Monitoring and Evaluating progress with adaptation in the UK

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UK Committee on Climate Change

Expert seminar 'Development of monitoring system for adaptation'

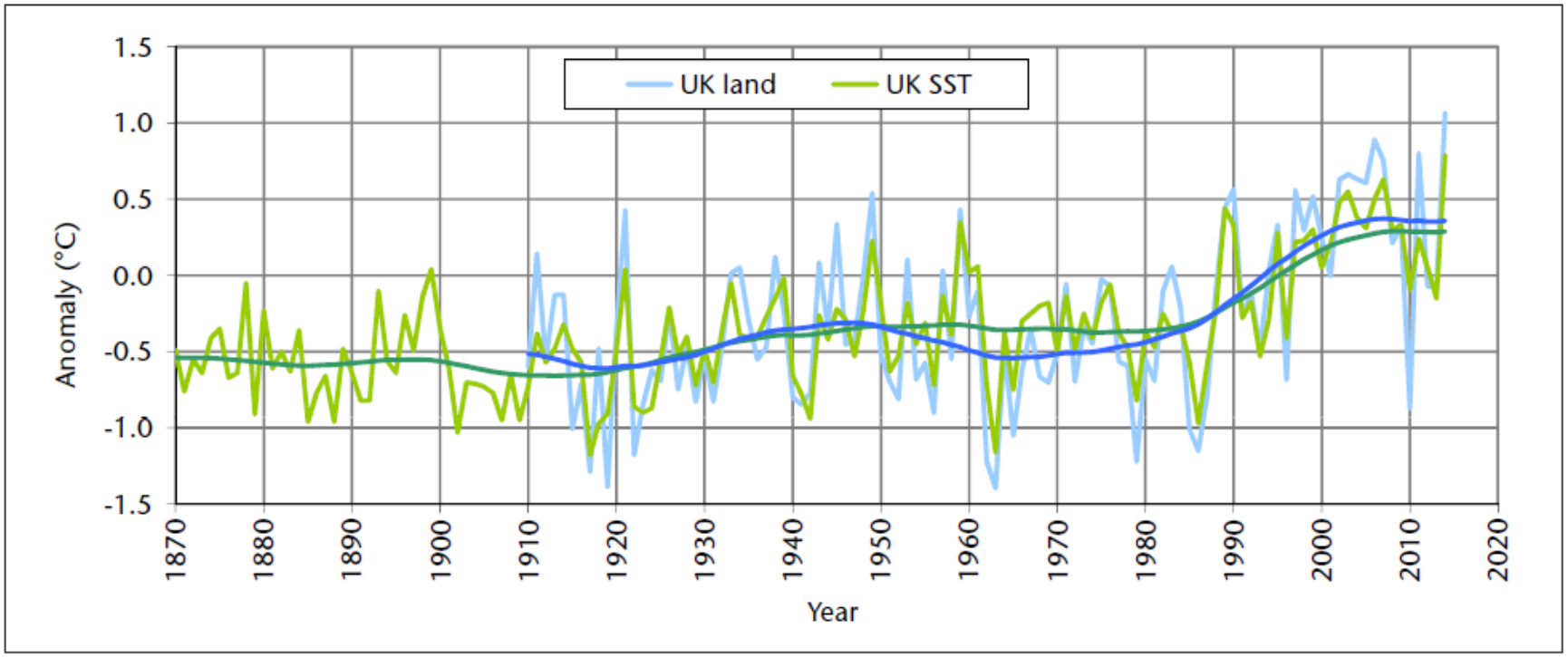
Ministry of Environmental Protection and Regional Development of Latvia

Riga, 23rd May 2016

Contents

1. Risks and opportunities from current and future climate change
2. Adaptation policy framework
3. Approach to monitoring and evaluating progress with adaptation, including use of indicators
4. Key findings from CCC's 2015 progress report
5. Key challenges

UK land and sea surface temperatures have warmed by ~1°C, record highs for both in 2014

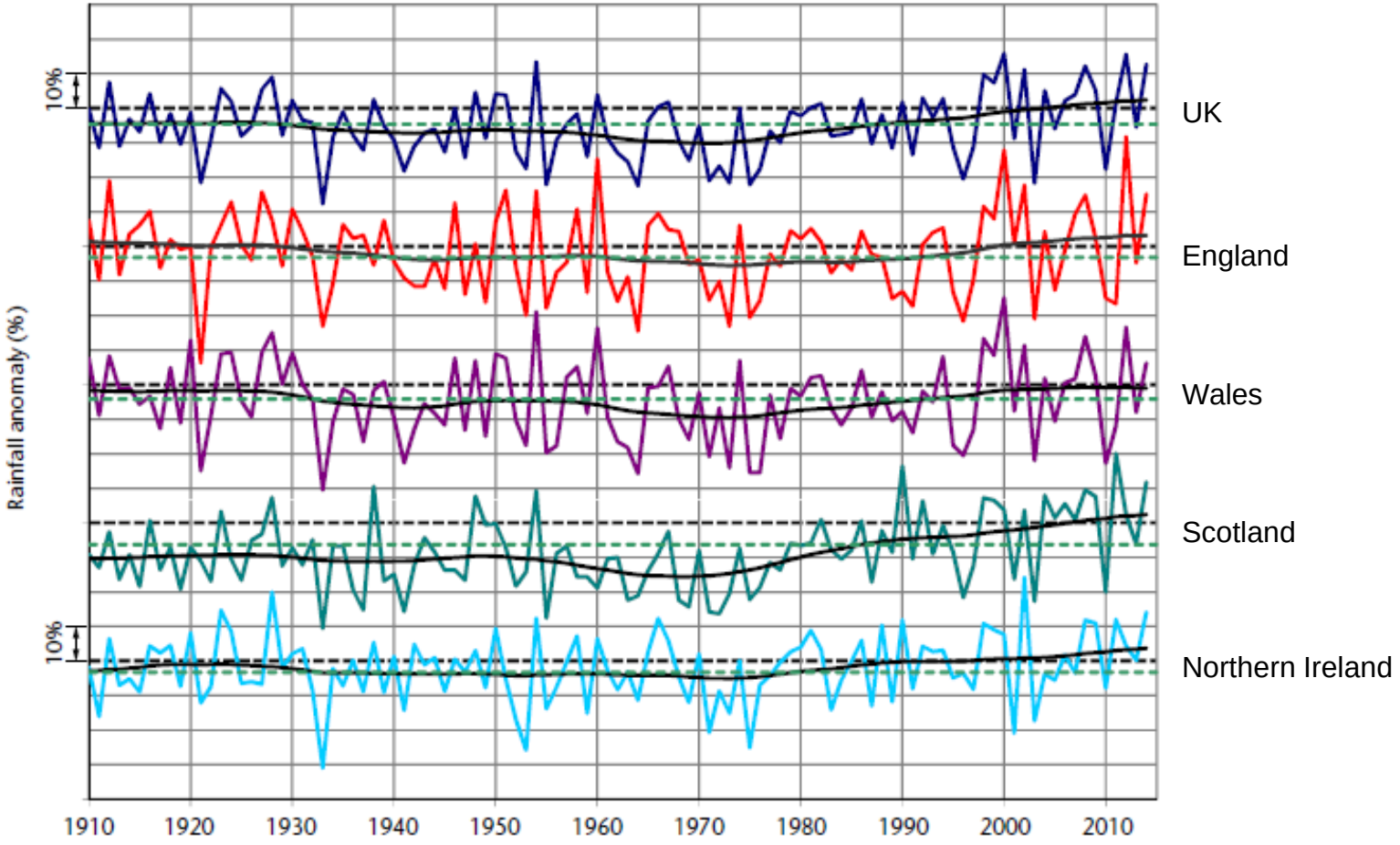


Variable	1961-1990 average	1981-2010 average	2005-2014 average	Year 2014
UK land	8.3	8.8	9.2	9.9
UK near-coast sst	11.1	11.5	11.7	12.2

Source: Met Office, *State of the UK Climate 2014* (2015)

Trend towards increasing rainfall in Scotland and north-west England. Winter rain totals increasing, falling in heavier events.

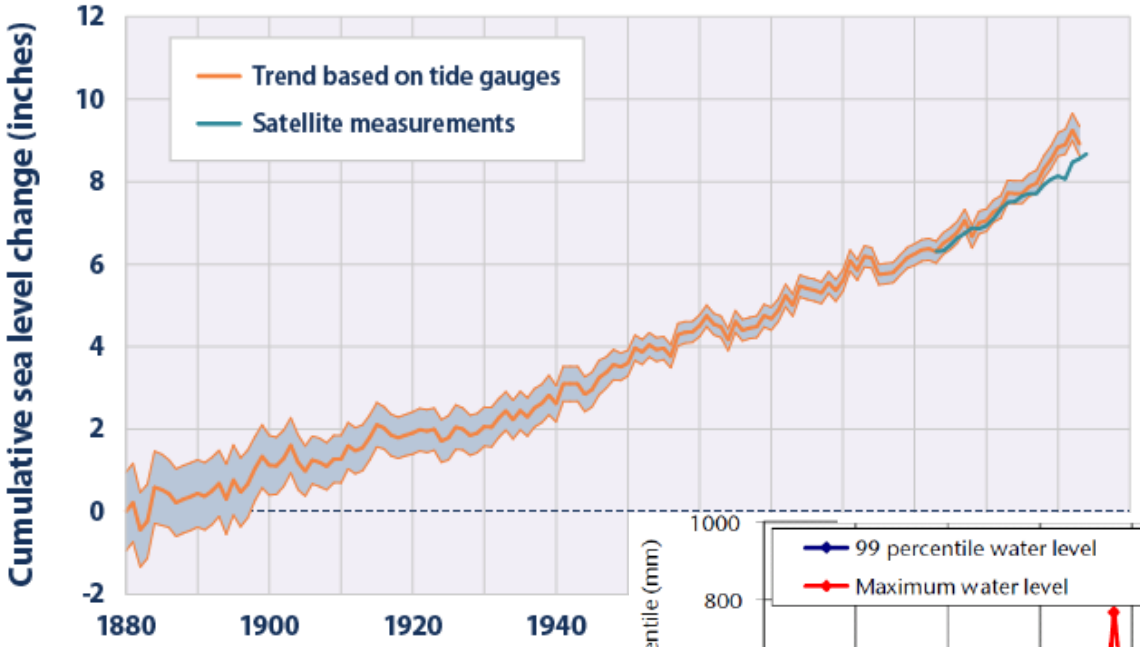
Annual rainfall totals, 1910 to 2014



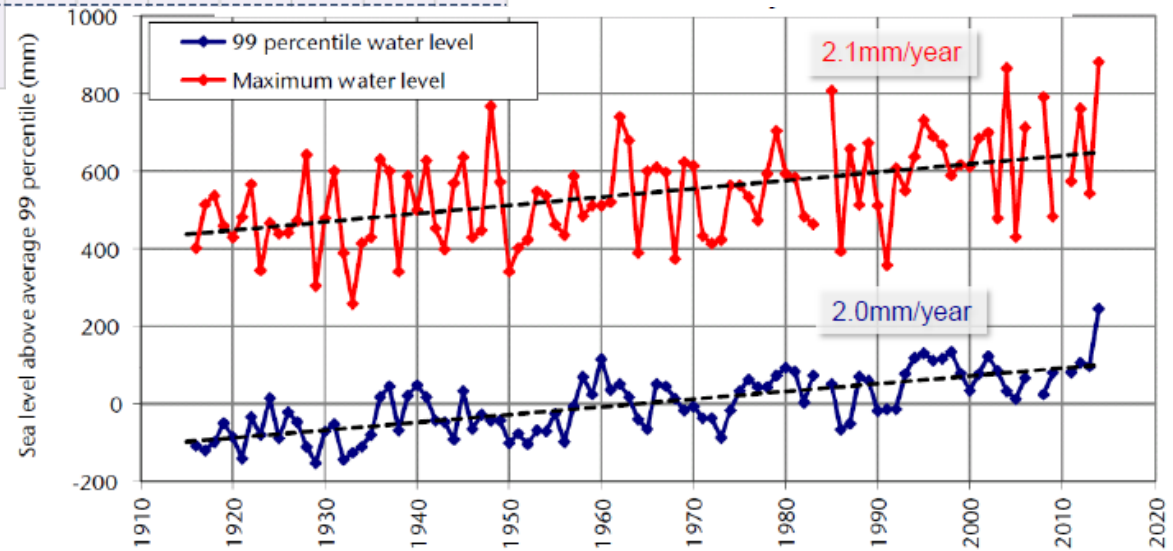
The hatched black line is the 1981-2010 long-term average. The lower hatched green line is the 1961-1990 long-term average.

