicting impact*
 - *Technological solutions*
 - ***Social Sciences/arts:***
 - ***Human impact:***
 - » *Effect on markets, resource allocation, social justice, social cohesion, well-being.*
 - ***Human response:***
 - » *Policy response, state failure, market failure, religious response, psychological response*
 - *"Climate change ... is the greatest and widest-ranging market failure ever seen." (Stern, p. i)*
 - ***Requires a strategic & coordinated research response across all areas of research, government, and private sector:***
 - ***how will your planned career be affected?***

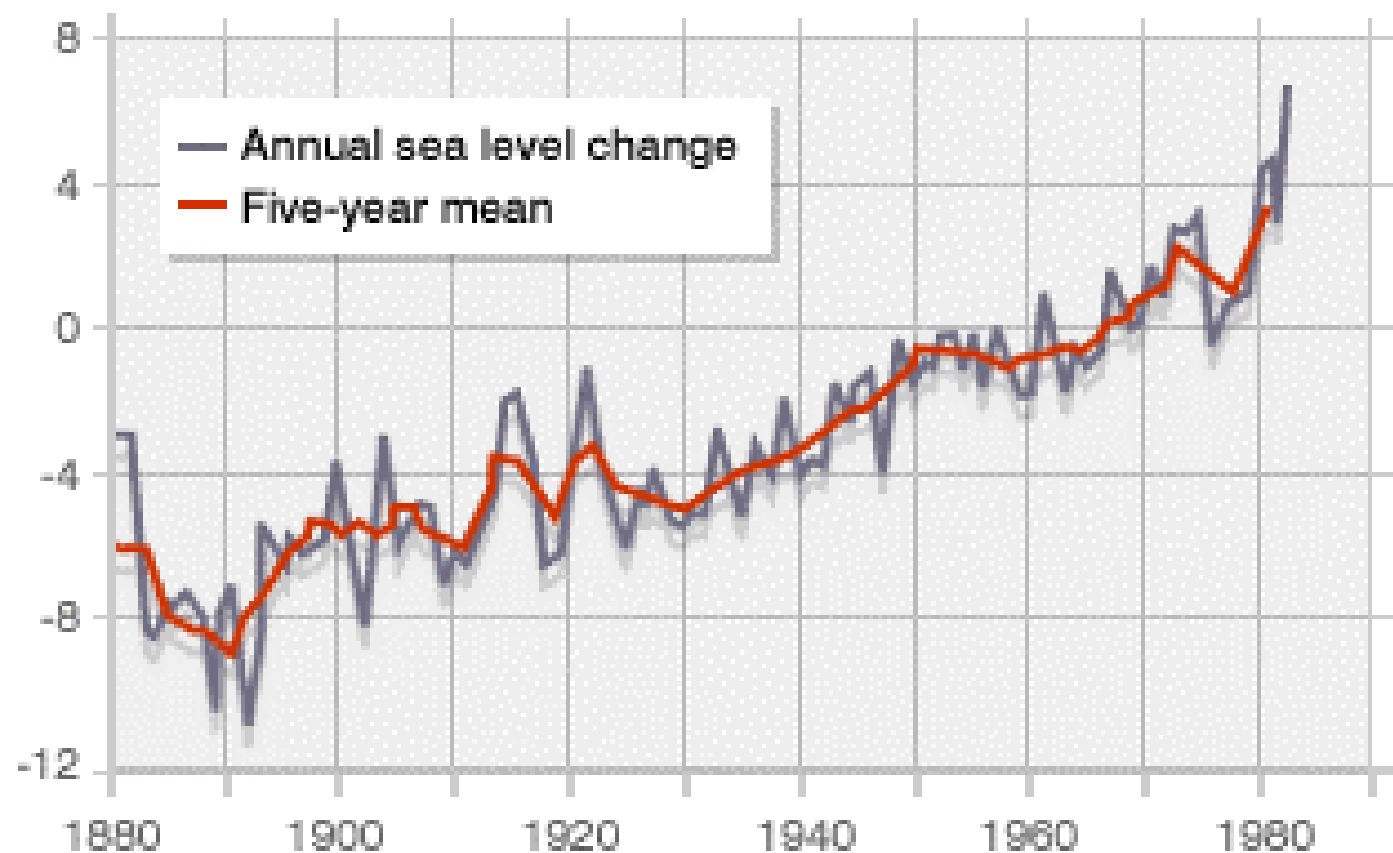
Physical Impacts on the UK

- Global warming
 - Rising sea levels, but also:
 - +
 - Increased winter precipitation in the UK
 - +
 - Increased storminess/storm surges
- Overall effect of Global Warming:
 - V. Large increase in flood risk in certain areas of UK

Sea Level Rise:

Sea level change over the last century

Centimetres



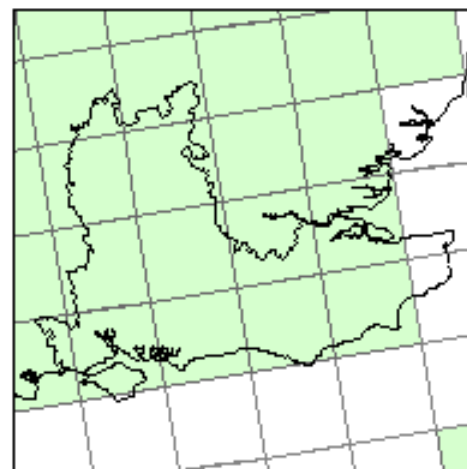
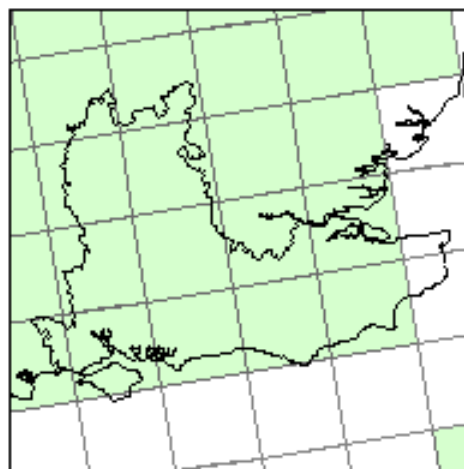
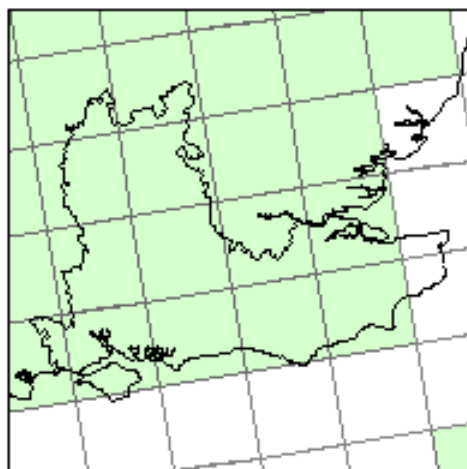
SOURCE: UNEP

