

# Flood Hazard and a Changing Climate

Adapting to change, changing to adapt

**XVth World Water Congress**  
**Edinburgh, 27 May 2015**

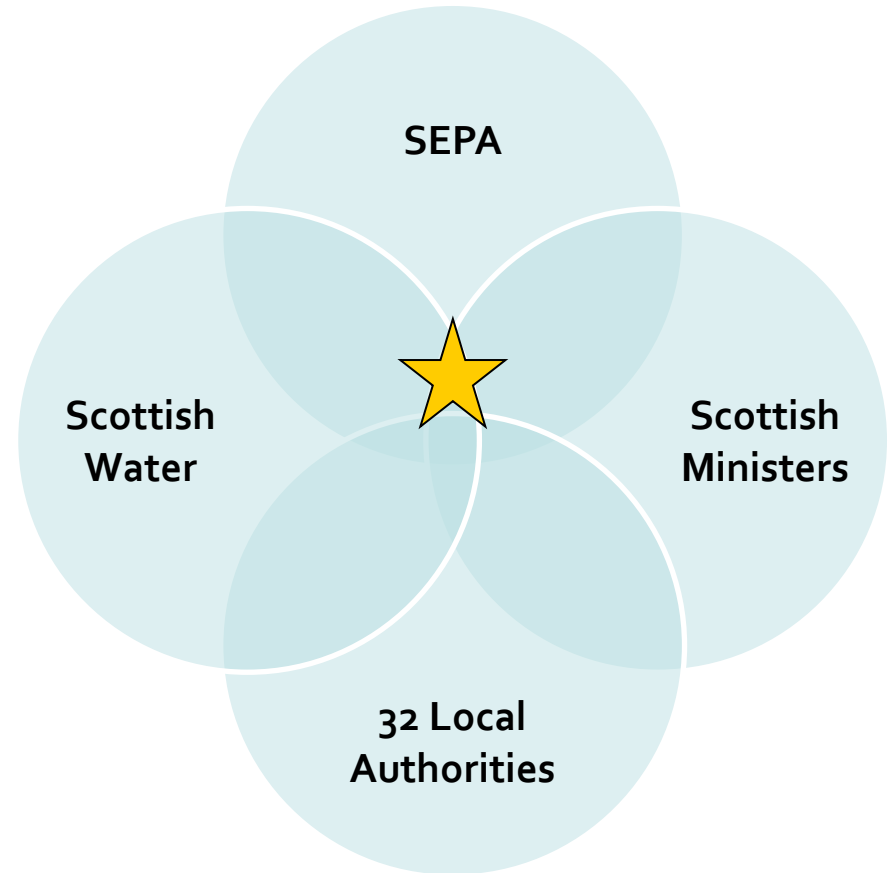
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# Content

- Overview of FRM & CC in Scotland
- Consideration of the challenges in adapting to climate change
  - New information
  - The need for new practice