Source: Met Office, *State of the UK Climate 2014* (2015)

Sea levels have risen 20 centimetres since 1901, with the rate of increase accelerating in recent decades



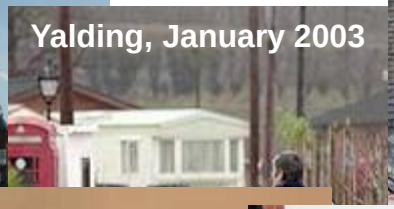
Global mean sea level rise, 1880-2014



Sea level rise at Newlyn, Cornwall

Source: (a) CSIRO (2015), (b) Met Office Hadley Centre

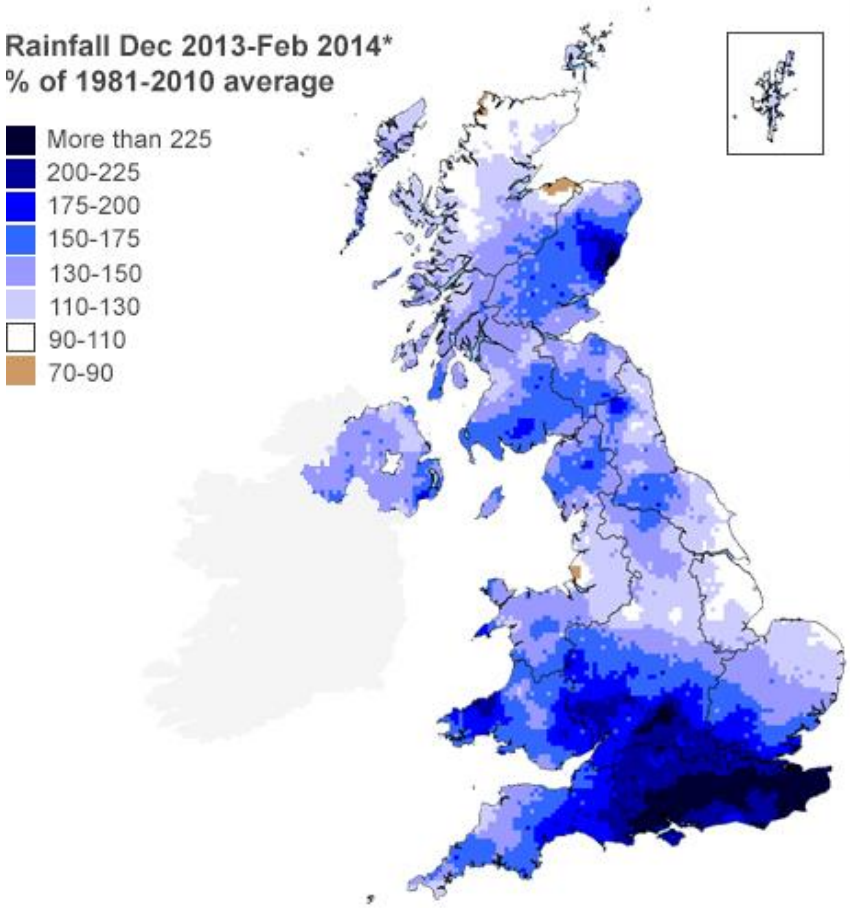
“Once in a lifetime” floods in England since 2000



Winter 2013/2014 - wettest since records began

Committee on Climate Change

UK's wettest winter on record



Source: Met Office *Data from 1 Dec 2013 to 19 Feb 2014

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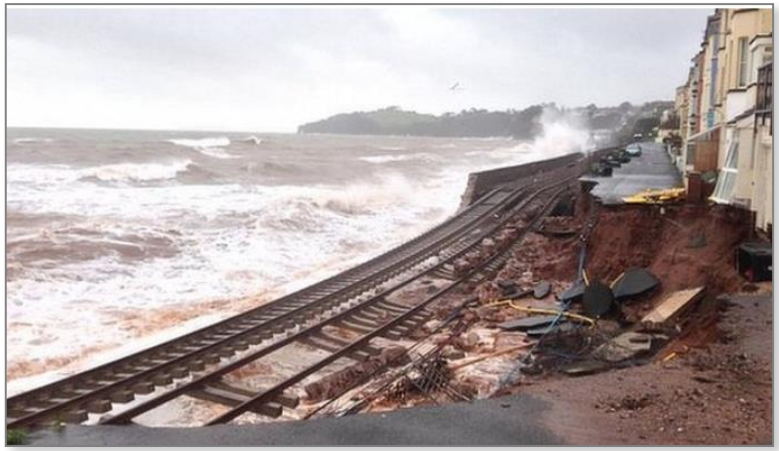
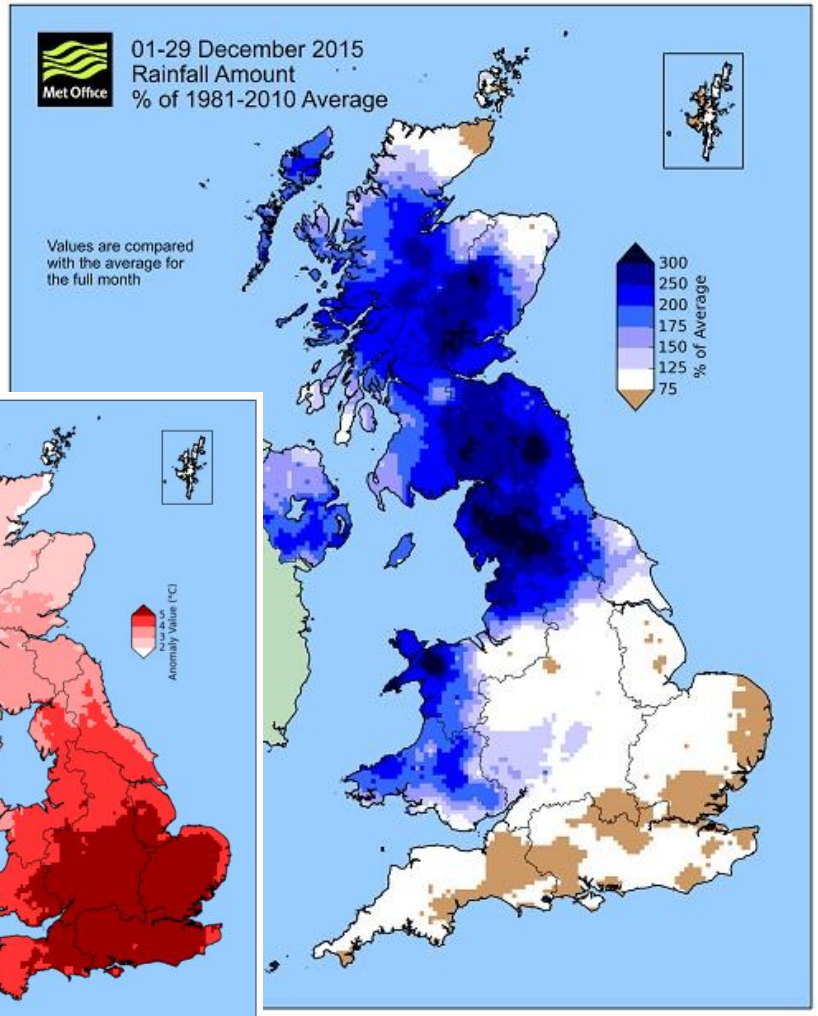
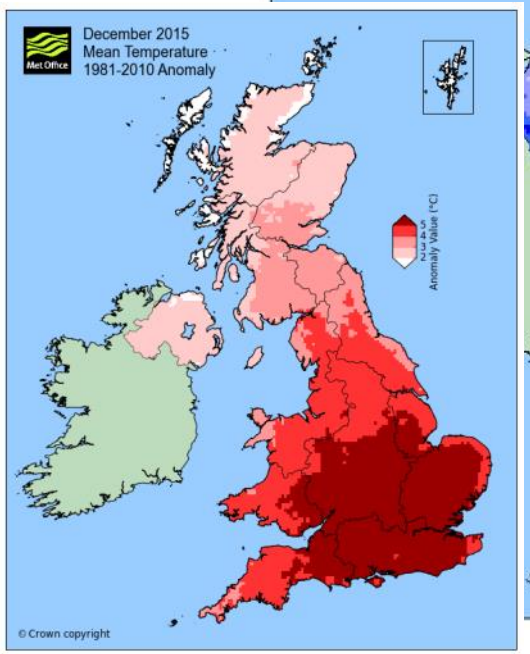
Flooding and storms caused widespread disruption and damage



- 6,000 homes flooded
- Hundreds of thousands of households without power
- Main rail link between London and South West washed away by storms

December 2015 was the wettest calendar month on record with many rainfall records broken

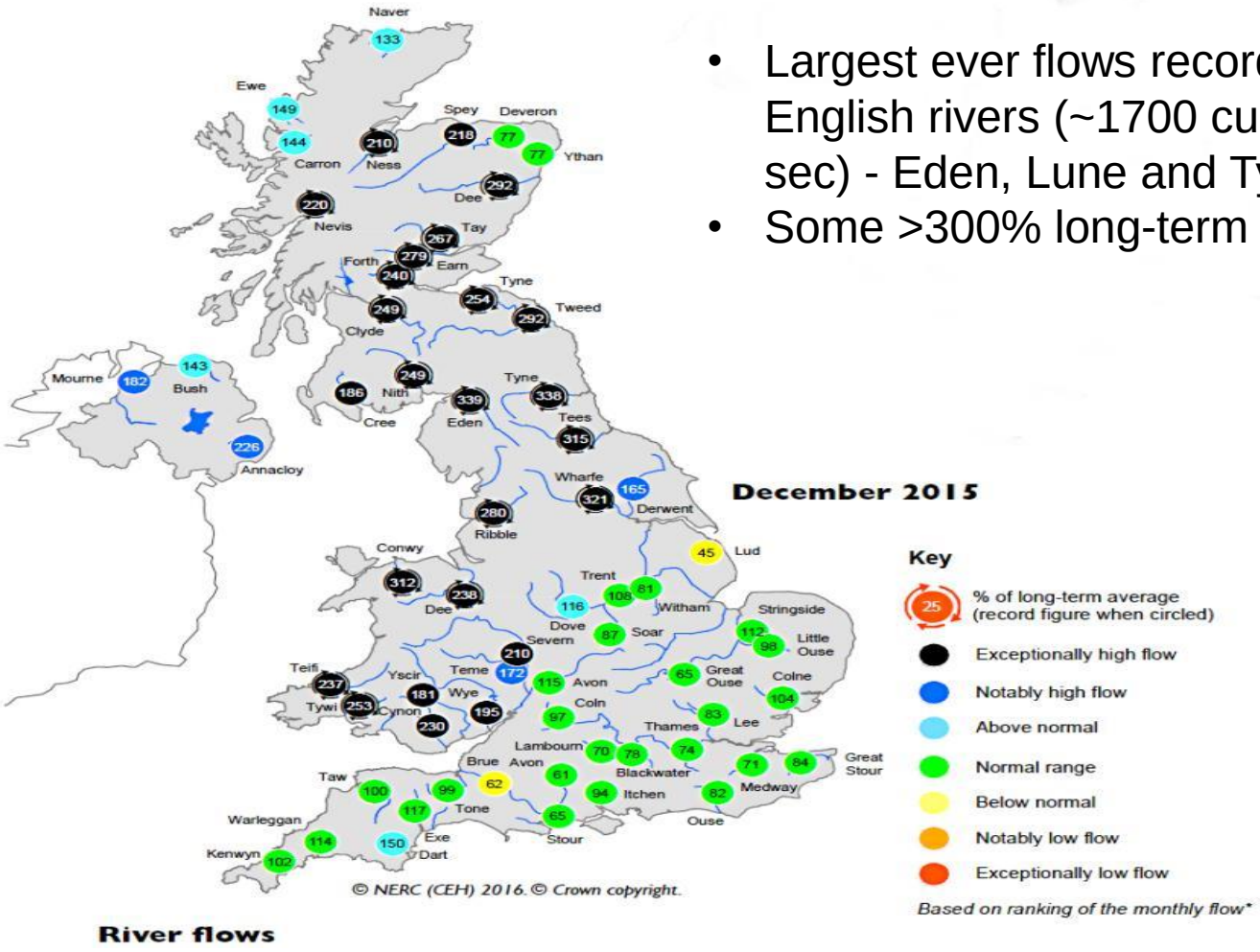




- New 24-hour rainfall record for UK (341.4mm, Honister Pass)
- New 48-hour rainfall record for UK (405.0mm, Thirlmere)
- Wettest calendar month on record for UK (191% of December average) in a series from 1910
- Warmest December in a series from 1910 (4.1°C above average)

Source: Met Office (2016), Centre for Ecology & Hydrology (2016)

High rainfall resulted in number of 100+ year river flow records being broken in England and Scotland