South East England

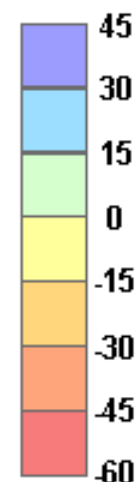
Source: UKCIP02 Climate Change Scenarios (funded by Defra, produced by Tyndall and Hadley Centres for UKCIP)

Percentage change in winter precipitation

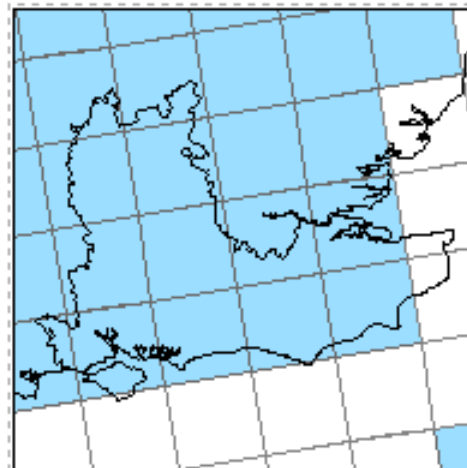
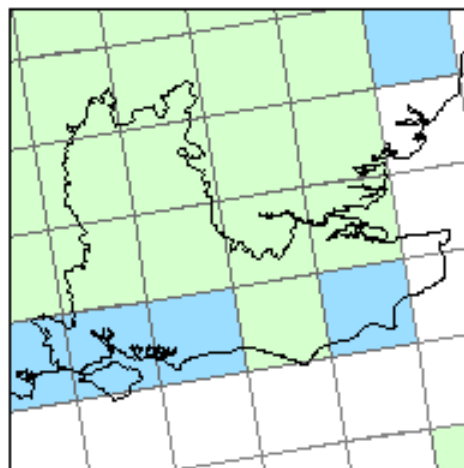
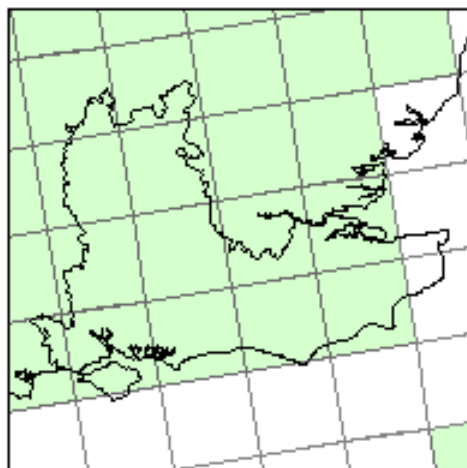
Low
Emissions
scenario



