

## **SESSION III: Pop-Up Talks**

- 1) Simon Collander-Brown, DSTL**
  - 2) Anant Prakash, BP**
  - 3) Simon Cook, Southern Water Services**
  - 4) Rosalind West, DEFRA**
- Specialist: Jan Kwakkel**



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# Problem Statement

- How do we plan for the Future Requirements for Defence?
- Complexity of problem
  - Uncertain context
  - Knowledge of system is incomplete
  - Some systems are inherently uncertain
  - Systems change in response to our decisions
  - Systems change in response to other peoples decisions
  - Others may be trying to play the system to gain advantage
  - Others may be trying change the system to gain advantage

# Approach

- Currently use “scenario” planning
  - Build small numbers of plausible futures
  - Complex analysis to identify which factors drive outcomes
    - Any shortfalls in capability
  - Process designed to tie in key decision makers

# Results and Feedback

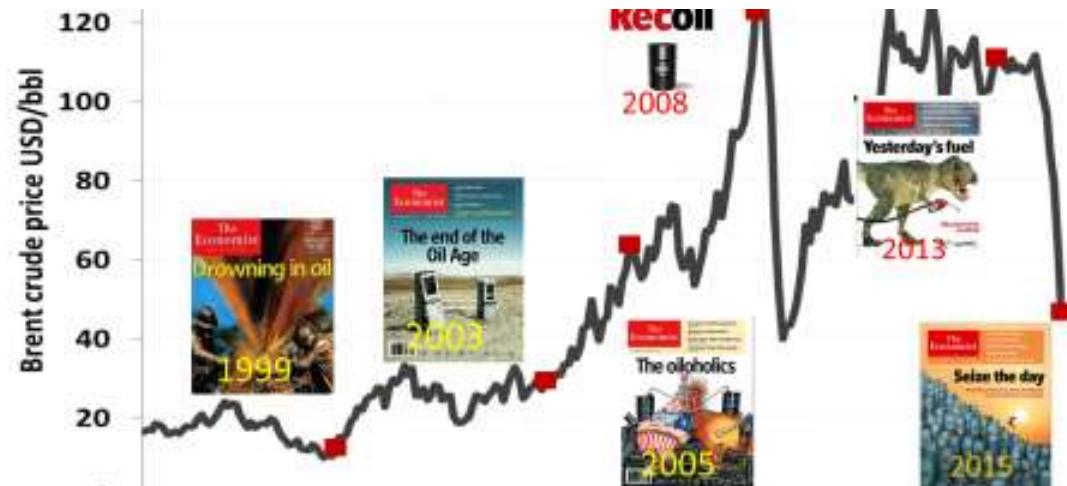
- Current method gives useful results
  - Slow
  - Expensive
  - Doesn't deal with uncertainty well
- Other methods being examined
  - Generally for simpler systems
    - Shorter time frames
    - No or constrained opposition
- Want to test hybrid methods in near future

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# Problem Statement



- What problem did/does your organisation face?
  - Planning price, or oil price assumption
- How was/is this problem complicated by elements of uncertainty?
  - Uncertainty of oil price
  - Risk of sub economic investments and projects
  - Plenty of scenarios, forecasts, predictions and forward strips available – but huge range.
  - Strategic complications – Commitment to dividend. Changing Geopolitics. Sector deflation.
  - Time horizon for typical oil and gas investments to turn cash flow +ve is 8-10 years

# Approach

- How did/does your organisation make decisions in light of the uncertainty it faces?
  - Bottom up analysis
  - Price and profit calculations for various assets
  - Deterministic calculations and sensitivities
  - Development of scenarios, portfolio analysis

# Results and Feedback

- What decision did your organisation make, and how was this informed by the preceding uncertainty analysis?
  - Allocation of capital: Projects, workforce, capex, opex
- What challenges or limits did your organisation experience in implementing the decision-making process?
  - Uncertainty on realisations
- How were the results of the decision-making process communicated to the ultimate decision makers/insiders/shareholders/public etc.?
  - Complex analysis. Simple charts.
- How could your decision-making process improve?
  - Faster analysis and turnaround, less complexity. Probabilistic considerations.
- How can the research community support improvements in your decision-making process?

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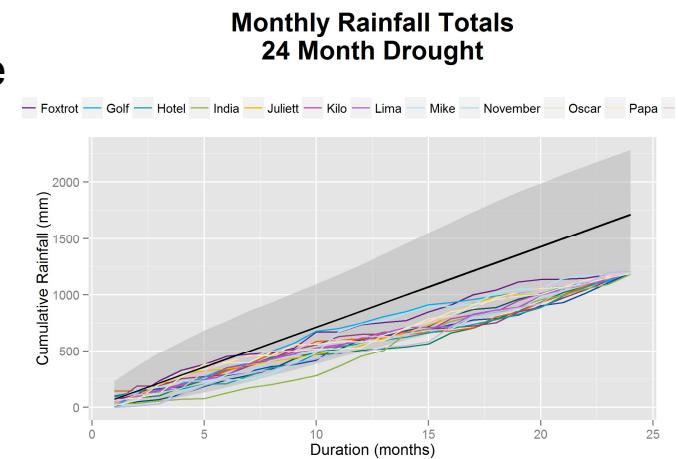
# **Risk and Uncertainty for Water Resource Planning**