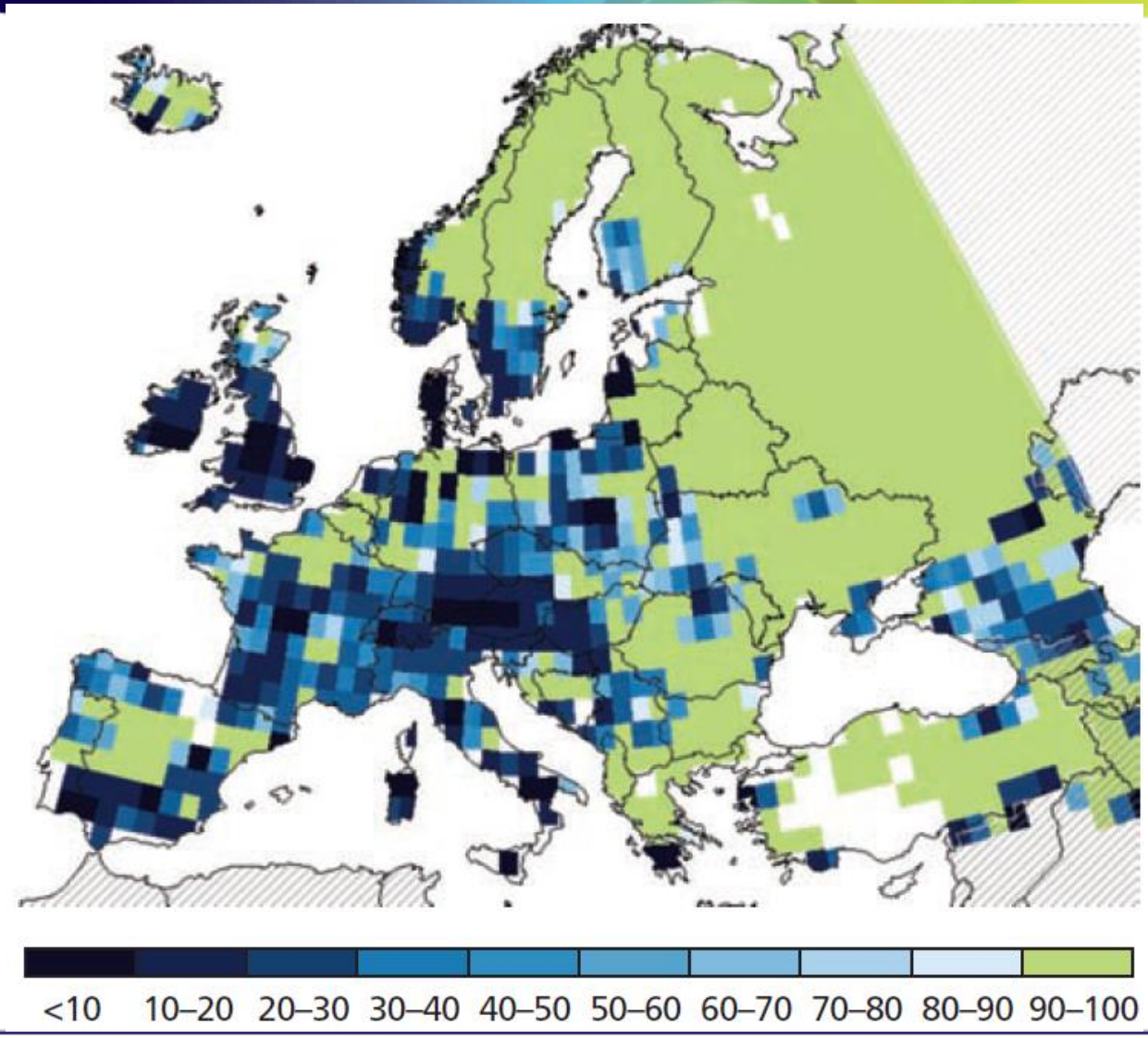
- Largest ever flows recorded on some English rivers (~1700 cubic metres per sec) - Eden, Lune and Tyne
- Some >300% long-term average

Source: Centre for Ecology & Hydrology (2016)

Resulted in even more severe flooding than 2014

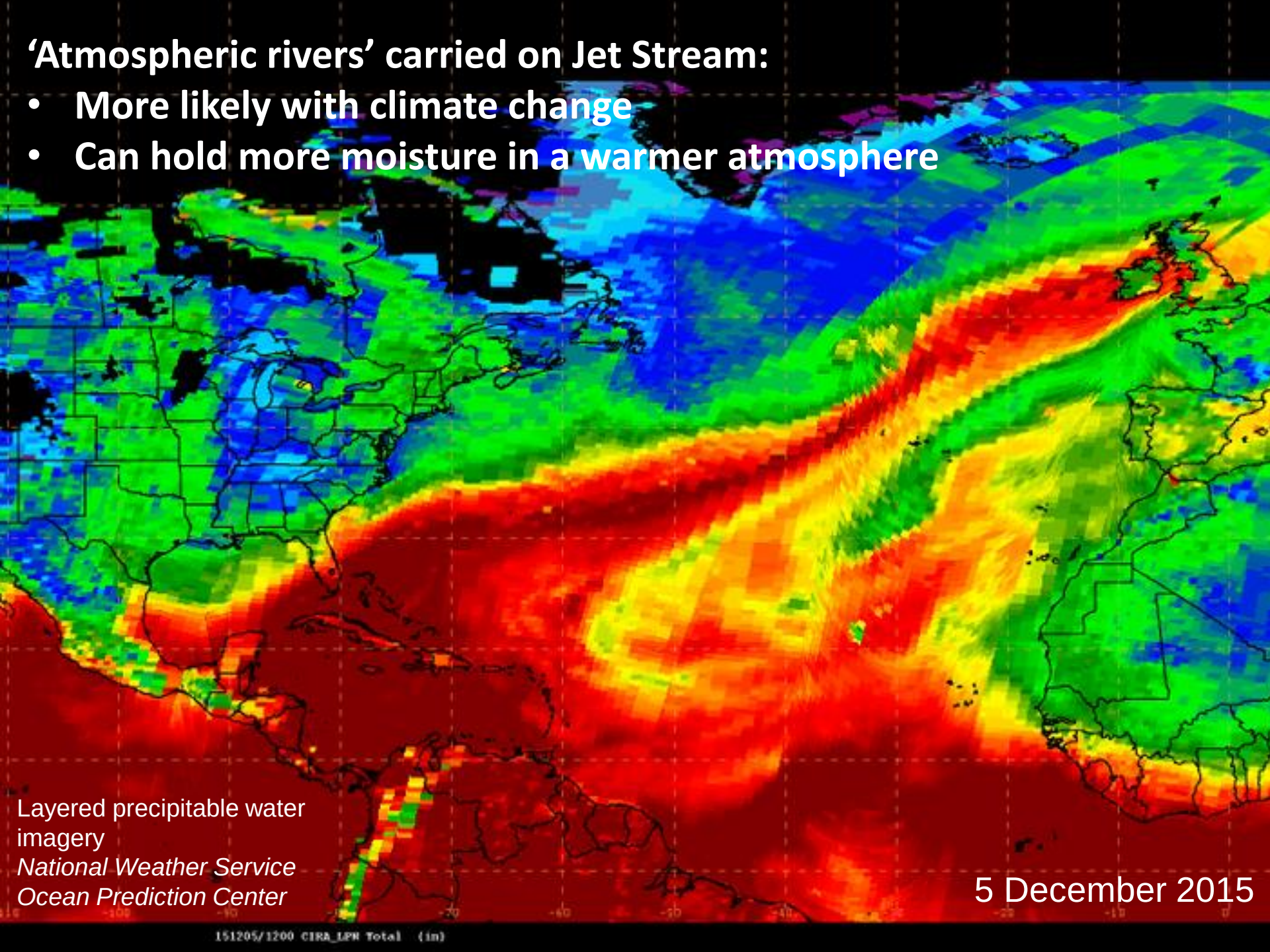
- >10,000 homes flooded
- 50,000 households without power
- Main rail link between London and Scotland cut off
- Road bridges swept away
- New £35m flood defence scheme in Carlisle overwhelmed

Flood events in the UK expected to become more common

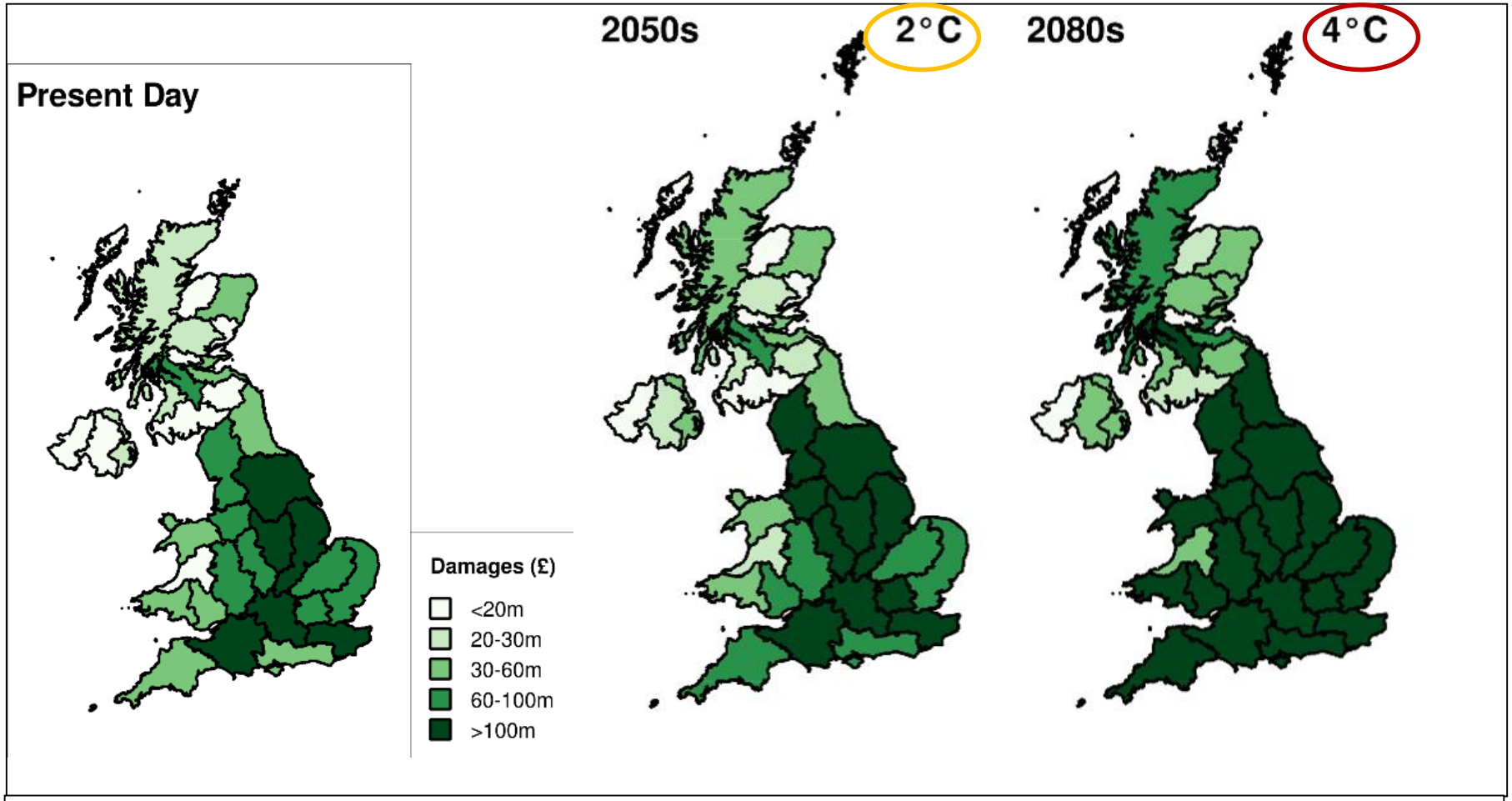


Return period for a 1 in 100 year flood today (1961-1990) by the end of the 21st century (2071-2100)

Source: EASAC 2013


‘Atmospheric rivers’ carried on Jet Stream:
• More likely with climate change
• Can hold more moisture in a warmer atmosphere
Layered precipitable water imagery
National Weather Service
Ocean Prediction Center
5 December 2015
151205/1200 CIRA_LPW Total (in)