per cent
change



High
Emissions
scenario

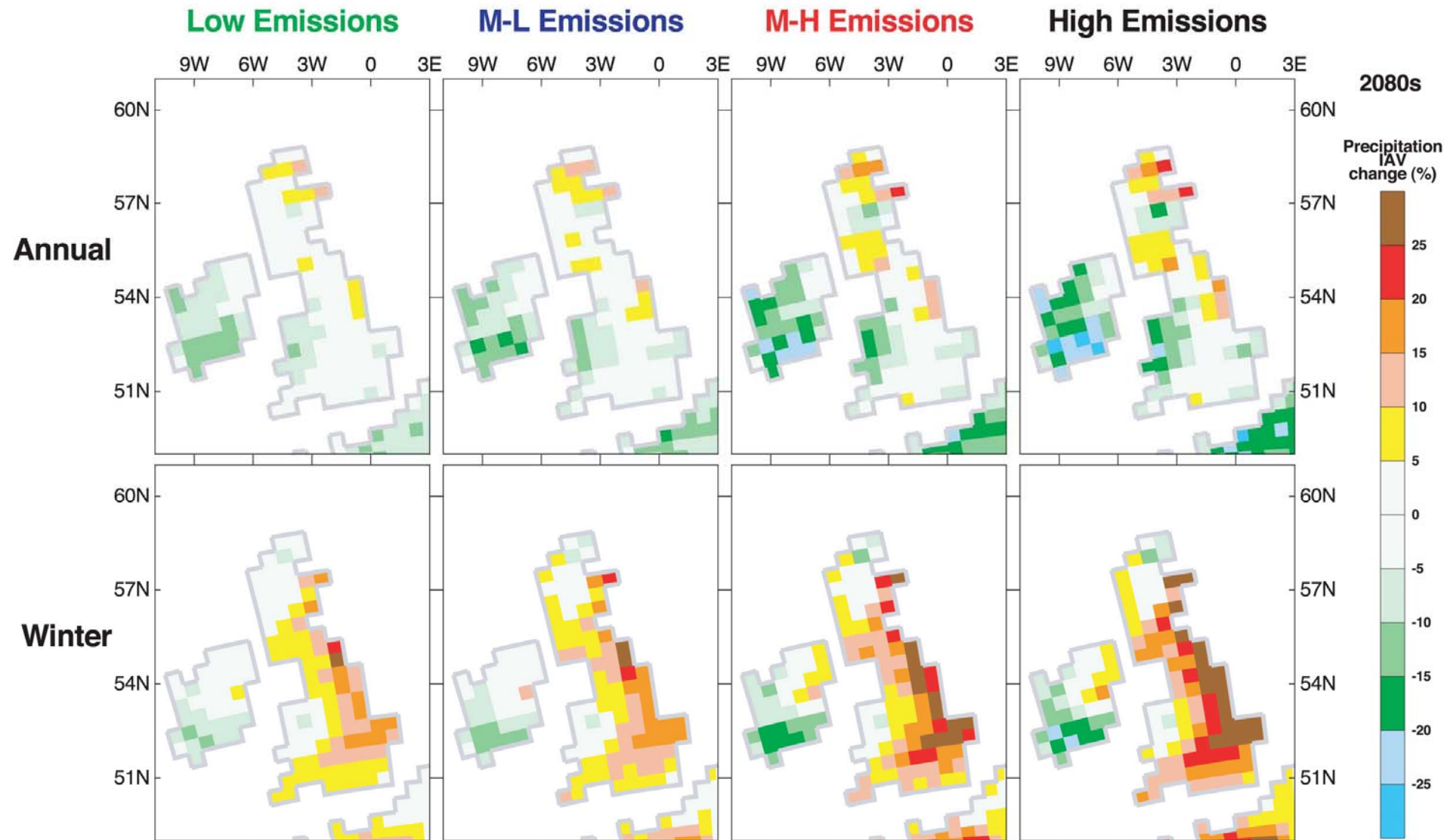


2020s

2050s

2080s

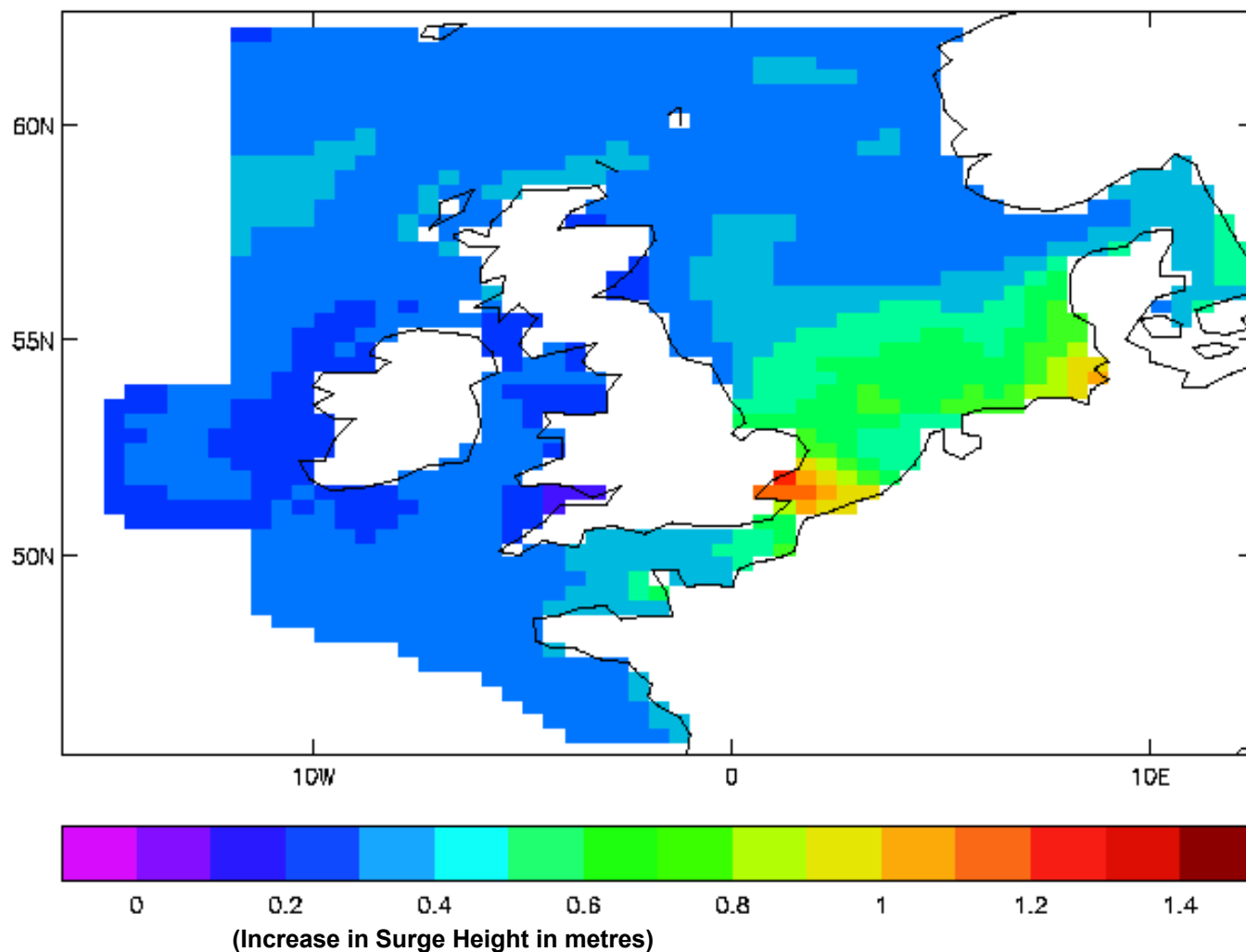
Large Increase in Winter Precipitation (20%+)



Source: Met Office Hadley Model, in Hulme et al (2002)

Combined Effect of Sea Level Rise and Storm Surges

Medium-High Emissions



Comparison of Flood Risk

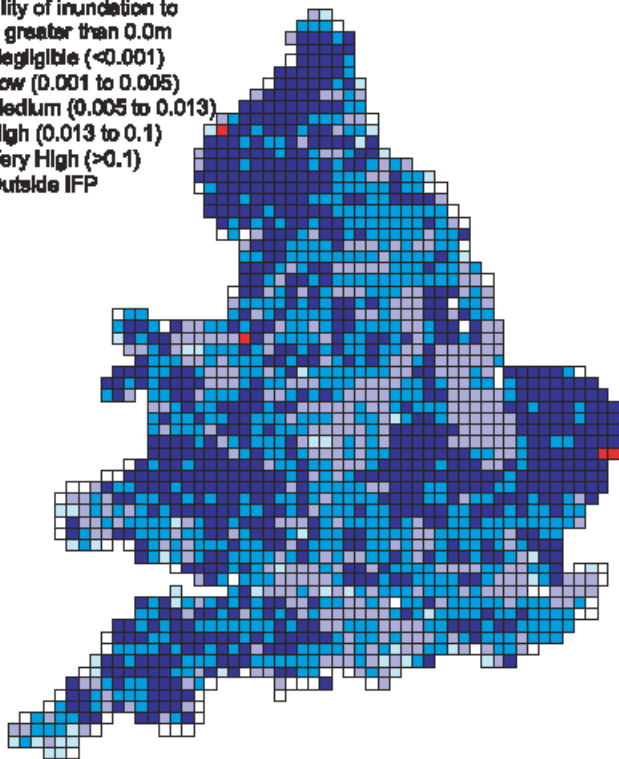
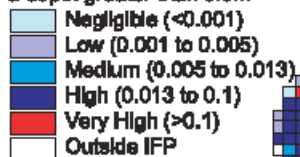
(Assuming Medium/High Emmissions):