**Simon Cook**

# Problem Statement



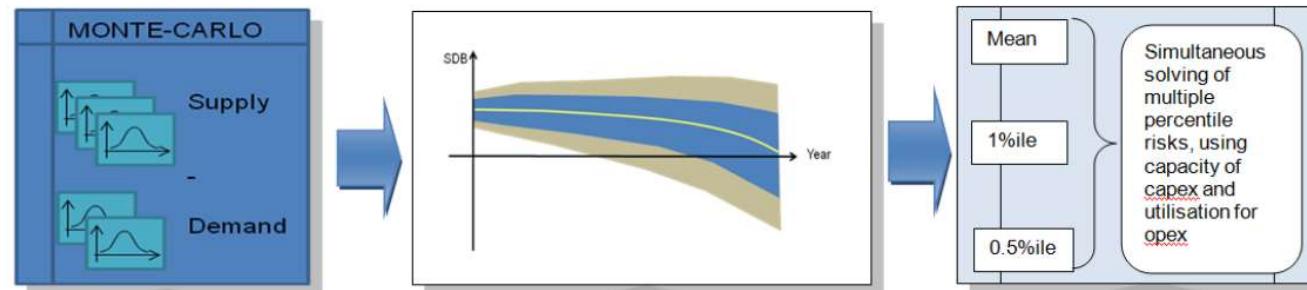
- Southern Water have a statutory obligation to produce a Water Resource Management Plan for a minimum of the next 25 years
  - Weather Variability and Drought
  - Climate Change
  - Impacts of New Technology
  - Source Behavior and Lack of good historic observations
  - Water Quality
  - Forecasts of Demand (Population Growth, Development, behavior)
  - Environmental Impacts
  - Limits of Resource Models (Data, Computing Power)
  - What Options are Available
  - Where and how should we invest for the future



# Approach



- Adopted a stochastic Approach to Weather Variability (Rainfall)
- Multiple Climate Change Scenarios (Perturbations)
- Multiple Growth Scenarios for Demand
- Integrated Monte Carlo Approach for Supply/Demand Balance
  - Target Headroom
  - Accounts for all major sources of uncertainty
- Investment model reflects multiple states of the world
  - Dry, Normal, Intermediate
- Investigated a Real Options approach for no regret investment
- Statutory Consultation Period + Informal engagement with regulators and stakeholders



# Results and Feedback



- Weather Generator wasn't perfect (PET and Bias correction)
- Technically Difficult / Harder to communicate
- High degree of challenge from regulators
  - New and advanced techniques (lack of acceptance/confidence)
  - Southern Water were going it alone
- Approach has informed guidance for next set of Water Resource Management Plans for all companies
  - Better Accounting for uncertainty and risk
- Future Plans
  - Further develop and extend the approach
  - Improve estimates of Resilience (Reliability and Failure models)
  - Extend real options,
    - Better capture customer and environmental preferences
  - Better Environmental Forecasting
    - Sustainability and Resilience

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Department  
for Environment  
Food & Rural Affairs

# **Identifying priority risks in the 2<sup>nd</sup> Climate Change Risk Assessment (2017)**

**Dr Rosalind West  
Defra Climate Change Adaptation Team**

**With thanks to Kathryn Humphrey & the  
Adaptation Sub-Committee of the Committee on Climate Change**



# Problem Statement

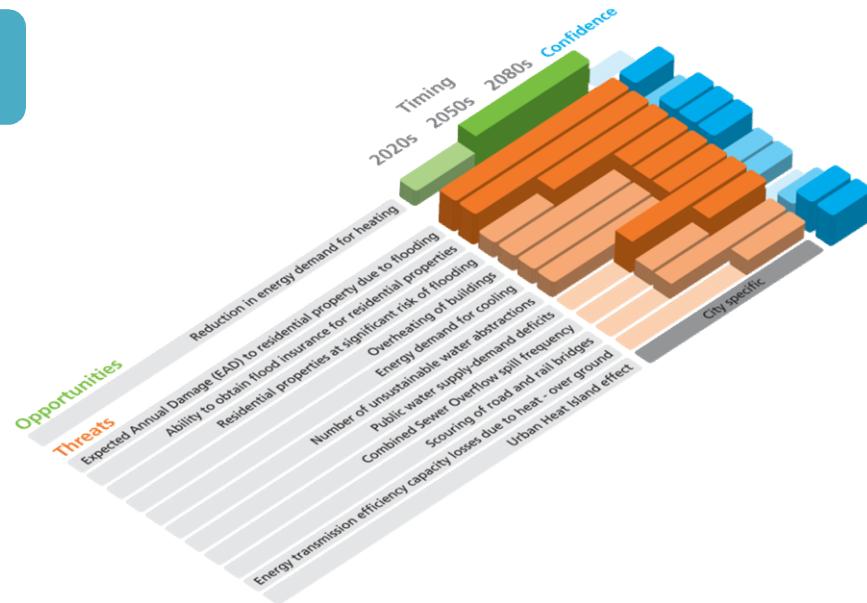
- ***The Problem:*** How to identify the **most urgent risks** from climate change for government to consider in the next five years.
- ***Uncertainties*** at every stage:
  1. Assessing the **current and future level of risk**
  2. Estimating the **effect of planned and autonomous adaptation on residual risk**
  3. Assessing **benefits of action in next 5 years**
- ***Outcomes*** affect national adaptation plans of the UK government and devolved administrations