Costs of flooding expected to increase with climate change

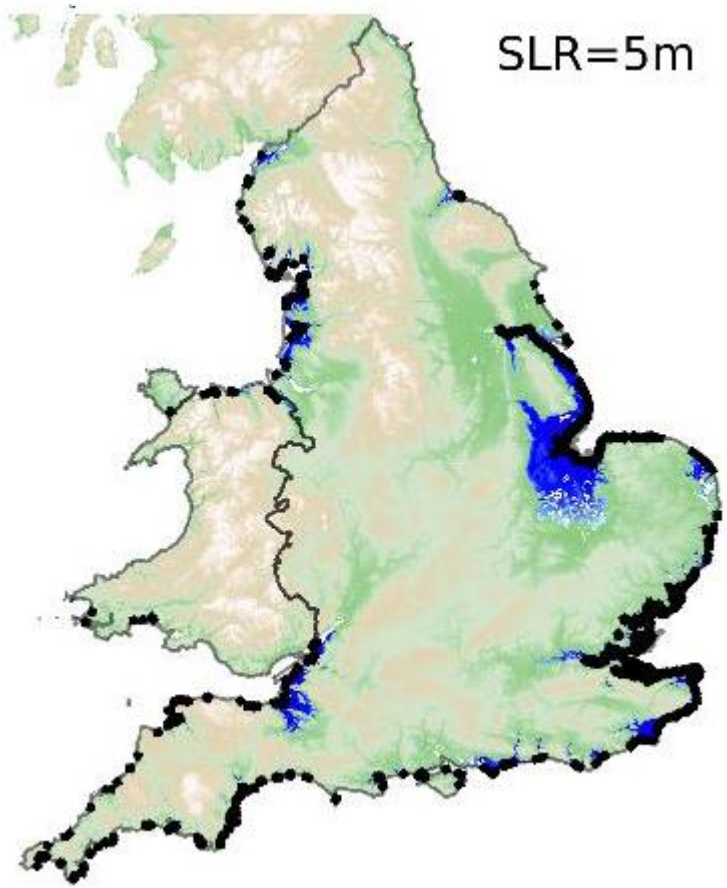


- More investment and adaptation will be needed to manage a 2°C rise in global mean temperatures
- Increasing damages inevitable with a 4°C rise in global temperatures

Source: Sayers et al. (2015) for the ASC: *Projections of future flood risk in the UK*

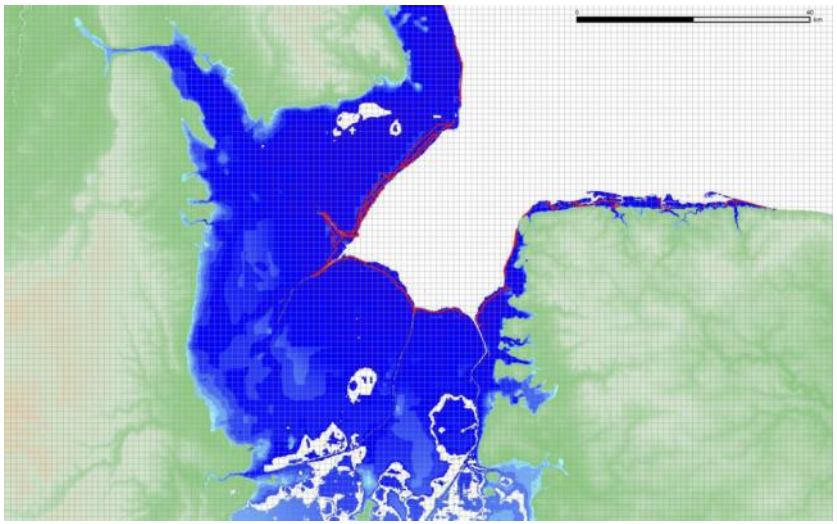
Coastal defences in England expected to become highly vulnerable to failure as sea levels rise

Inundation depth in a 1:200 tidal surge: 0 meters 5 meters



Black lines: vulnerable defences

SLR=5m



The Wash

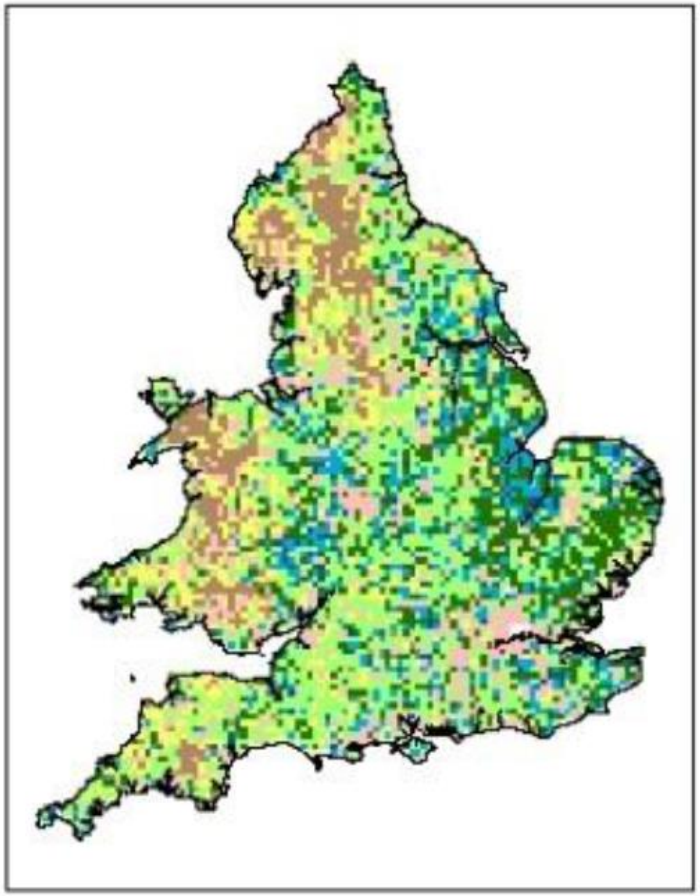
Red lines: vulnerable defences

White areas: below current sea level

Source: Sayers et al. (2015) for the ASC: *Projections of future flood risk in the UK*

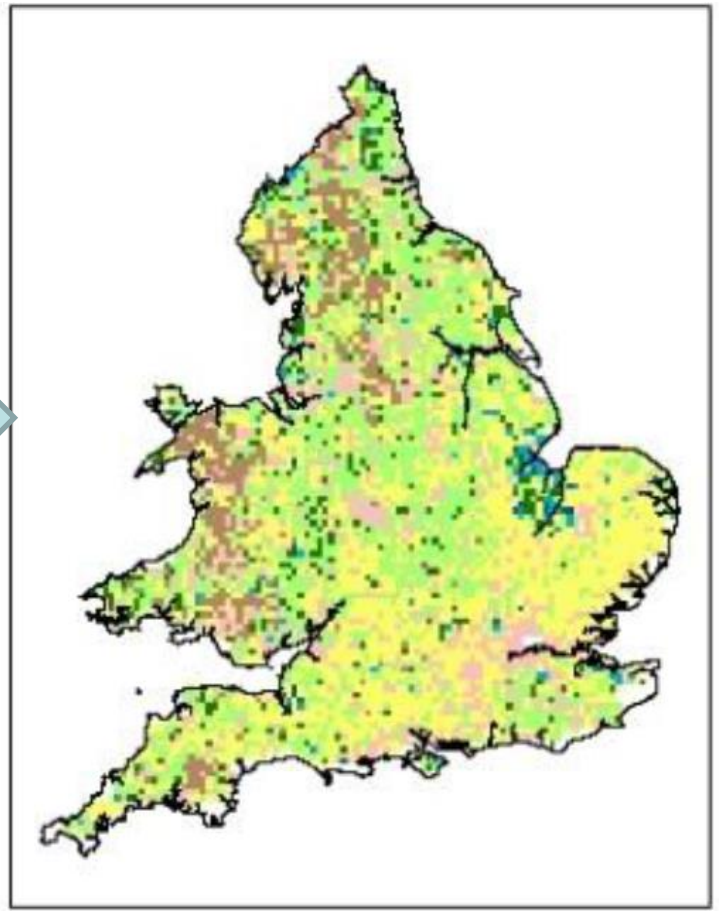
Not just flooding - projections of increased aridity in eastern side of UK, with implications for crop production

Baseline (1961-91)



Grade 1
Grade 2
Grade 3a
Grade 3b
Grade 4
Grade 5
Non Agricultural

2050s (high emissions scenario)

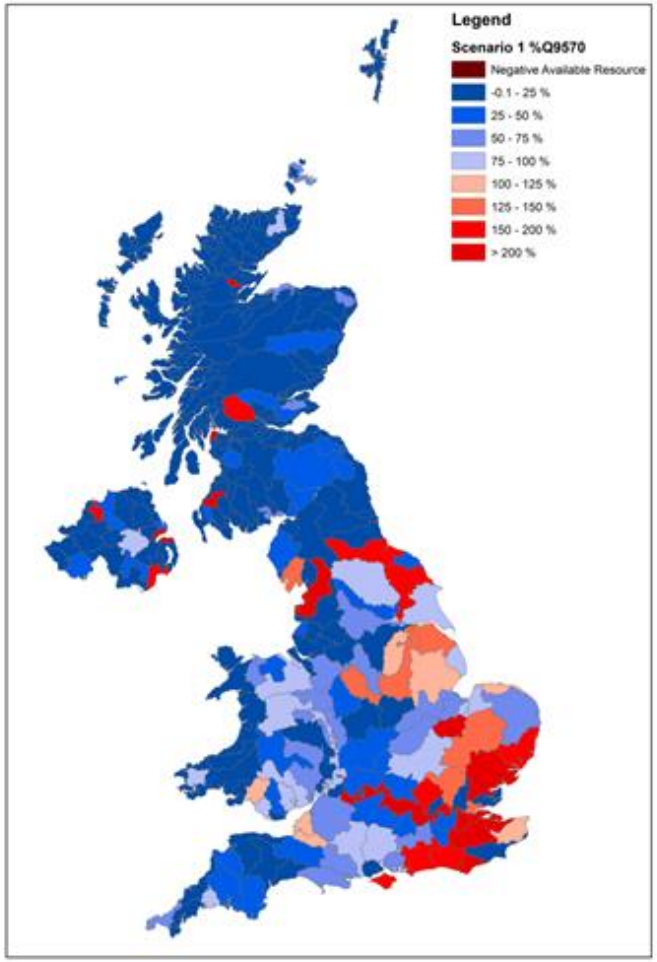


Projected increased in soil droughtiness drives downgrading of ALC

Source: ADAS/Cranfield (2014) for Defra project SP1104

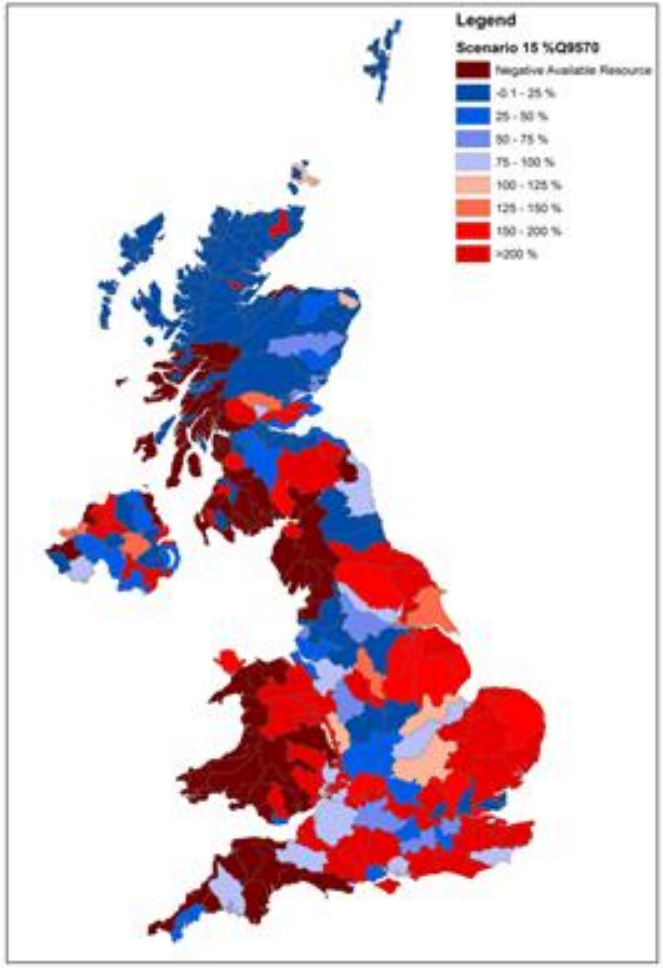
Reduced water availability projected in many parts of UK - implications for agriculture and ecosystems

Present Day



Abstraction demand as a percentage of the available resource during drought periods