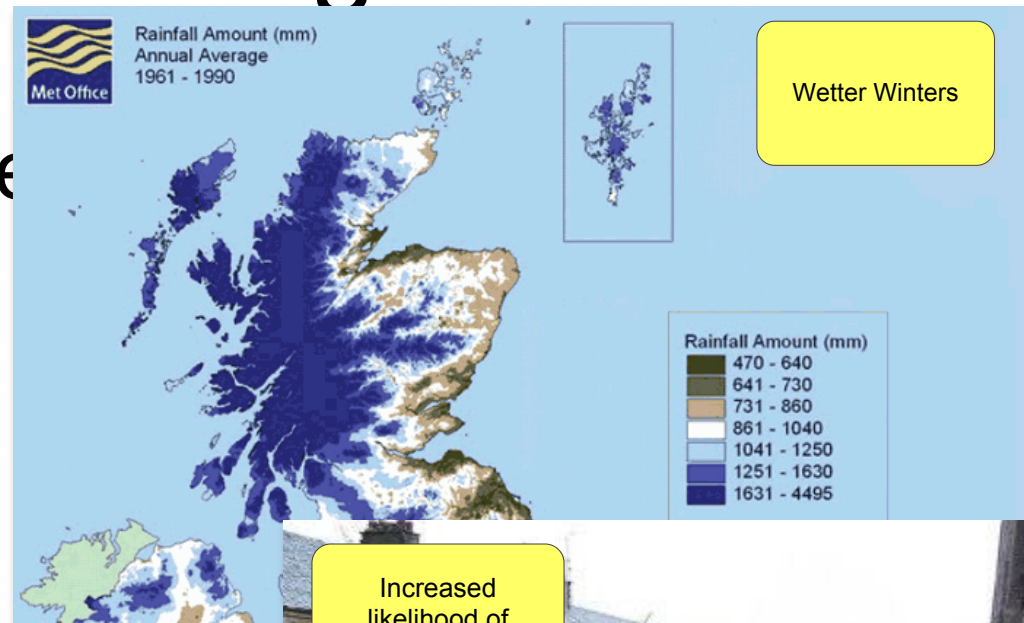
# SEPA - Overview

- Scotland's environmental regulator
- Central role in flood risk management
- Ambition: low carbon, resilient Scotland
  - Climate Change (Scotland) Act 2009