2002

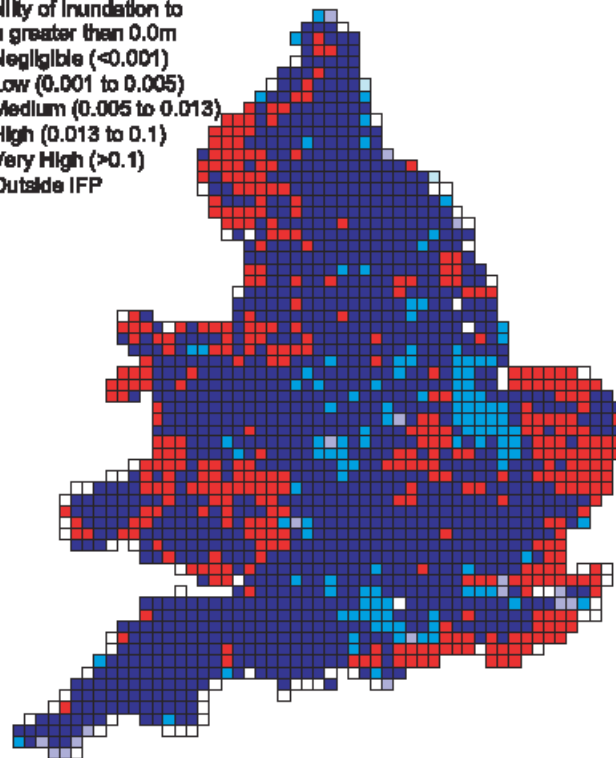
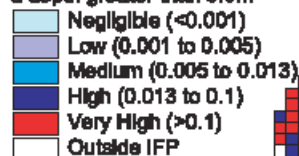
vs

2080

Probability of inundation to
a depth greater than 0.0m



Probability of inundation to
a depth greater than 0.0m

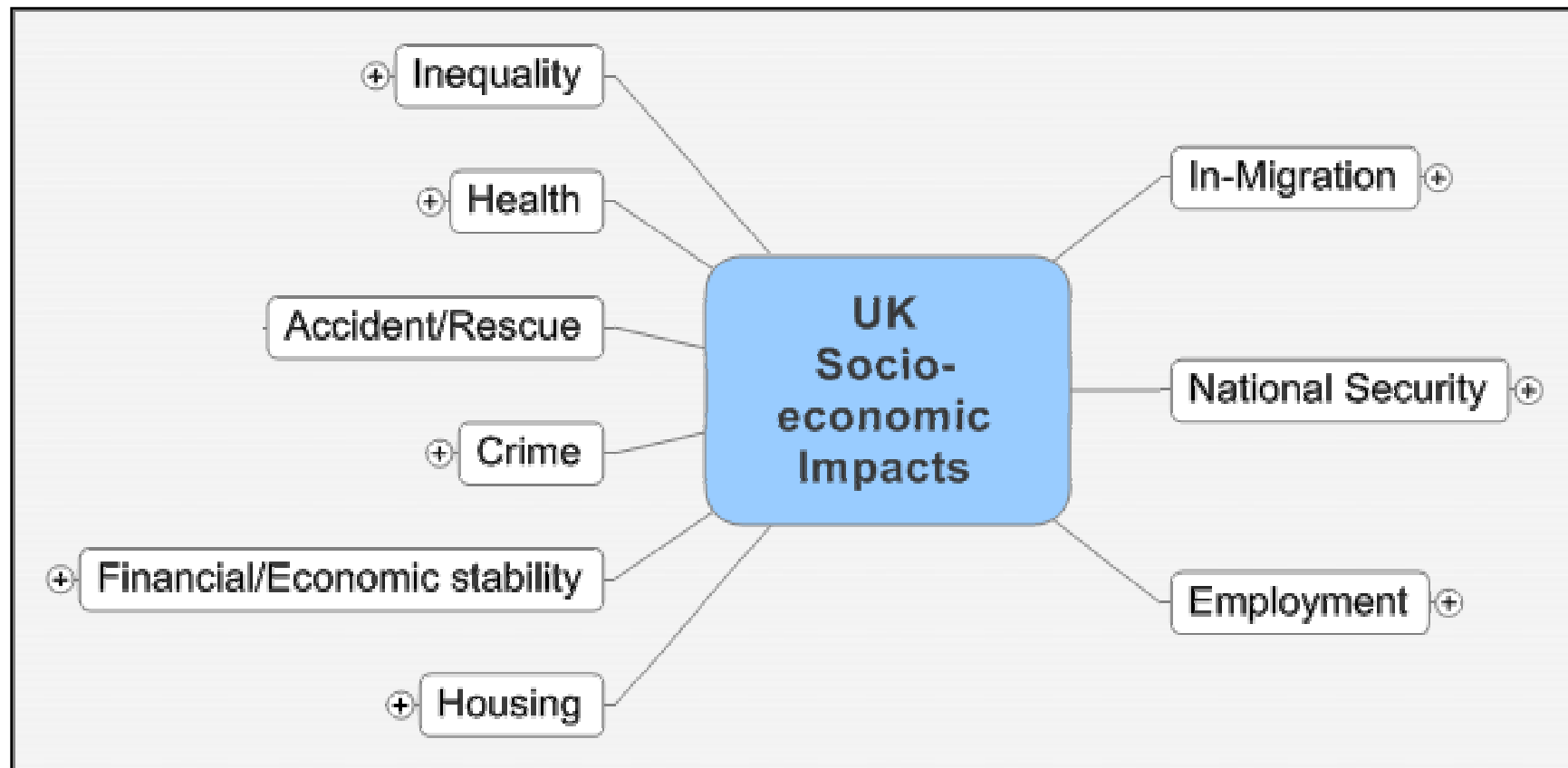


Source: *Foresight Report 2002*

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UK Socio- economic Impacts



In-Migration:

- Most severe effects of climate change are likely to be in Developing Countries...
 - Africa
 - ↑ temperatures, ↓ crop yields, ↓ clean water
 - Bangladesh
 - ↑ Flooding; ↓ clean water
- Duration, frequency and severity, humanitarian disasters likely to increase
⇒ ↑ migration, ↑ refugees, ↑ asylum seekers