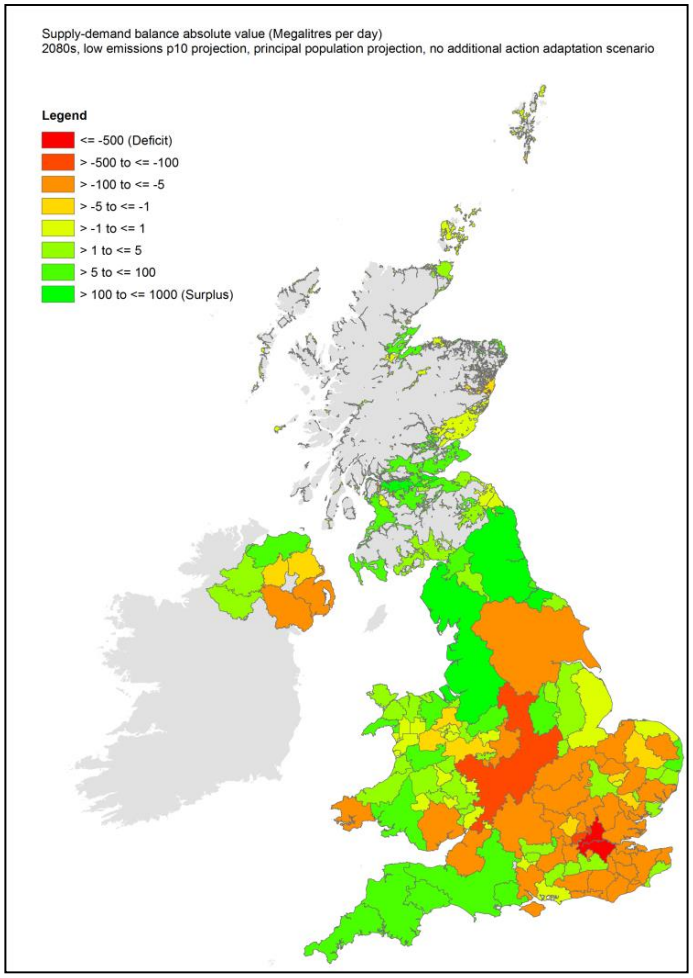
2050s (high emissions scenario)



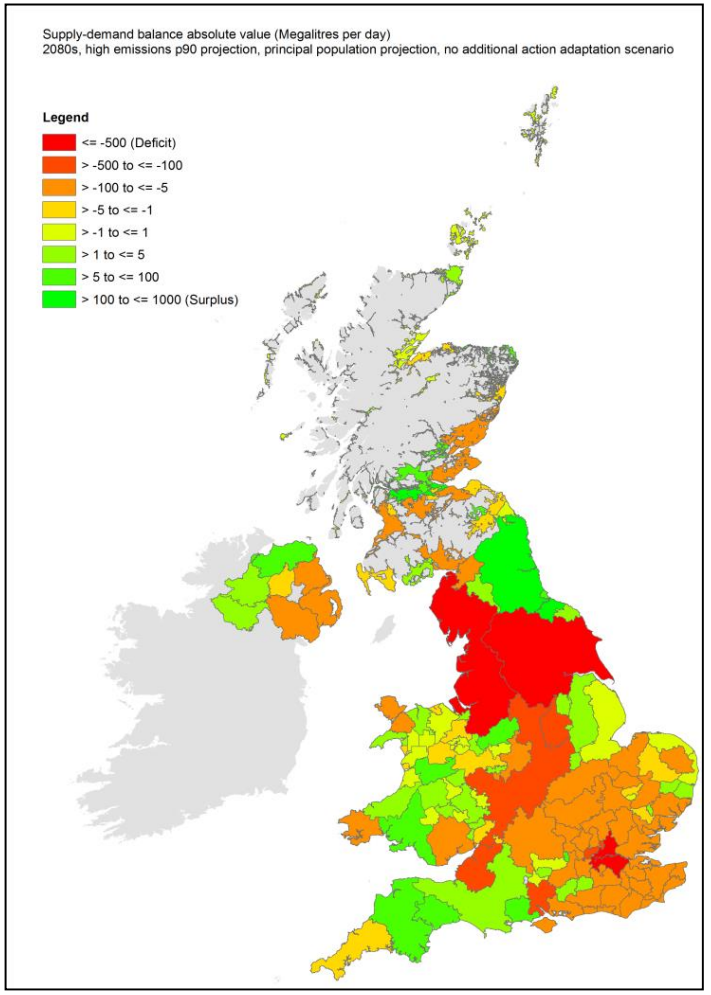
Source: HR Wallingford(2015) for the ASC: *Projections of future water availability in the UK*

Increased risk public water supply being in deficit in many parts of UK by 2080s

Low climate



High climate



Source: HR Wallingford(2015) for the ASC: *Projections of future water availability in the UK*

Top 6 broad climate risks facing UK

- Increased flooding and coastal change
- Increased water scarcity and drought
- Increased heat stress
- Impacts on natural capital – soils, habitats, forestry, marine
- Impacts on UK food system (domestic and international)
- Increased pests and diseases

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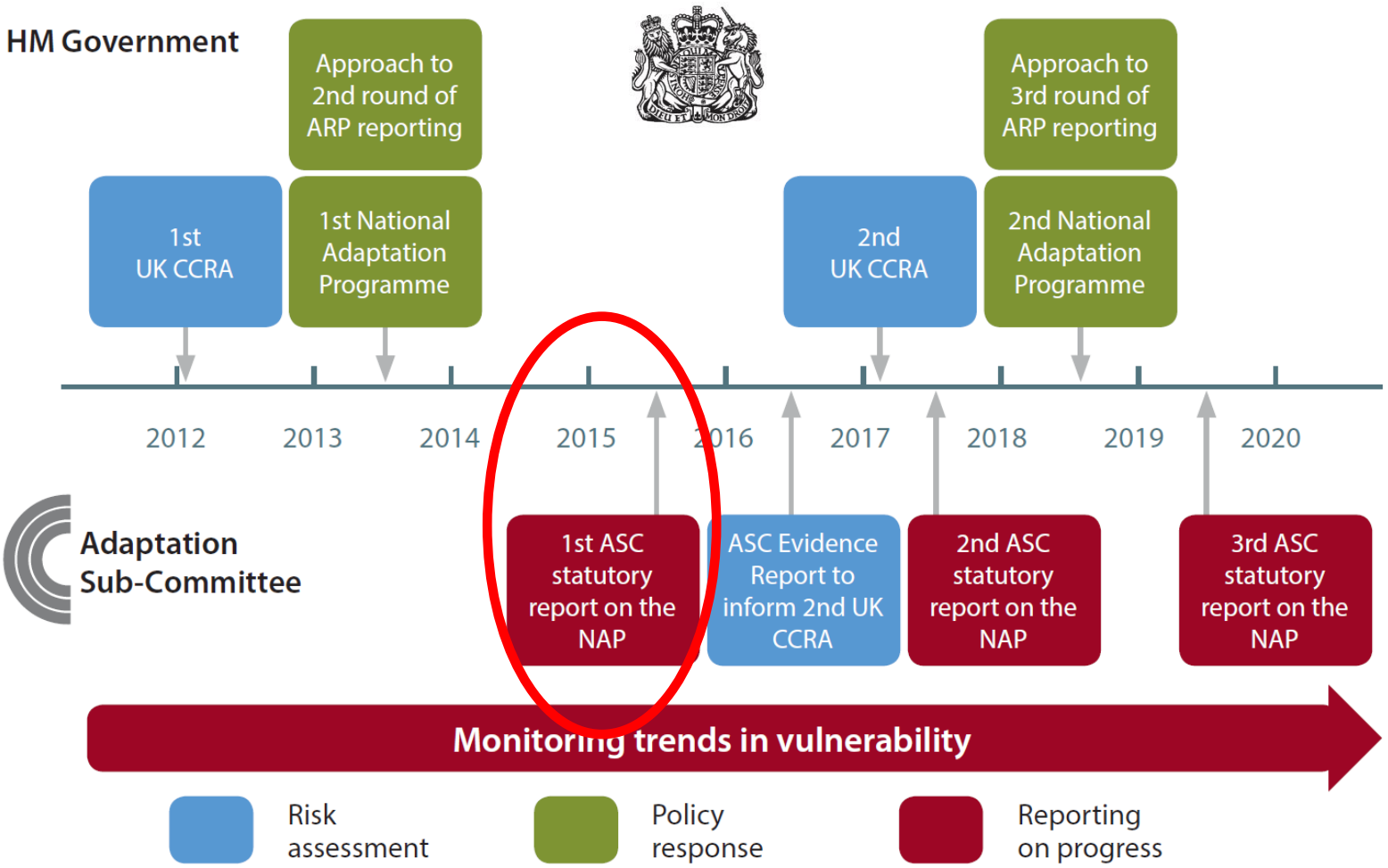
Climate Change Act 2008 created a legal adaptation policy cycle for the UK



The Adaptation Sub-Committee of the Committee on Climate Change

Statutory roles in the 2008 Climate Act:

- **To provide independent, expert advice** on the UK climate change risk assessment (advisory role)
- **To report to Parliament on progress** with implementation of the NAP (scrutiny role)

Prof Lord John Krebs (chair)

Ece Ozdemiroglu

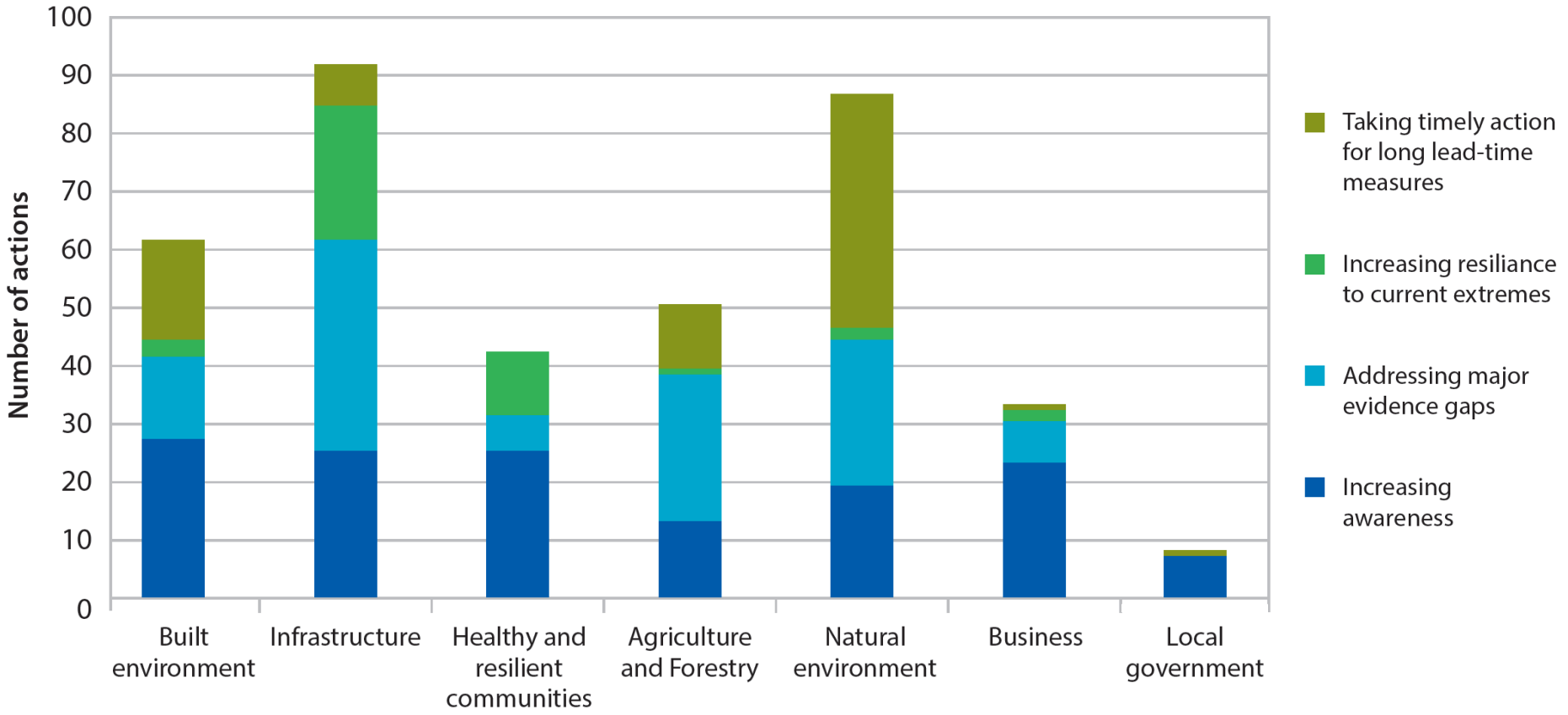
Prof Jim Hall

Prof Dame Anne Johnson

Rosalyn Schofield

Sir Graham Wynne

National Adaptation Programme (NAP): 7 themes, over 370 actions



Actions in NAP mostly refer to existing policies and programmes important for adaptation

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Approach to evaluating the NAP: identified 'adaptation priorities'

- 'Adaptation priorities' – the key factors that are most important for managing the risks of climate change
- Example below for Built Environment theme