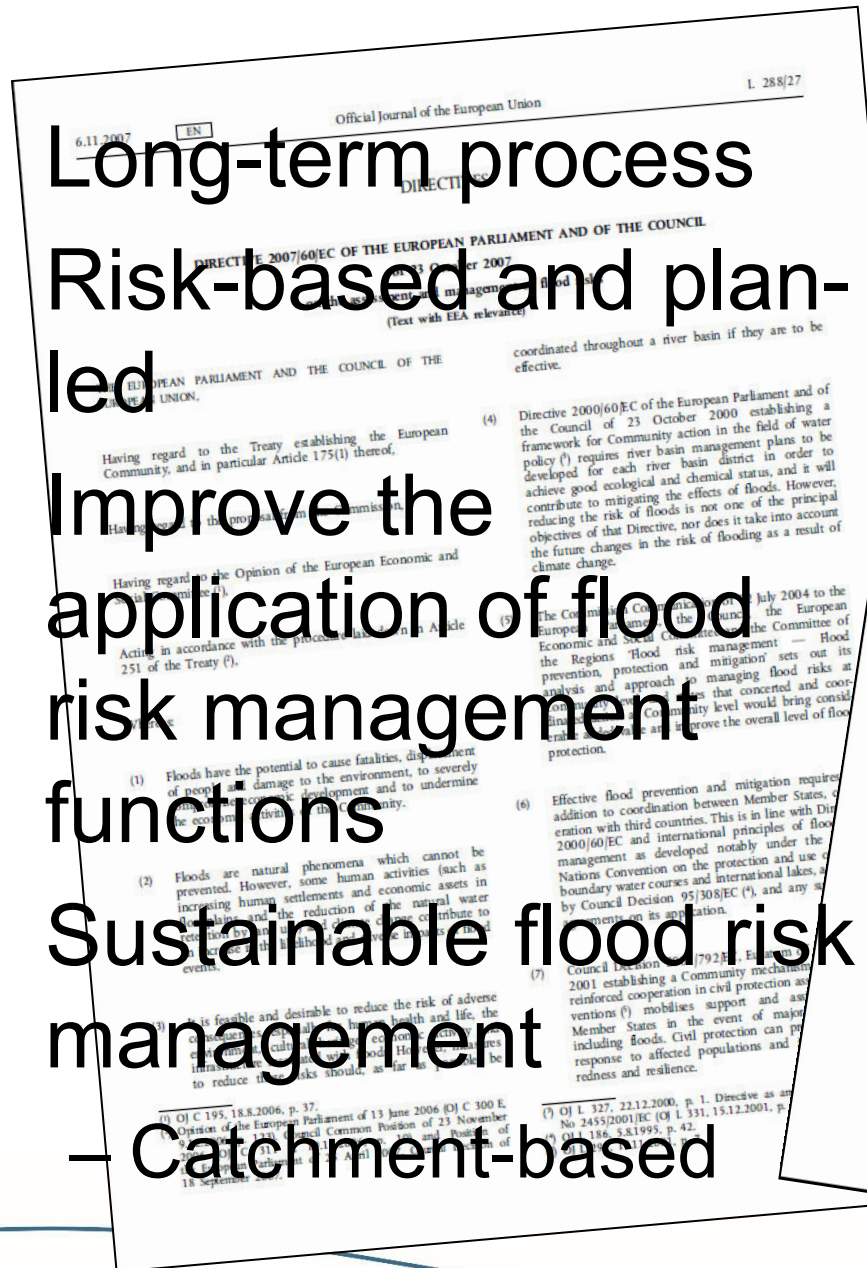


# The Challenges

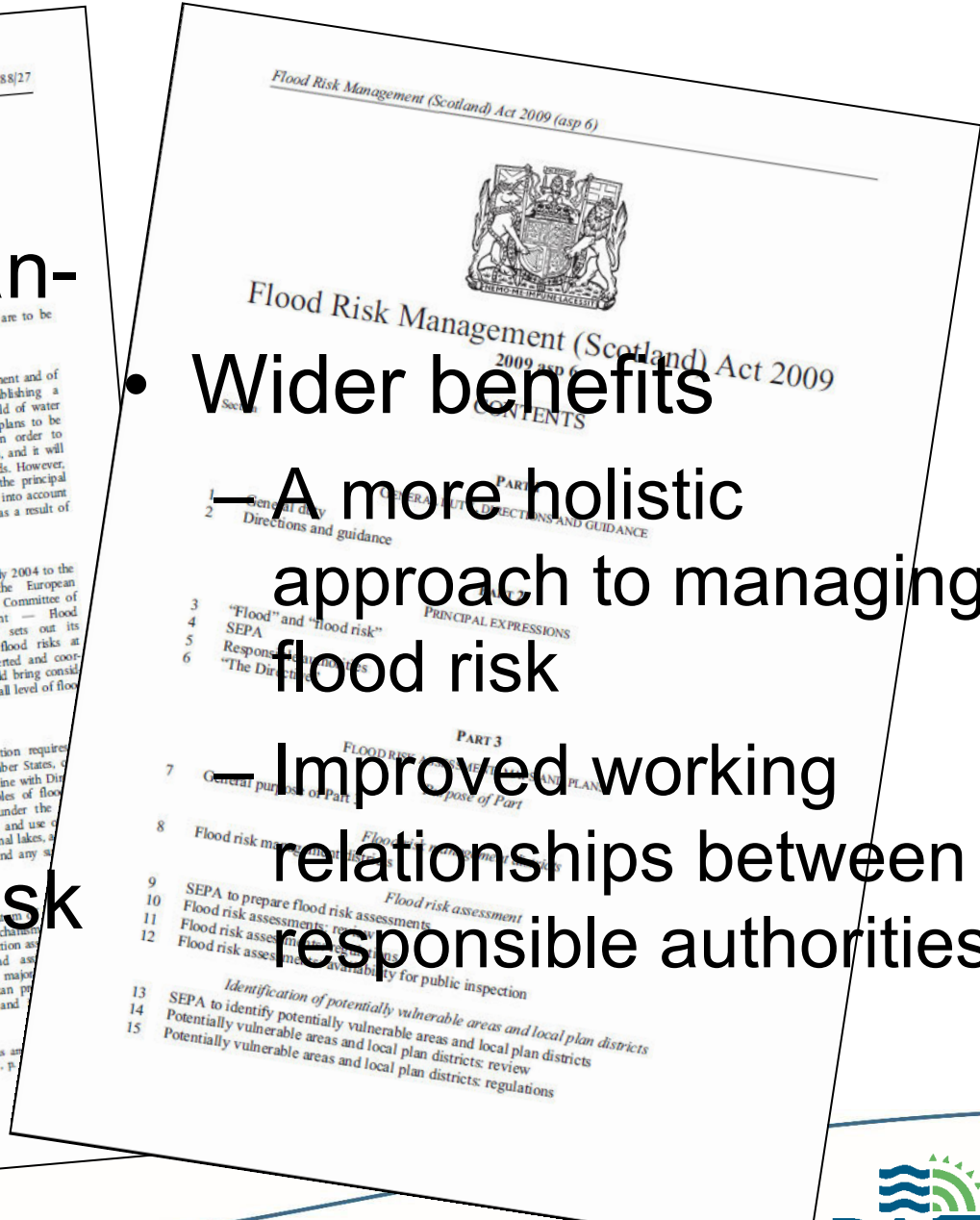
- To adapt to climate change
  - Adapt to future conditions
- To change managers approaches to climate change information