**Major
Flooding
Occurring
Almost every
day**

**- a taste of the
future?**



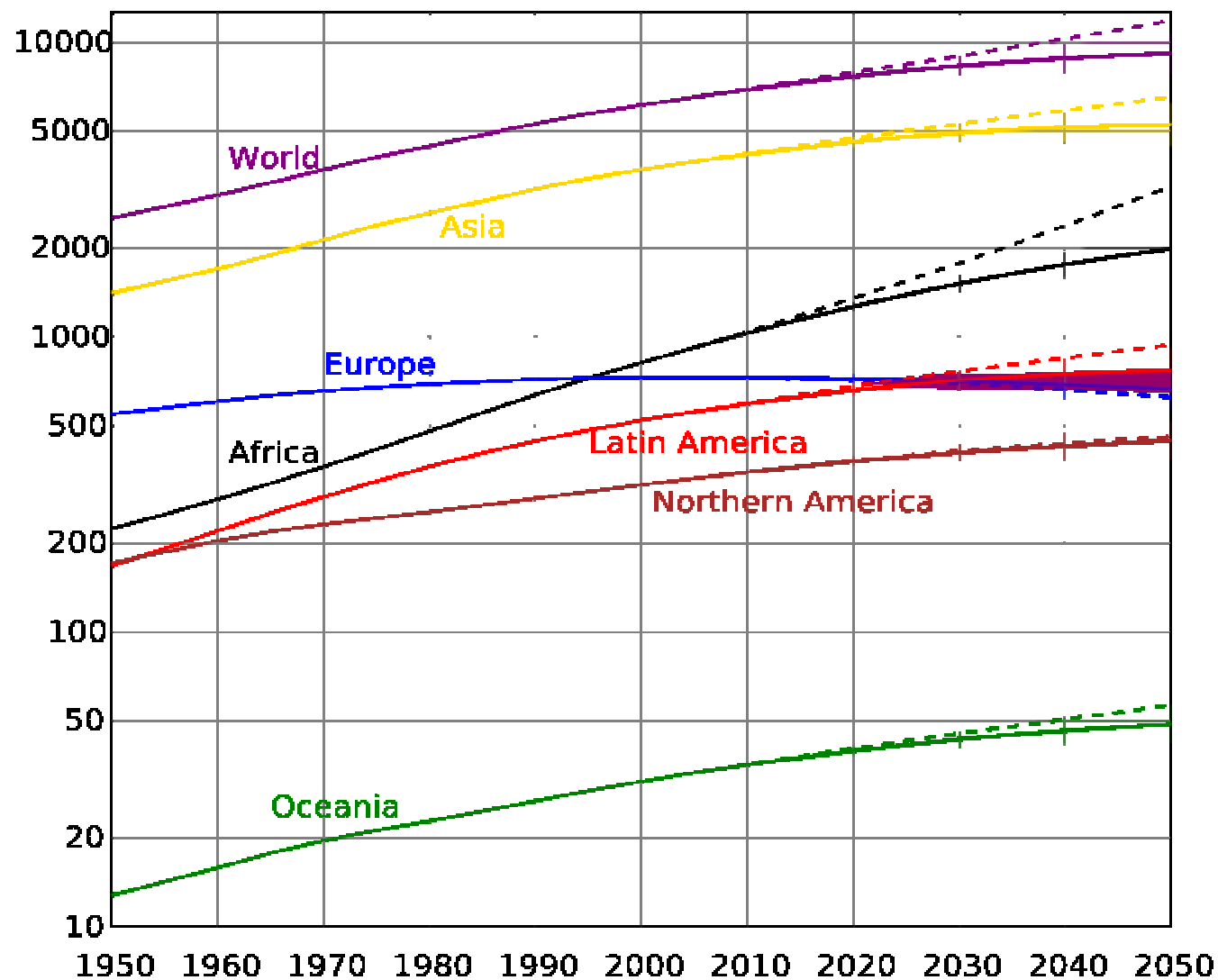
Migration flows:

- Exacerbated by other factors:
 - Building on flood plains
 - Urbanisation
 - Heat island effects
 - Lack of soil/natural absorbency
 - Population growth
 - Pollution/industrial externalities

Population growth in developing countries



Growth in world population



Drought exacerbated by industrial activity...

The Aral Sea formerly one of the largest lakes in the world, is drying up as a result of water abstraction for cotton production.



- All this has the potential to undermine the long-term sustainability of entire nations/continents?
- ↑ Political instability due to economic frailty and competition for resources

⇒ **unprecedented global migration?**

⇒ Implications for UK:

- Housing: prices, supply, greenbelt
- Infrastructure: sewers, roads, hospitals, schools etc
- Social cohesion: competition for national resources, segregation, spatial inequalities

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National Security

- Expenditure on and preoccupation with National Security may increase considerably due to:
 - Competition for world resources
 - Greater realisation of impact of one country's consumption behaviour on another
 - Greater polarisation of world wealth?
 - greater political instability abroad
 - internal security:
 - Terrorism, crime
 - Managing migration
- All this has public spending implications
 - Armed forces/defence
 - Police/judicial system
 - Surveillance
 - Immigration/Asylum seekers bureaucracy
 - Internal Social pressures of in-migration and international tension

Employment

- impact of flooding on SMEs
 - Lagged impact on profitability
 - Relocation to low-flood risk areas
- some urban areas become unsustainable?
 - New Orleans
- Regional inequality/urban regeneration issues
 - Particularly as other demands on public resources likely to increase, and potential falls in public revenues

Housing

- Flood risk map of Britain could change dramatically
⇒ house price map of Britain could change dramatically...