Figure 2.1: Climate hazards, contextual factors and adaptation priorities for the built environment theme

Climate hazards	Contextual factors	Adaptation priorities	Relevant NAP actions
Flooding Water scarcity Drought Heavier rainfall Sea level rise Higher average and extreme temperatures	Population growth Demographic change Economic growth Average property occupancy	Community-scale flood alleviation	• Implement National Flood & Coastal Erosion Risk Management Strategy for England
		Surface water flood management	• Implement local flood risk management strategies • Increase use of sustainable drainage systems
		Avoid inappropriate development in flood risk areas	• Implement National Planning Policy Framework
		Residual flood risk to existing properties	• Promote property-level flood protection
		Heat-related health impacts	• Review housing policies and regulations in relation to heat • Implement Green Infrastructure Partnership work on adaptation
		Water demand in the built environment	• Implement Water Resources Management Plans • Implement Building Regulations

We ask three questions for each adaptation priority

Is there a plan?	Are actions taking place?	Is progress being made in managing vulnerability?
Green • Plans or policies are in place that aim to address the adaptation priority	**Green** • Relevant NAP or other actions are complete or on-track	**Green** • Vulnerability reducing, or not increasing • High uptake of low-regret actions • Long-term decisions are accounting for future climate
Amber • Plans or policies in place that partially address the adaptation priority	**Amber** • Not all relevant NAP or other actions are on-track	**Amber** • Some trends in vulnerability increasing • Scope to increase low-regret action • Not all decisions accounting for the future climate
Red • No relevant policies or plans in place	**Red** • Relevant NAP or other actions are behind schedule	**Red** • Most trends in vulnerability increasing • Minimal uptake of low-regret actions • Decisions not accounting for the future climate
	Grey • No apparent action taking place	**Grey** • Insufficient evidence to make a judgement

We evaluate progress using a combination of policy analysis and indicators (e.g. Built Environment theme)

Overview of progress			
Adaptation priority	Is there a plan?	Are actions taking place?	Is progress being made in managing vulnerability?
1. Community-scale flood alleviation	Green	Green	Amber
2. Surface water flood management	Green	Amber	Red
3. Avoid inappropriate development in flood risk areas	Green	Green	Amber
4. Residual flood risk to existing properties	Red	Green	Red
5. Heat-related health impacts (covered in Chapter 4: Healthy and Resilient Communities)	Amber	Green	Red
6. Water demand in the built environment	Green	Amber	Green

Source: ASC (2015) *Progress in preparing for climate change*

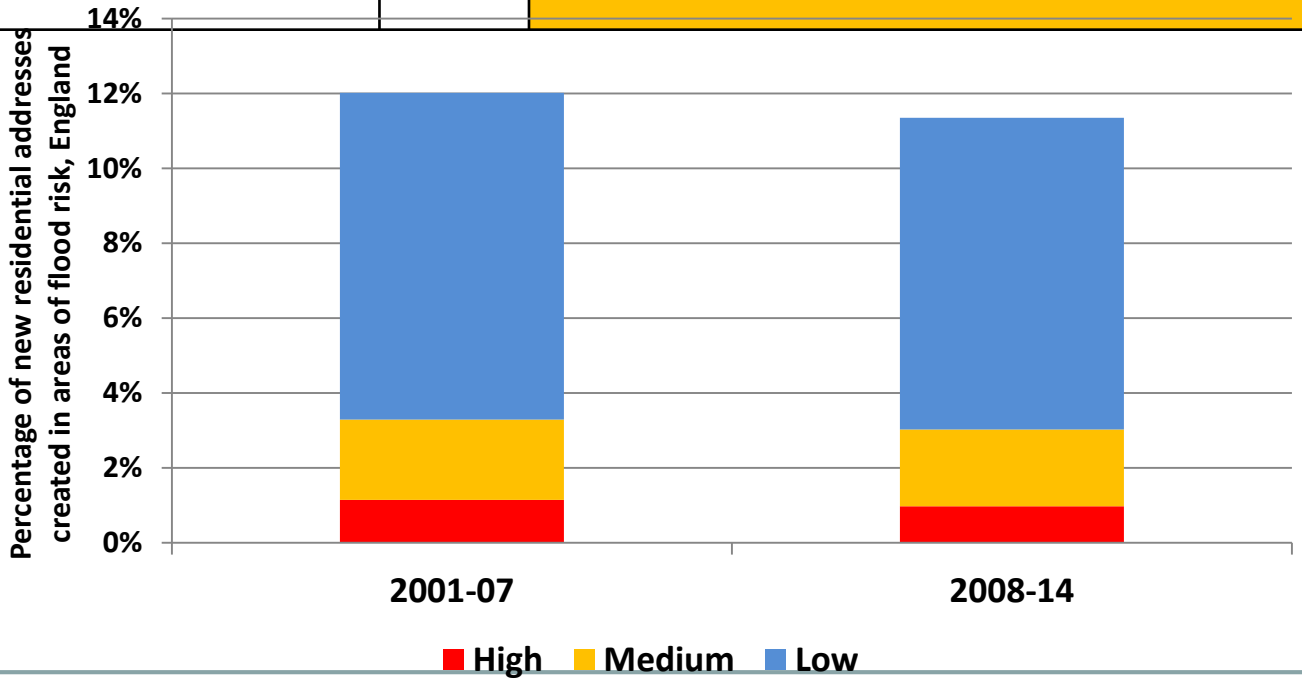
Indicators used to assess trends in floodplain development

Indicator	Data series	Source	Trend	Implication
Proportion of new homes built in flood risk areas, England	2001-2014	OS Mastermap/ EA NaFRA	⇩	**Proportion has only slightly declined, from 12% (2001-07) to 11% (2008-2014).**
Proportion of new homes built in flood risk areas, by region	2001-2014	OS Mastermap/ EA NaFRA	⇔	**Floodplain development has increased in some regions, but declined in others**
Proportion of planning applications with unsatisfactory flood risk assessments	2009-2013	Sample of EA objections	⇔	**One-third of planning applications do not submit satisfactory FRAs**
Proportion of planning applications approved despite sustained EA objection	2009-2012	Sample of EA objections	⇩	**Very few applications going ahead against EA advice, although not always informed of the outcome.**

Proportion of new homes built in flood risk areas has declined nationally, but not significantly

Proportion of new homes built in flood risk areas - England

Proportion of new residential addresses created in flood risk areas has only slightly declined, from 12% (2001-07) to 11% (2008-2014).



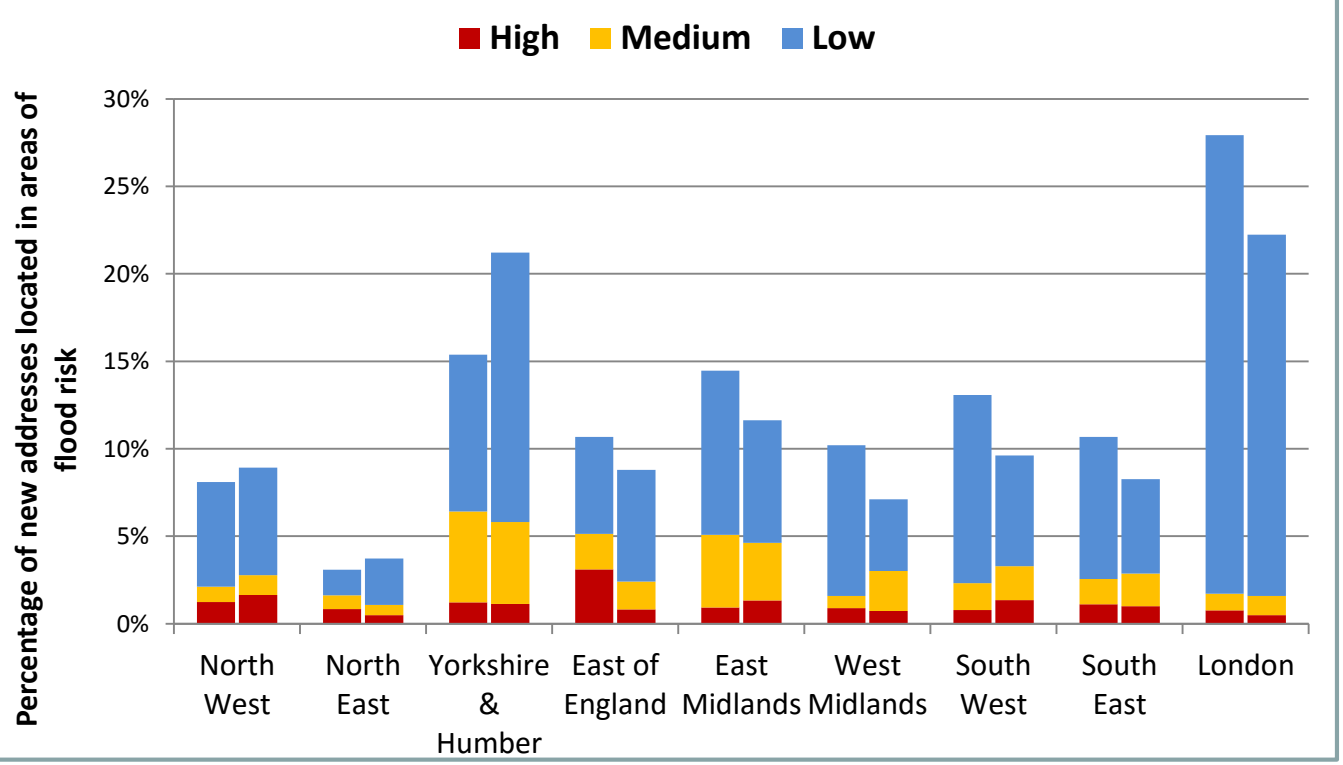
- An average of 12% of new residential addresses were created in areas at risk of river or coastal flooding between 2001-2008.
- The proportion declined to 11.3% between 2008-2014.
- An average of 1.1% of new residential addresses were created in areas with a high likelihood of flooding (>1:30 year) between 2001-2008.
- This declined to 1.0% between 2008-2014.

Notes: GIS mapping was used to identify the number of properties over four time periods (2001, 2008, 2011 and 2014). The data points for each year are November 2001, July 2008, September 2011 and May 2014. The total time series for this analysis is therefore 12.5 years. The data used was the Ordnance Survey Mastermap Address Layer. This gives the grid reference, type, address and other parameters for 27 million properties in Great Britain.

Source: HRW for the ASC (2015)

Proportion increased in northern England, but declined in the south/midlands

Proportion of new homes built in areas of flood risk - Regions	⇔	Proportion of floodplain development has increased in some regions, but declined in others



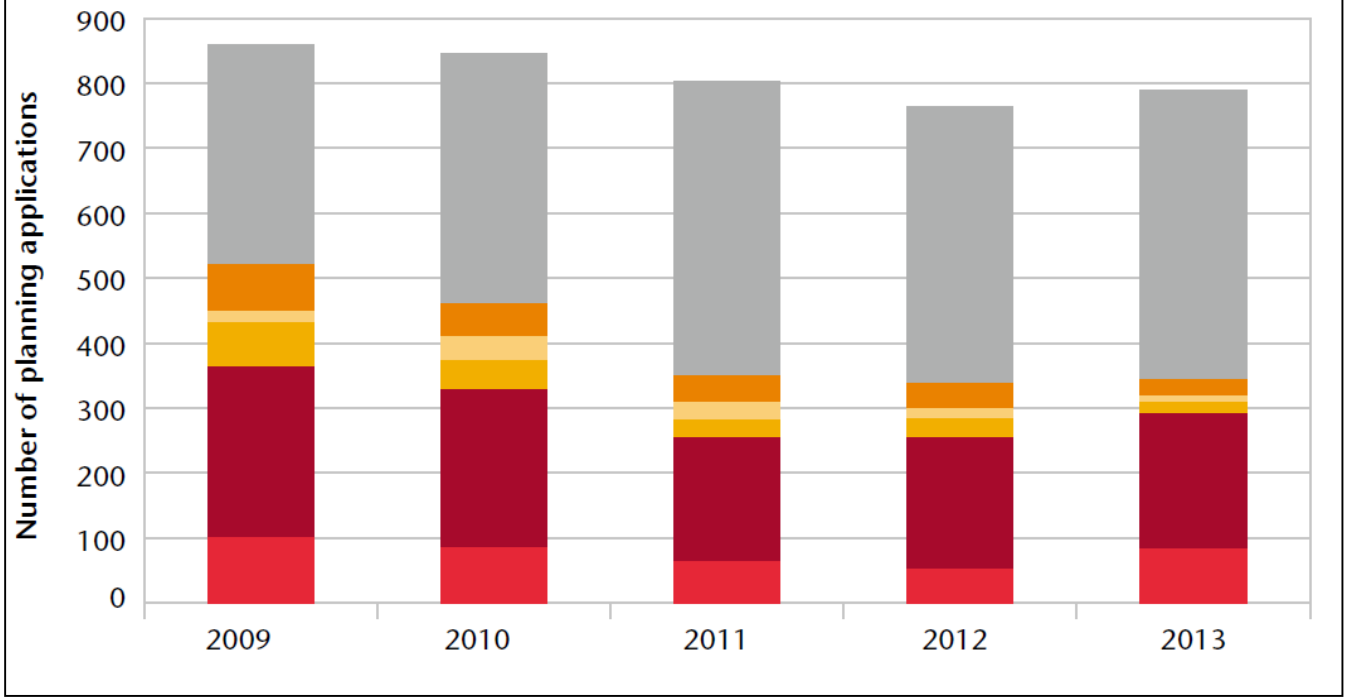
Notes: As above slide

- The proportion of floodplain development has increased in northern England but declined in the midlands and south.
- Some regions have seen development in high risk areas increase, e.g. from 1.2% to 1.6% in North West, from 0.8% to 1.4% in South West and 0.9% to 1.3% in East Midlands
- Other regions have seen development in high risk areas decline, e.g. 3.1% to 0..8% in East of England, or stay broadly the same.