- Long-term process
- Risk-based and planned
- Improve the application of flood risk management functions
- Sustainable flood risk management
  - Catchment-based



- Wider benefits
  - A more holistic approach to managing flood risk
  - Improved working relationships between responsible authorities





# Adapt to a Changing Hazard

## Floods Directive/FRM Act Delivery

Consultation Hub Find Consultations

### Flood Risk Management Planning in Scotland

Welcome to the consultation on Scotland's first flood risk management plans.

The Scottish Environment Protection Agency (SEPA) and 14 local authorities are jointly consulting on the future direction and delivery of flood risk management in Scotland. Together, we are focusing on where the flooding impacts are greatest and where the benefits of investment can be maximised. Our goal is to move away from reacting to the latest flood, to investing and preparing in advance with a wide range of actions. Doing so will reduce the distress caused by floods and significantly lessen their economic impact.

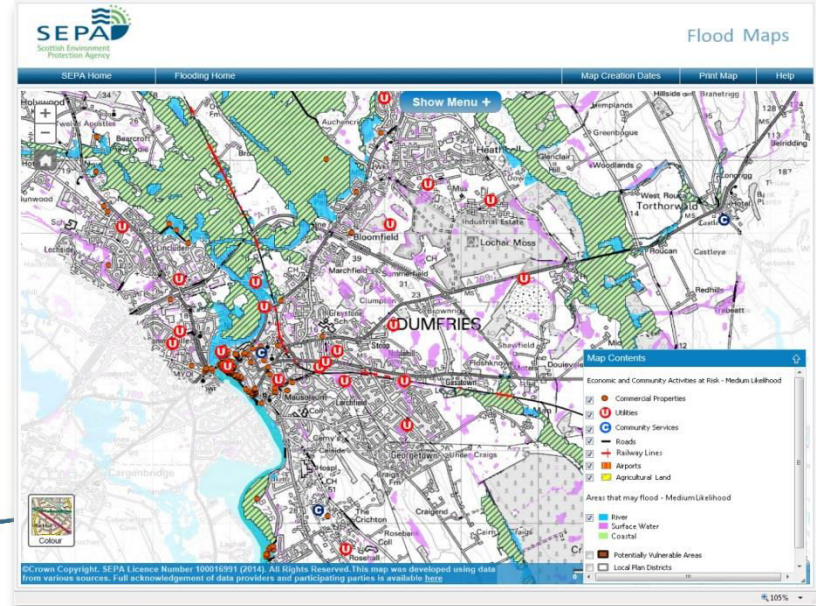
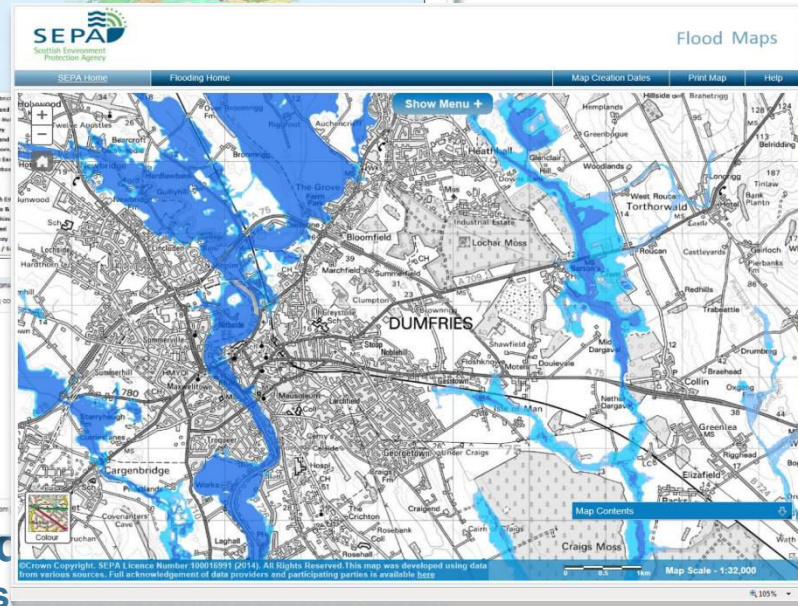
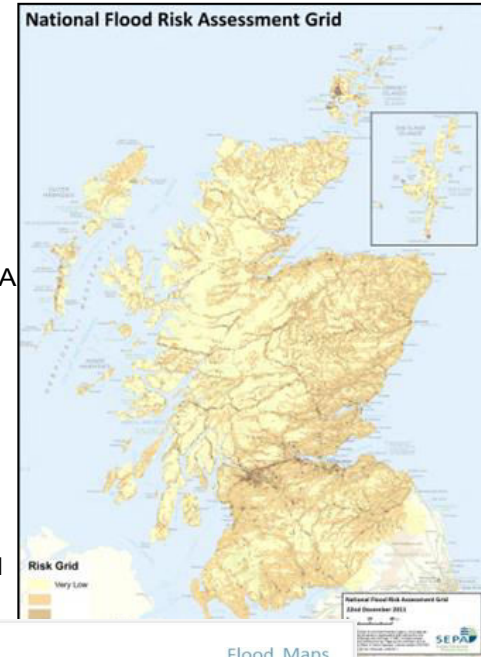
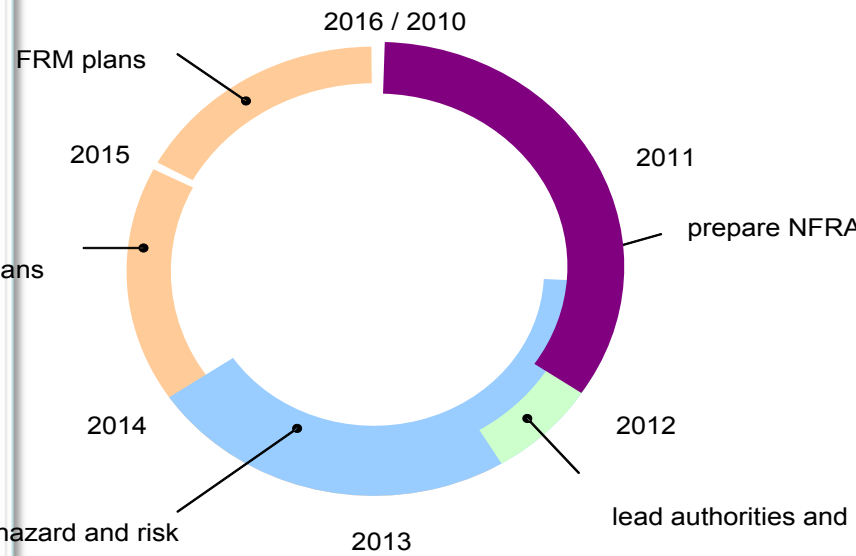
In December 2015, following feedback from this consultation, SEPA will publish a Flood Risk Management Strategy for each of the 14 Local Plan Districts covering Scotland. These strategies will confirm the immediate priorities for flood risk management as well as set out the future direction to be taken by all flood risk authorities.

Shortly afterwards in June 2016, the lead local authority in each Local Plan District – on behalf of all 32 local authorities in Scotland – will publish delivery plans clearly setting out how flood risk will be managed, coordinated, funded and delivered between 2016 and 2022. The 14 lead local authorities are Aberdeenshire Council, Angus Council, Dumfries and Galloway Council, Edinburgh City Council, Glasgow City Council, Highland Council, Moray Council, North Ayrshire Council, Orkney Council, Perth and Kinross Council, Scottish Borders Council, Shetland Council and Stirling Council.