Comparison of Flood Risk

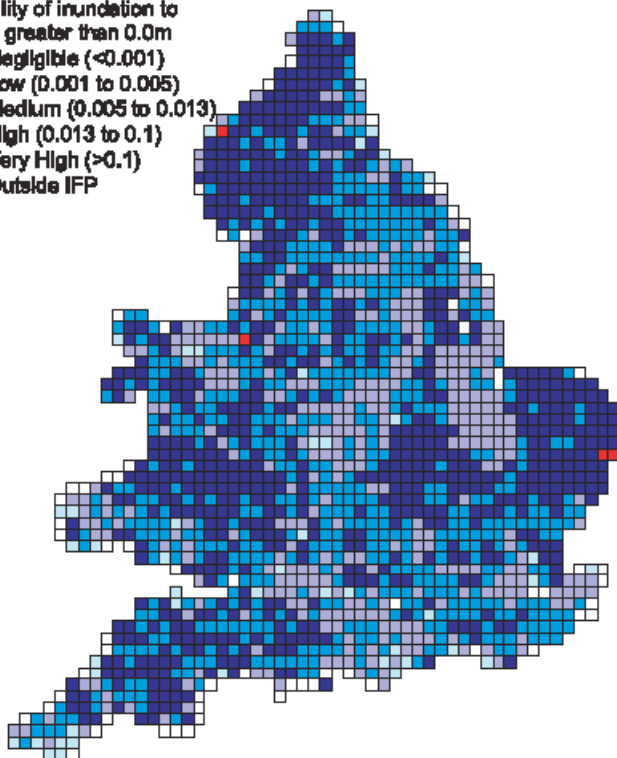
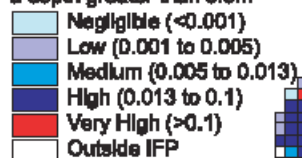
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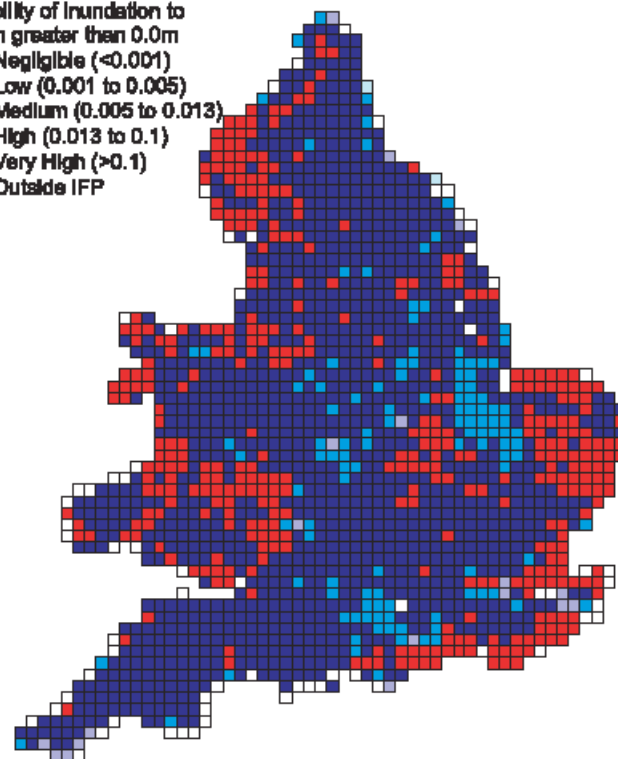
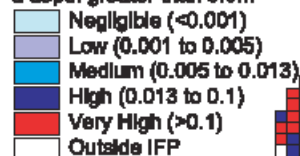
vs

2080

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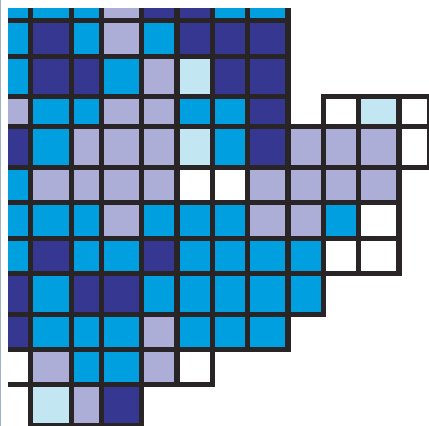
Probability of inundation to
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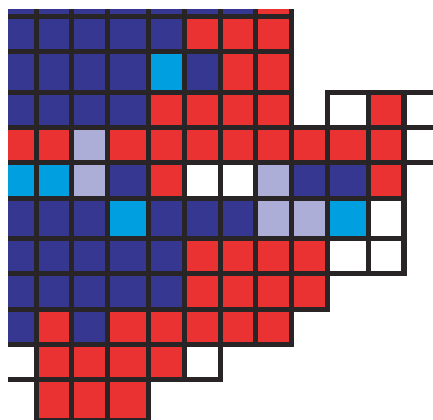
Source: *Foresight Report 2002*

No Evidence Yet of Market Prices Responding to Future Flood Risk:

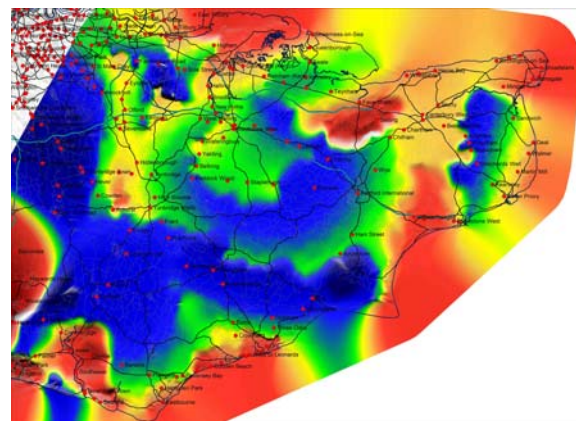
Flood Risk
2002



Flood Risk
2080

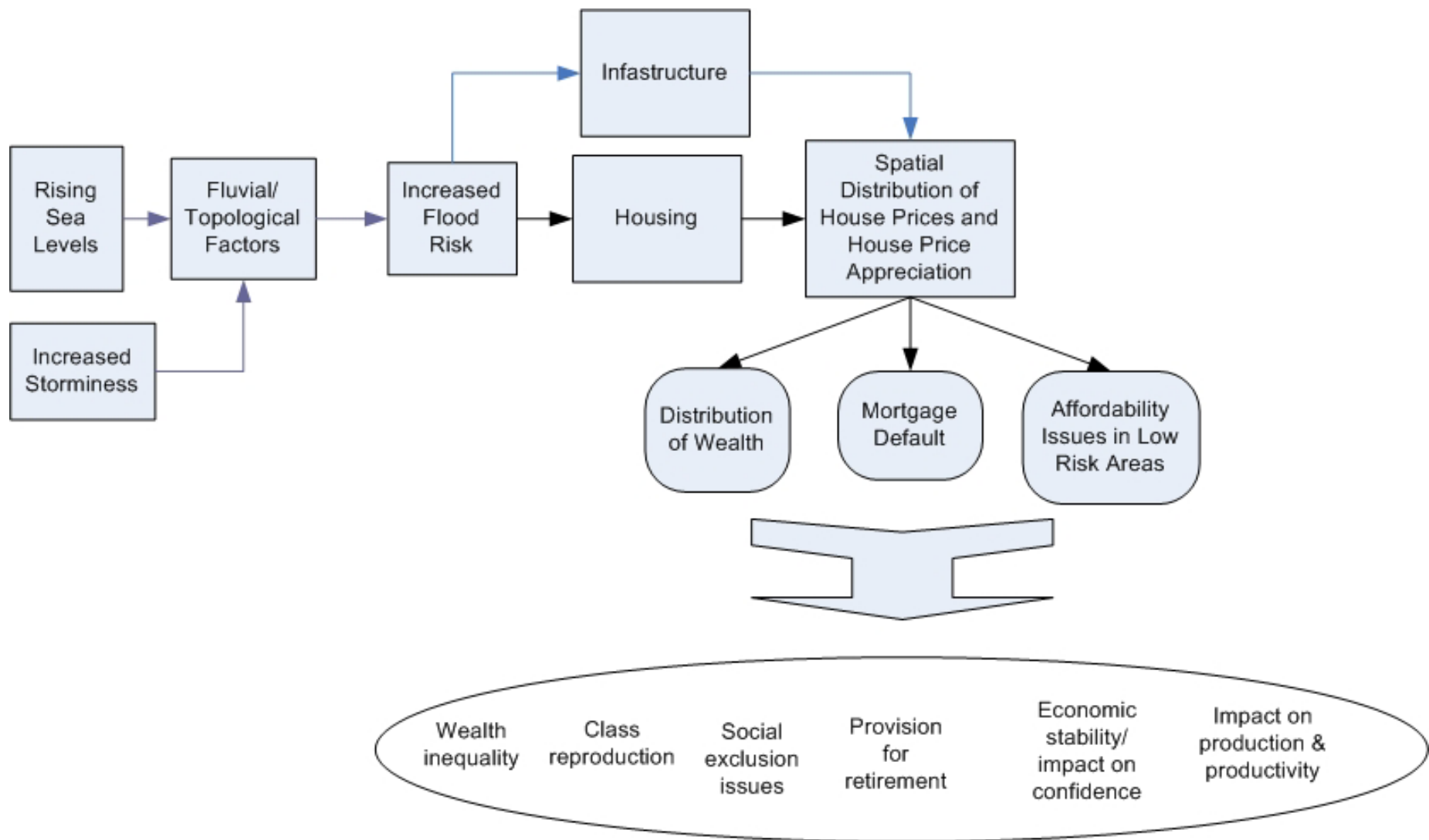


CQ House Price
Inflation 1996-2004



House price impact

- If and when house prices adjust, what are the potential negative impacts?

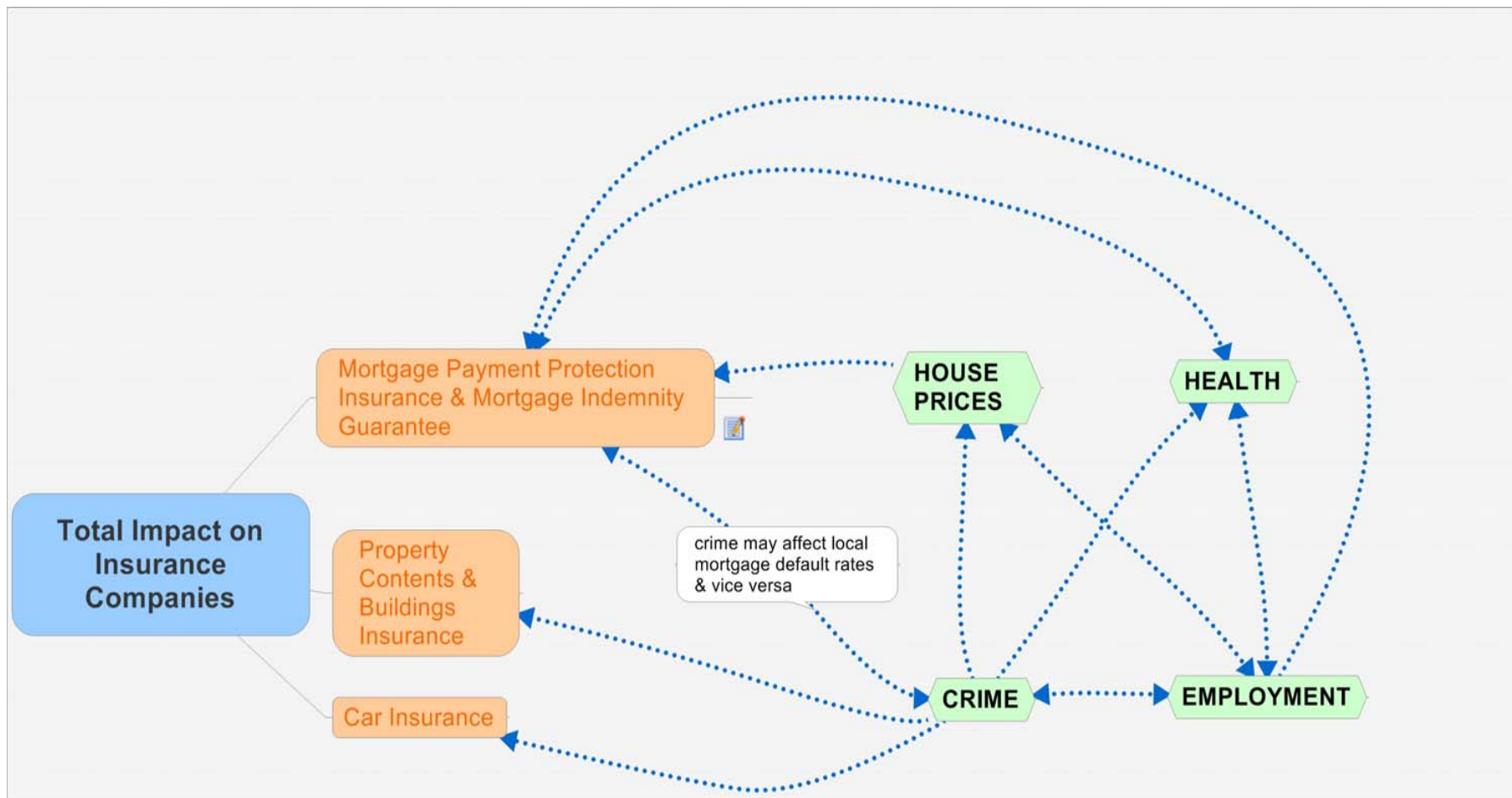


- Falling prices and negative equity in high-flood risk areas
 - Impacts on financial resources saved for retirement.
 - “property pensions”: disaster waiting to happen?
 - care for people in old age
 - who will foot the bill in areas where house prices collapse?
- uninsurable housing
- housing supply
- spatial inequality
- rising unemployment
- Repossessions

Financial/Economic stability

- mortgage default
- unsecured bad debt
- bank runs?
- sub-prime mortgages
- mortgage defaults
- credit crunches
- Impact on the wider economy:
 - E.g. highest debt-gearing & debt concentration in London/SE, yet some of the highest projected flood risk in those areas
 - Impact on the wider economy could be profound.
 - Collapse of equity-withdrawal – debt fuelled boom could translate into a debt-fuelled depression.

Implications for Insurers of Socio-Economic Effects



Vulnerability of insurance companies?

- non-independent risks
- MPPI
- MIGs
- Contents insurance
- Subsidence
- Crime

Impacts on the Economy?