Source: HRW for the ASC (2015)

One-third of development applications do not have satisfactory flood risk assessments

Reason for EA objections	⇔	Proportion of objections due to unsatisfactory FRAs has remained at around 30% of all applications



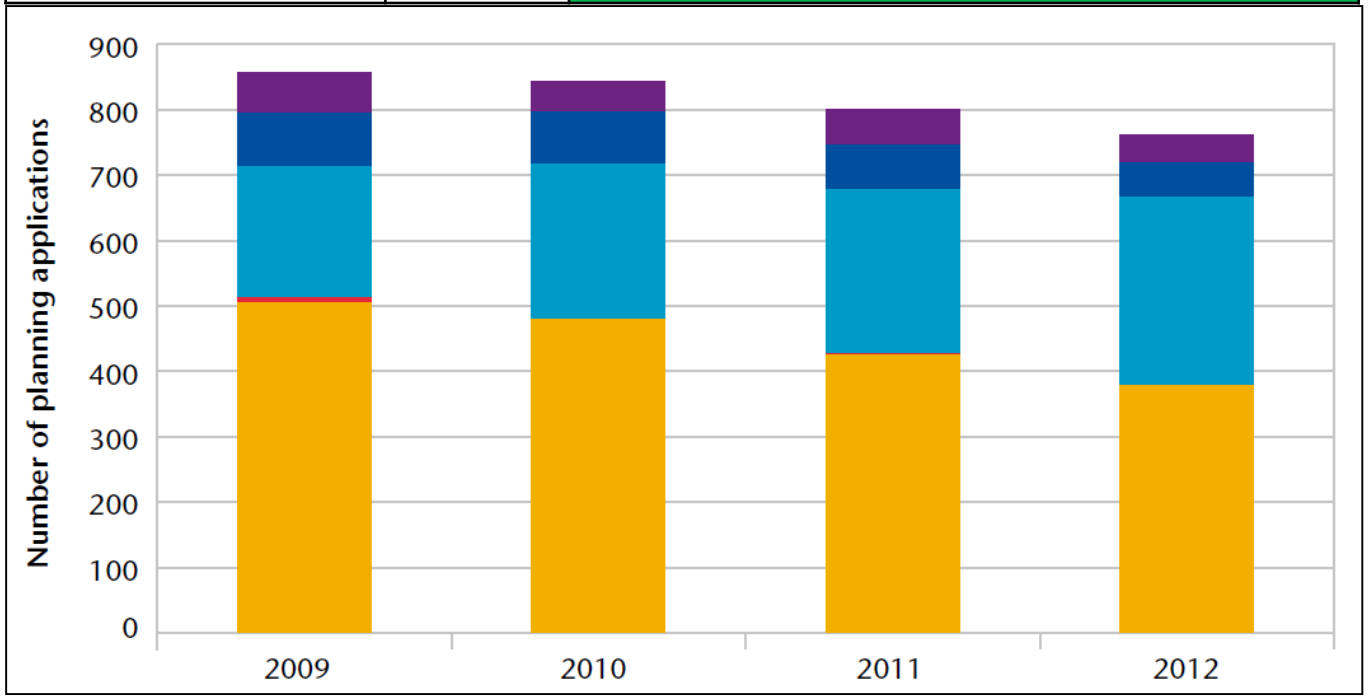
- In our sample in 2013, 11% of applications failed to produce a FRA, despite this being a requirement of planning policy.
- A further 26% were judged inadequate by the Agency.
- Common problems are due to developers failing to assess the risk of surface water flooding, and not taking account of climate change.

Notes: Based on a representative sample of 4,060 Environment Agency responses on flood risk grounds to planning applications made between 2009 and 2013 across 42 local authorities in England. The sample represents around 10% of the total number of flood-related responses made by the Agency over that period in England. The Agency objected to 1,697 of the 4,060 applications sampled. In some cases more than one reason was given for an objection, meaning that there were over 2,000 separate reasons for an objection overall.

Source: ASC (2014), page 47

Very few Environment Agency objections are ignored

Proportion of EA objections ignored	⇩	Very few applications going ahead against EA advice, although Agency not informed of outcome in high proportion of cases.



- Where the EA is informed of the outcome, their advice is adhered to by local planning authorities in almost all cases.
- There were only 11 applications out of the 3,000 we reviewed between 2009 and 2012 where a sustained EA objection was over-ruled by the planning authority (red in the chart). Almost all these instances were in 2009
- The Agency were not informed of the outcome in 41% of application sin our sample in 2013 (50% in 2009).

- Application withdrawn
- Permission refused
- Permission granted – provided EA conditions met
- Permission granted – contrary to EA objection
- Outcome unknown

Notes: Based on a representative sample of 4,060 Environment Agency responses on flood risk grounds to planning applications made between 2009 and 2013 across 42 local authorities in England. Data for 2013 (789 applications) is not included as a high proportion of applications had not been determined when the analysis was completed in 2014. The sample size is therefore 3,267.

Source: ASC (2014), p48

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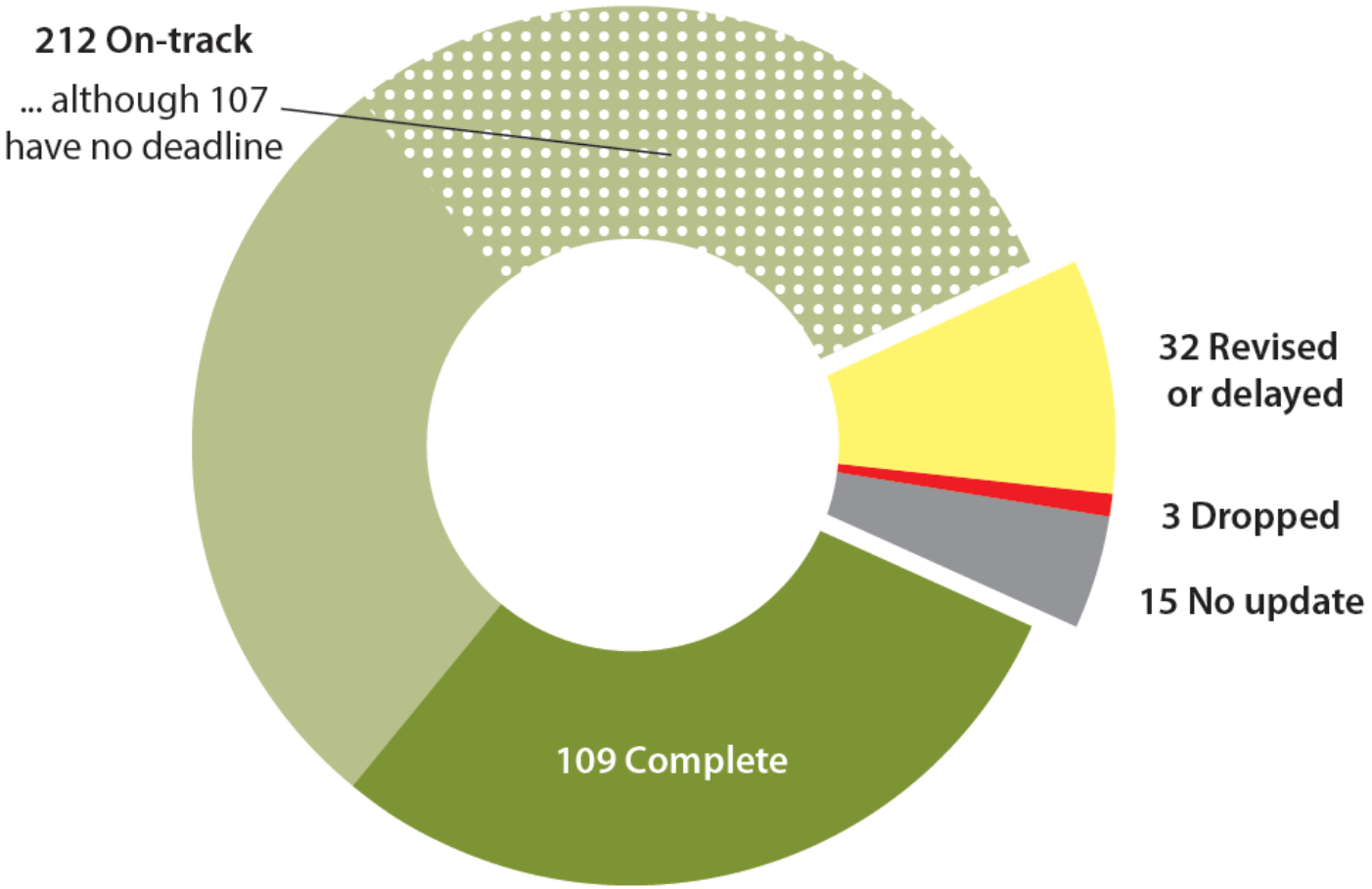
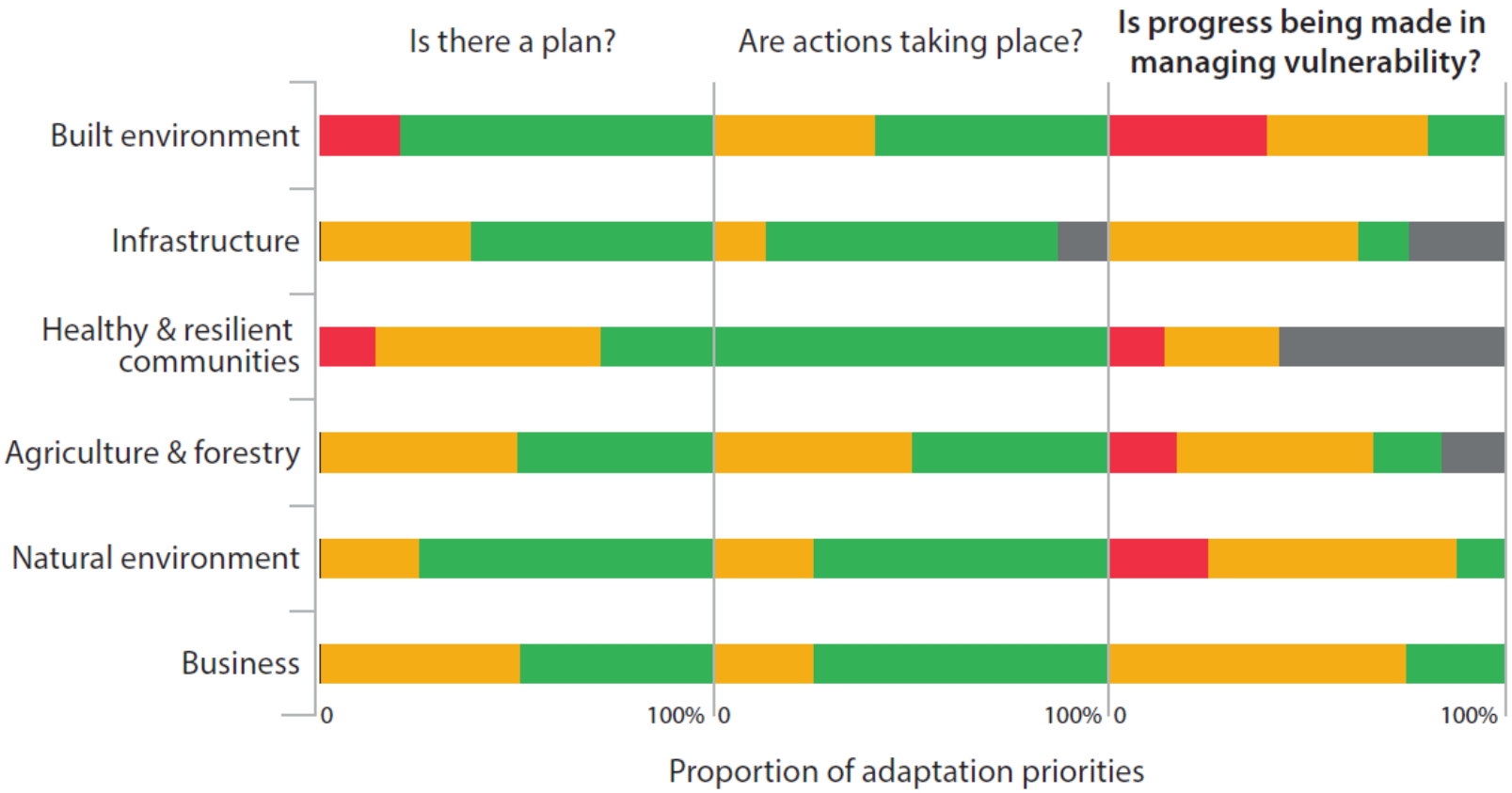
We found that majority of NAP actions are being delivered…



Source: ASC (2015) *Progress in preparing for climate change*

…but progress is not being made in managing vulnerability in many priority areas.