We welcome views on these important plans from everyone – from individuals and businesses at risk of flooding, from interested community groups as well as from those organisations with an interest in how flood risk is managed and delivered.

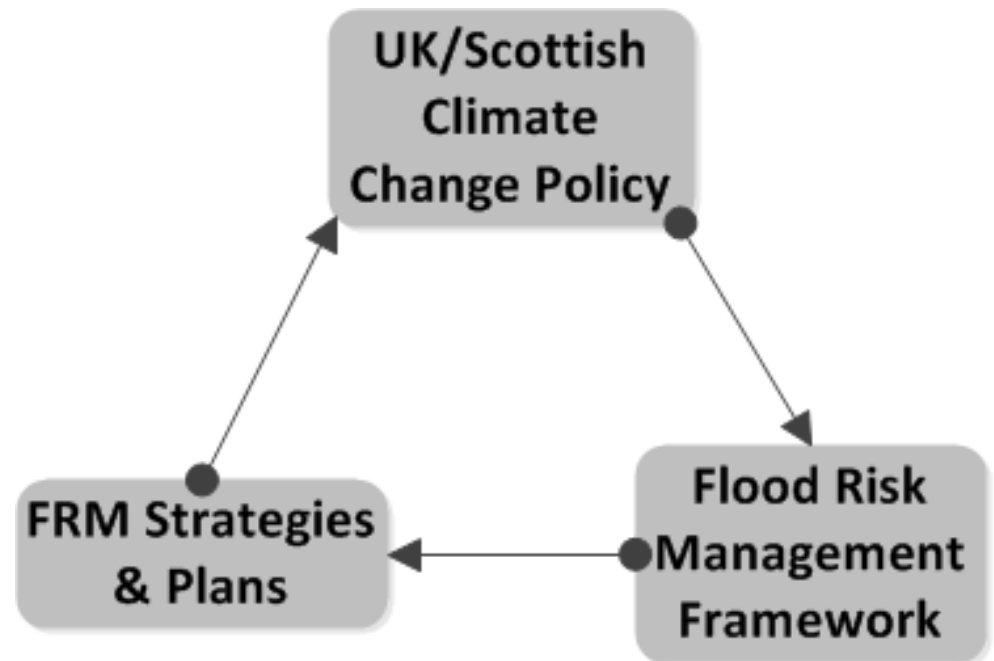
#### Local Plan Districts

#### FRM plans



# FRM & Climate Change

- Explicit consideration of climate change in legislation:
  - NFRA
    - Future floods
  - Flood Hazard Maps
    - Suite of scenarios
  - FRM Strategies
    - Long term planning



# FRM: Holistic Approach

- Catchment focus
- Break-down of flood risk
  - Hazard, Exposure, Vulnerability
- Open consideration of uncertainty
- Extensive collaboration