- Economic impacts of more cautious lending, credit rationing, and higher costs of borrowing could be profound:
 - Slower growth
 - Less tax revenue
 - Inflationary impacts?
 - Higher unemployment
 - Increased cost to the exchequer in terms of:
 - Unemployment benefit
 - Income support
 - Housing Benefit
 - Social housing
- Exacerbated by:
 - Higher fuel costs
 - Higher food costs
 - Lower rates of international growth
 - Reduced export revenues

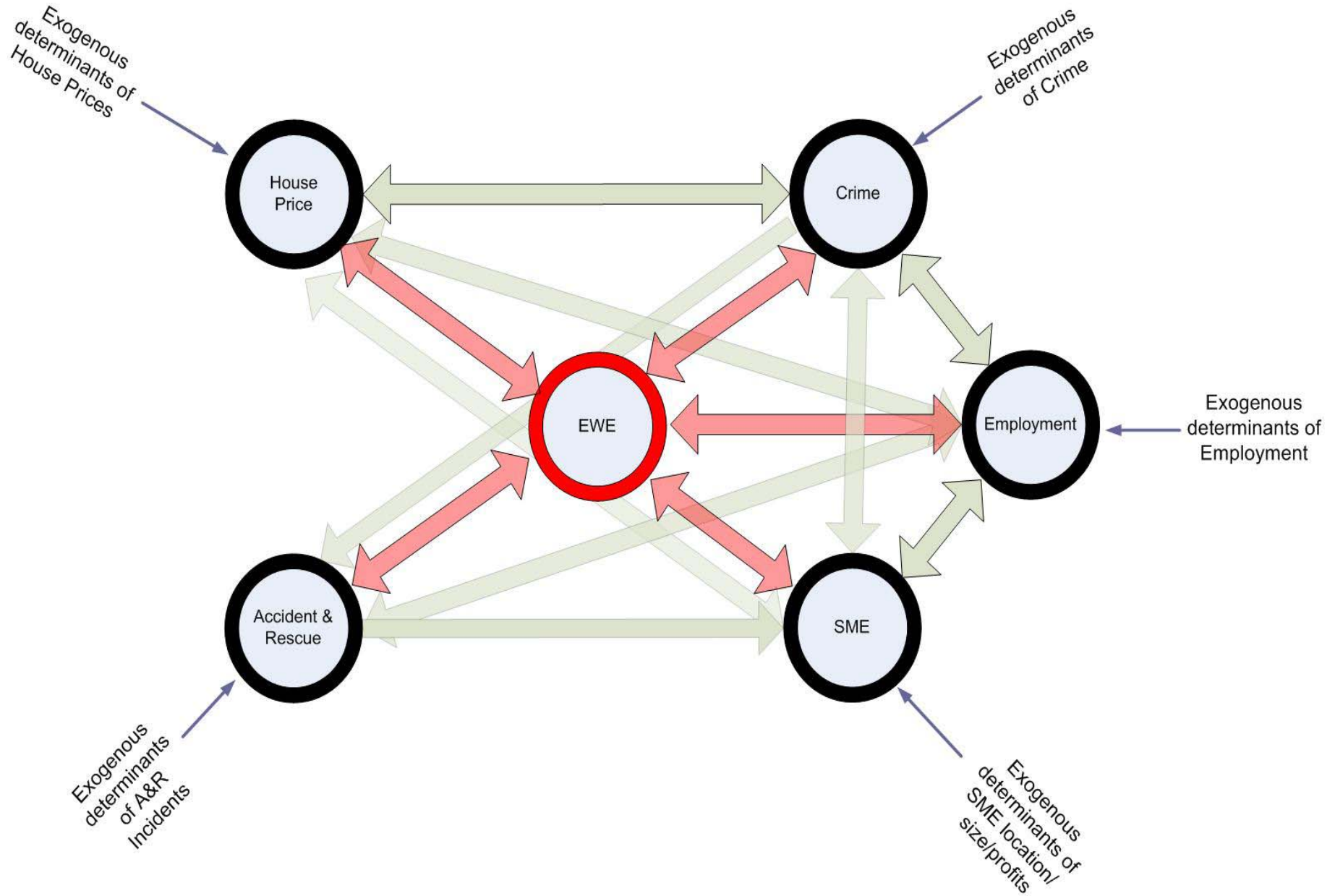
Crime

- abandoned properties
 - rising unemployment
 - insufficient financial/emotional resources to move
- ⇒ Spatial concentration of decline in high flood risk areas
- ⇒ Spatial concentration of affluence in low-flood risk areas with good infrastructure
- ⇒ Spatial inequality

Health

- In-migration put huge pressure on health services in prosperous areas
- Unemployment, repossession, economic decline increase demands on health services in depressed areas
- Potential “Key Worker” & property price issues exacerbated in low-flood risk areas.

EWESem



Regional & Social Inequality

- most able, educated and well-off will find optimal coping strategy
 - move to low flood risk areas
 - avoid capital losses
 - comprehensive insurance
 - maximise financial opportunities
 - survival of the fittest!
- Wealth accumulation geog polarisation
- Class reproduction

Implications for the welfare state:

- Welfare expenditure increases on health and education over the past decade funded by an unprecedented period of growth (high tax revenue) and falling unemployment (low IS costs) and low inflation (low public sector wage claims)
- If we entered a period of sustained rising unemployment and lower growth, will this lead to major cutbacks in the welfare state?
 - Particularly if increased demands on public finances from:
 - In-migration
 - Repossessions/homelessness
 - Retreat of private insurance/credit
 - National security
 - Public sector fuel costs
 - Flood defences

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Further Implications:

- Raises questions about some fundamental concepts of political economy:
 - Property rights
 - Global scale – who owns access to resources?
 - Local scale – who owns access to low-risk areas?
 - Role of the market
 - Market failure – inability to bring about the optimal adjustment
 - E.g. New Orleans
 - Stability of world financial system
 - Role of the state
 - State failure
 - Unintended outcomes of policies
 - Coordination failure at global (CO₂) and local levels (NIMBY)
 - Short-termism of electoral system – leave it to future governments to foot the bill & take tough decisions
 - » E.g. inheritance tax; fuel tax; housing capital gains tax
 - Will we still have a welfare state?

– Inequality

- Forces at work will swamp the ability of welfare state and transfer payments to mitigate polarisation of wealth and well-being
- Will the social cohesion and favourable relationship between capitalism and liberal democracy enjoyed in the West continue?
 - If so, will this be at the expense of developing countries?
- Or will the Marxist prediction of the “crisis of capitalism” yet be fulfilled?