Green: plans are in place, actions are being delivered, progress is being made
Amber: adaptation priority has been partially addressed, some evidence of progress in some areas
Red: plans and policies, delivery of actions, or progress in addressing vulnerabilities, are lacking
Grey: insufficient evidence to form a judgement

Source: ASC (2015) *Progress in preparing for climate change*

We concluded that vulnerability is not being managed in six key adaptation priorities

Adaptation priority	Rationale for RAG assessment
Flood risk to existing properties	• 45,000 more homes projected to fall in to the highest flood risk category by the 2060s. • Pace of fitting property-level flood protection measures is slow • New flood insurance scheme may remove the financial incentive for flood alleviation
Surface water flood management	• Increasing trends in urban infill development and impermeable surfacing • Measures to promote SuDS in new development have been weakened. • Slow progress with local flood risk management strategies.
Overheating in buildings	• Vulnerability to the impacts of heat is increasing due to growing, ageing population. • Policies to increase air tightness and the insulation of homes could increase the risk.
Fertility of agricultural soils	• Soil organic carbon levels are deteriorating in arable soils. • Lowland peat soils continue to be lost and degraded, putting at risk some of England's most productive agricultural land.
Resilience of biodiversity to climate change	• Long-term and on-going declines in species diversity due to fragmentation, pollution and adverse management practices • This will make it harder for species to adapt to changes in climate space.
Condition of peatlands	• Peatlands are losing carbon to the atmosphere and to rivers/reservoirs • Burning for grouse-shooting continues, including on internationally-protected sites. • Progress in restoring degraded peatlands is not on-track to meet targets set in the England Biodiversity 2020 strategy.

We made 44 recommendations to Government where policy needs strengthening

Adaptation priority	Summary of recommendations
Flood risk to existing properties	• Develop a strategy to address the increasing number of properties in areas of high flood risk • Ensure Flood Re insurance scheme includes clear proposals for promoting flood risk alleviation amongst high risk households.
Surface water flood management	• Remove the automatic right to connect new development to sewers • Improve local flood risk management arrangements. • Make water companies statutory consultees on planning applications
Overheating in buildings/urban areas	• Introduce a standard to reduce the risk of new homes overheating. • Develop incentives to promote passive cooling in homes, hospitals, etc. • Adopt and deliver a goal to reverse losses in urban greenspace.
Fertility of agricultural soils	• Publish an action plan to deliver aspiration for all soils to be managed sustainably by 2030 • Ensure existing regulations for soil protection are enforced
Resilience of biodiversity to climate change	• Publish action plan for improving condition of protected sites and restoring degraded habitats • Ensure new agri-environment scheme delivers coherent ecological networks that will help biodiversity adapt to changes in climate
Condition of peatlands	• Take action to deliver the widespread restoration of degraded peatlands • Review consents for burning on protected sites • Review whether agri-environment schemes are funding damaging practices.

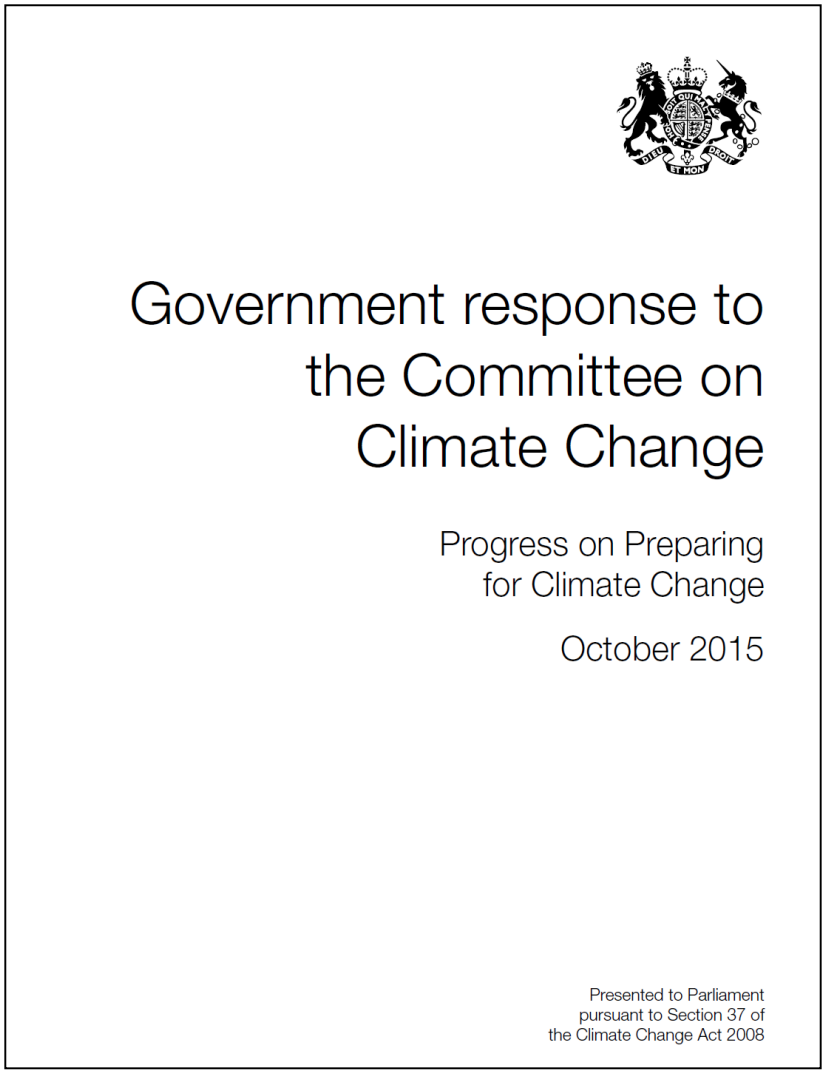
We found insufficient evidence to make a judgement in seven adaptation priority areas

Adaptation priority	Is there a plan?	Is progress being made?	Rationale
Ports and airports			There is very little data on the impacts of severe weather on ports and airports and the scale of action being taken in response.
Digital infrastruc-ture			IT, communications, and data processing and storage operations, should be inherently resilient, but there is no evidence from the industry or from the Government to support this assertion.
Pathogens, air pollution, UV radiation			It is difficult to assess how the combined effects of climate change, demographic change, behaviour of the population, and changes in land use, are altering exposure to these hazards.
Health and social care system			No data currently on what magnitude of extreme weather is being planned for by health and social care service providers, and what specific measures are being put in place to manage risks.
Emergency planning system			Information is lacking on capabilities and levels of local resilience to extreme weather events. There has been no assessment of the overall impact on emergency service capabilities from declining resources, and there is no independent scrutiny of local plans.
Peoples' ability to recover from flooding			There is little evidence of the long-term impacts on individuals' health and well-being arising from flood events. It is also not possible to assess whether the steps being taken will mean people will be able to recover from flooding more quickly in future.
Agri/forestry pests and diseases			The effects of climate change on the incidence of specific pests and diseases in England are highly uncertain.

We also made number of recommendations for improving the next NAP due in 2018

- **Set clear priorities for adaptation**: to make sure the most important and urgent issues are being addressed.
- **Ensure objectives are specific, outcome-focused, and measurable**: focus on priority outcomes, rather than describing processes and activities.
- **Focus on the core set of policies and actions**: that will have the biggest impact, with specific goals, responsibilities and timing.
- **Build local community and business engagement:** to ensure a range of organisations continue to help with delivery.
- **Introduce effective monitoring and evaluation:** to allow progress to be measured and policies strengthened, if need be, to make sure objectives are being achieved.

Government responded to ASC's report in October 2015



- Government response to ASC's recommendations was presented to Parliament on 15th October
- Accepted recommendations on improvements to next NAP
- Agreed with number of specific policy recommendations, including:
  - Improving local flood risk management
  - Reforming abstraction regime
  - Reviewing consents for burning peatlands
- Agreed in principle with some recommendations, but did not think any further action is needed
- Disagreed with some recommendations, including:
  - Developing strategy to address increasing number of homes at high flood risk
  - Removing automatic right to connect new development to sewers for surface water

Contents

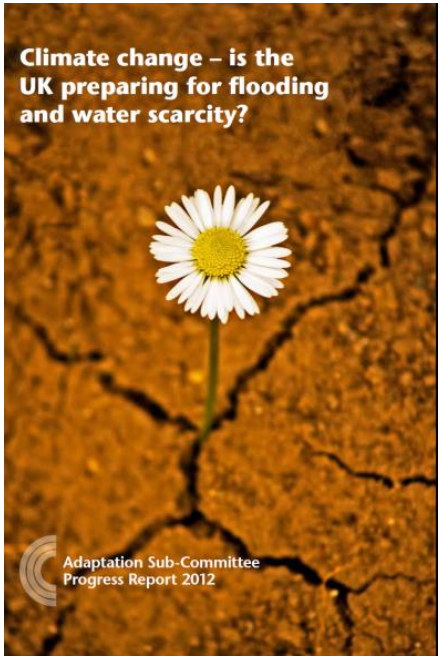
1. Risks and opportunities from current and future climate change
2. Adaptation policy framework
3. Approach to monitoring and evaluating progress with adaptation, including use of indicators
4. Key findings from CCC's 2015 progress report
5. Key challenges

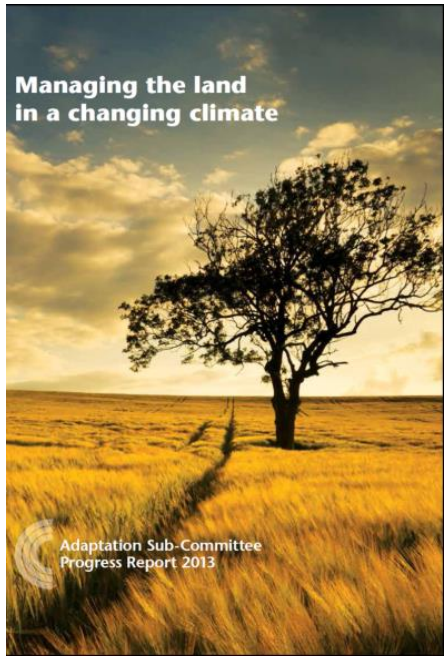
Key challenges

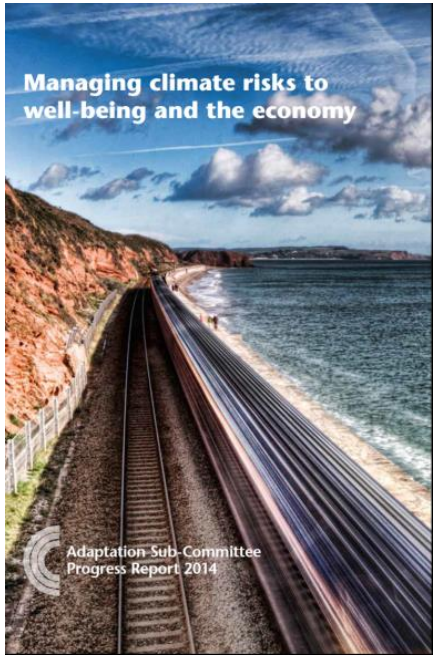
1. Political will to assess progress
2. Setting measurable outcomes/targets
3. Identifying relevant trends/factors to assess with indicators
4. Having the data available to assess key trends/factors

For further information

- Reports available at: http://www.theccc.org.uk/publications/







- Evidence report for CCRA2: **July 12th 2016**
- Progress report for Scotland**: 30th September 2016**

Next UK progress report: **30th June 2017**

Adaptation Sub-Committee

http://www.theccc.org.uk

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