At odds with the 'traditional' approach to considering climate change

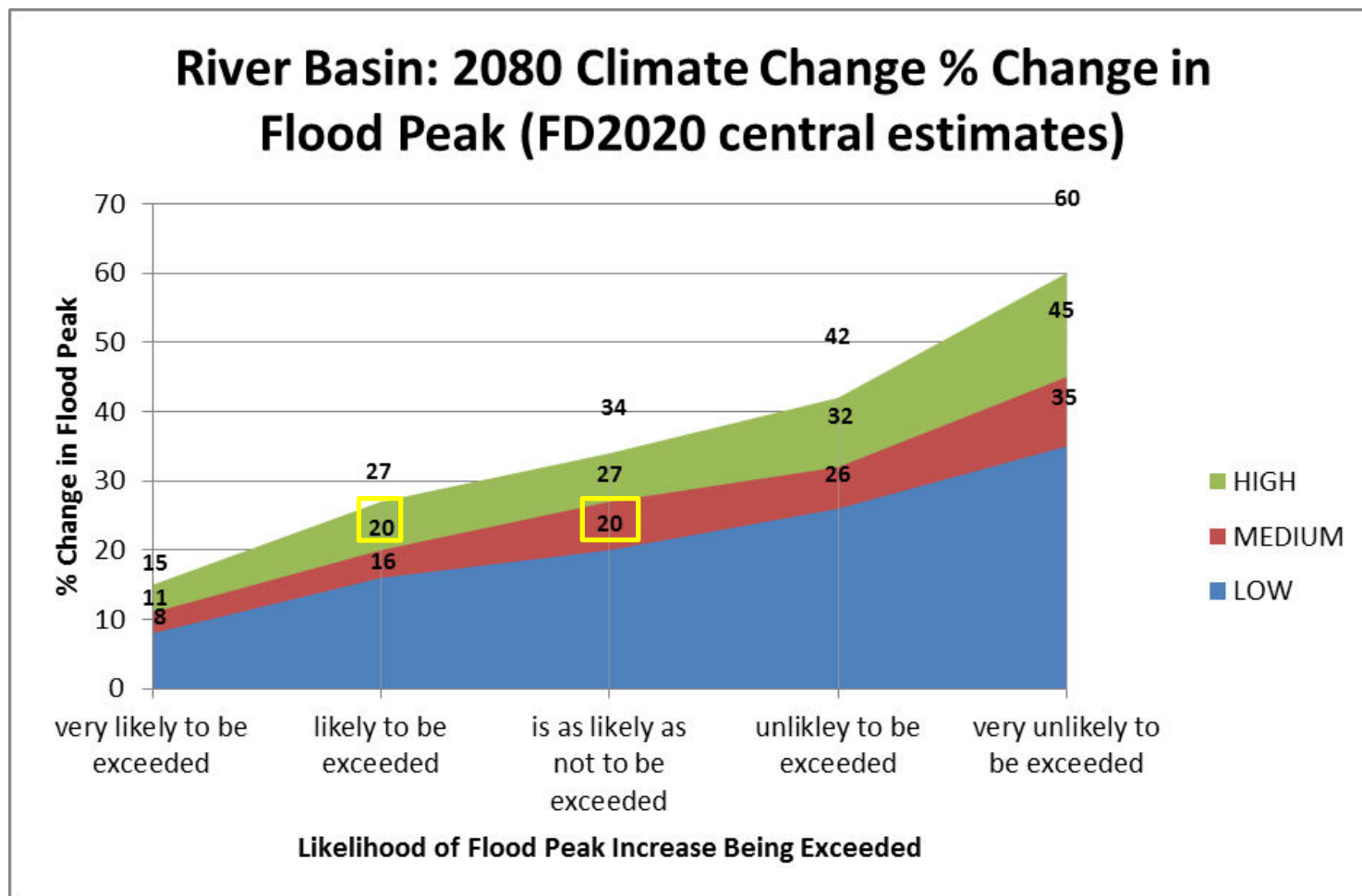


# Current Approach to CC Info

	Uplift	Application	Scale
Fluvial	+20%	Peak Flow	National
Coastal	+250mm-400mm	Still water level	Local
Pluvial	+20%	Peak rainfall	National

- Straightforward
- Easily embedded in language
- Initially conservative?
  - But 10-20 years ago
- Still appropriate?

## Changing Attitudes



# Can we change?

## New information

- UKCP09
- Specific assessment of impacts
- Regional focus

## New Mindset

- Willingness to change
- More flexible approach (FRM)
- Risk-based approach now embedded