# UK Climate Change Risk Assessment

## CCRA 1 (2012)

- 100+ risks and opportunities from climate change in the UK.
- Large programme of **external evidence and research work**
- 11 sectors



## CCRA 2 (2017)

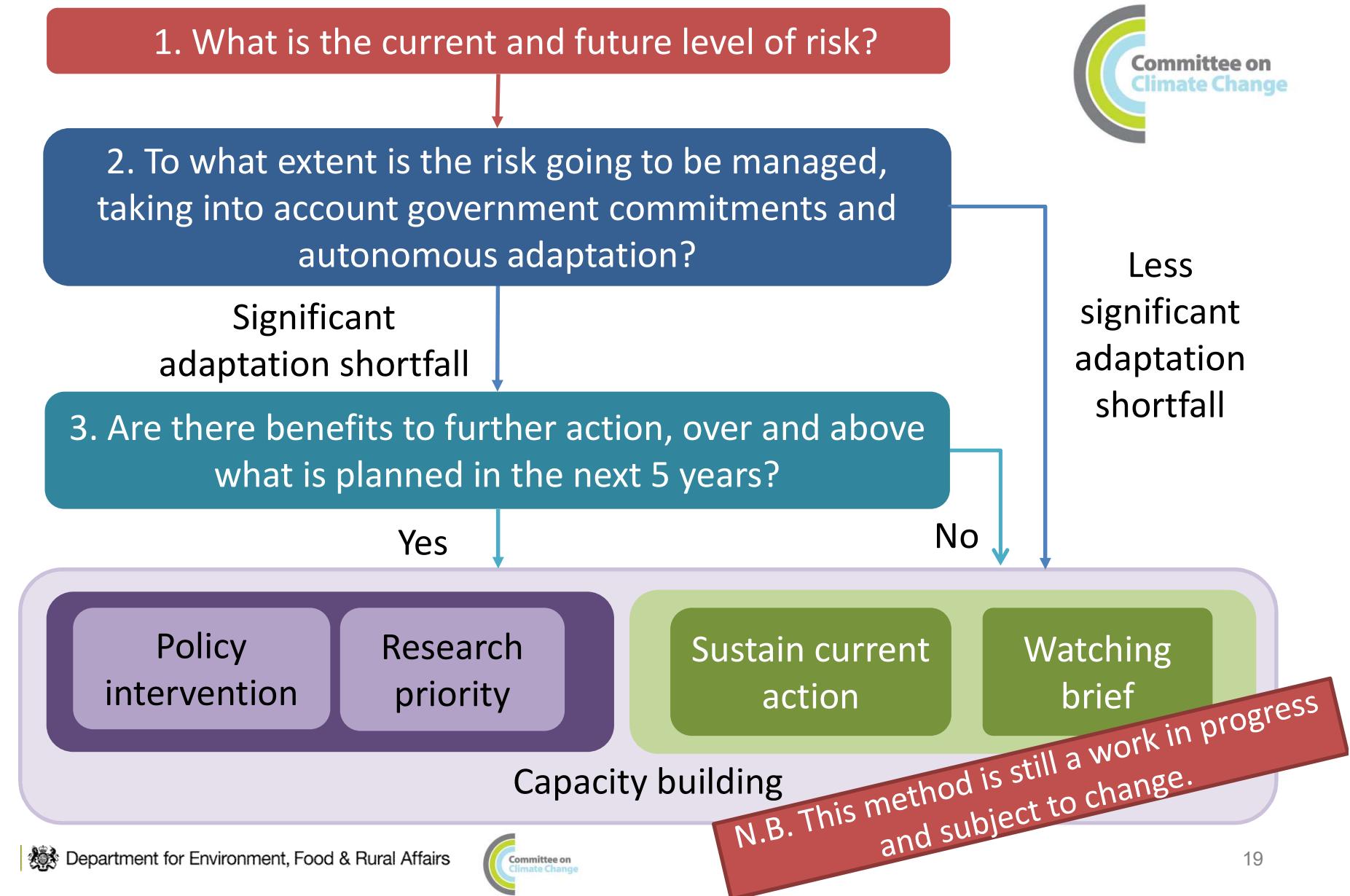
- Identify policy areas:
  - **with barriers to adaptation** and/or
  - where adaptation is **most urgent** during 2017 – 2022

## Key issues for CCRA 2:

- How climate interacts with **socio-economic factors** in affecting risk
- How the **effects of adaptation actions** are/could alter risk levels
- How **climate change overseas** could affect the UK



# ASC's approach to urgency scoring





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Food & Rural Affairs

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