# Climate Change Metrics for Flood Hazard

- UKCP09
- Assessment based on a 25km grid
- Data available for river basins

a) UKCP09 25km grid

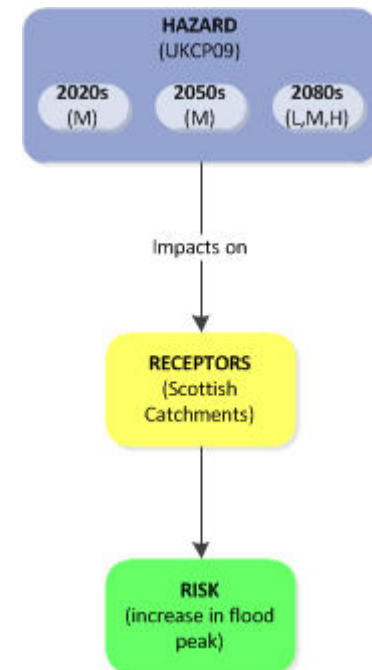


b) UKCP09 river-basin regions



# New Information

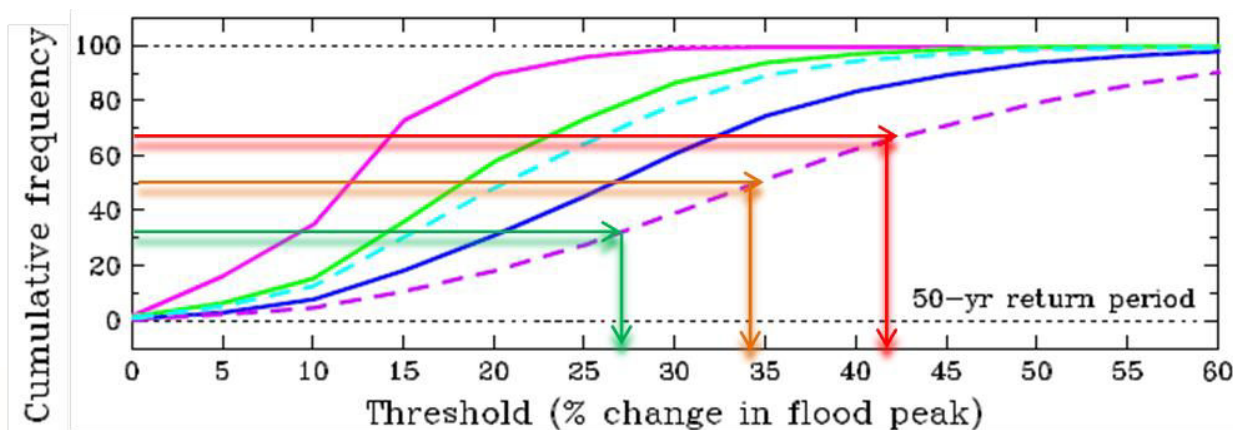
- 2011: CEH study for SEPA
  - Build on previous studies
    - Catchment response type
    - Estimates of the impact of climate change on flood flows
- 2050s, 2080s a focus
- Probability range
- Reflect regionalised impacts
  - Consider current uplifts





# Estimate of the impact of climate change on flood flows

Emissions Scenario	Time Horizon	Likelihood of a Flood Peak Increase Being Exceeded (%)	Exceedence Description
High	2080	10	Very likely to be exceeded
		33	Likely to be exceeded
		50	Is as likely as not to be exceeded
		67	Unlikely to be exceeded
		90	Very unlikely to be exceeded



# Guidance Development

Emissions Scenario	Time Horizon	Percentile	Impact (% increase in flow)
High	2080	90	50
		67	40
		50	30
		33	20
		25	10

- Establish context
- Sensitivity analyses
- Risk-based decision-making

# Future

- Apply the 'FRM approach' to climate change
- Embed the new information
- Seek to embed a new, flexible consideration of impacts
  - Discussion
  - Willingness to change approach

Changing Attitudes

# Encourage a New Approach

Flexible  
decision-  
making  
framework

Changing Attitudes

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Flexible  
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Increased  
Engagement



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Increased  
Awareness

Changing Attitudes

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Increased  
Awareness

Demonstrate  
Application

# Summary

- Communication challenge
- Understand each other
- Demonstrate change (evidence)
- Change is constant!
  - Climate impacts: adapt to new conditions
  - Managers: adapting to new modes
- Effective flood risk management
  - Adapt process and practice to meet new climate context

# Thank you.

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