



Scotland Case Study

Incorporating uncertain scientific evidence into
real-world adaptation decision making: what are
the missing links?

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Overview

- Introduction
- Method
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Introduction

Aim:

To work with decision-makers to improve understanding of the impacts, risks, vulnerability and adaptation options associated with high-end climate and socio-economic scenarios for the rural economy of Scotland, including interactions between key sectors such as forestry, agriculture, water and tourism.

Theme:

Land resource management, including: forestry; land use and land cover change; water; tourism; links to the global scale through food and beverage trade and its effects on land allocation.

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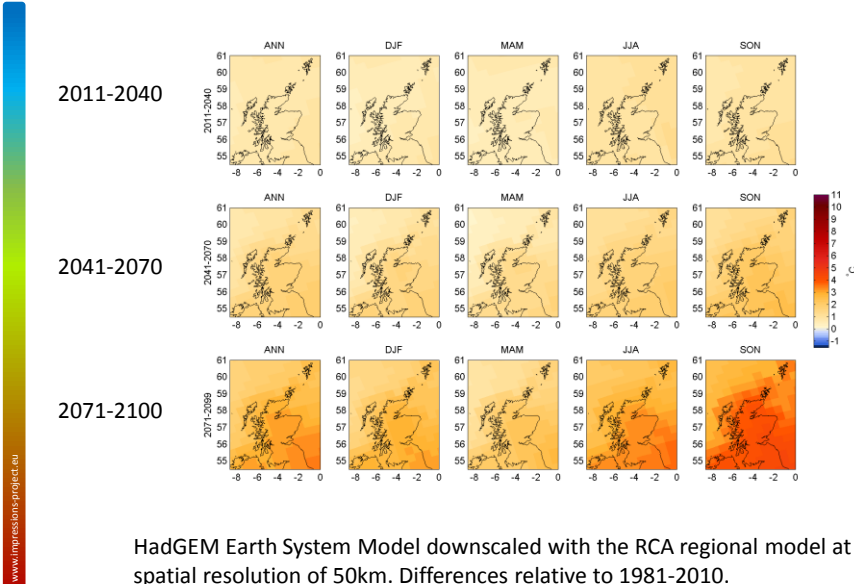
RCP8.5 temperature changes for Scotland from CMIP5

Timeslice	RCP	25%	50%	75%
2016-2035	RCP8.5	0.38	0.75	1.10
2046-2065	RCP8.5	1.31	1.67	2.16
2081-2100	RCP8.5	2.24	2.89	3.62

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Seasonal temperature change for RCP8.5



HadGEM Earth System Model downscaled with the RCA regional model at a spatial resolution of 50km. Differences relative to 1981-2010.



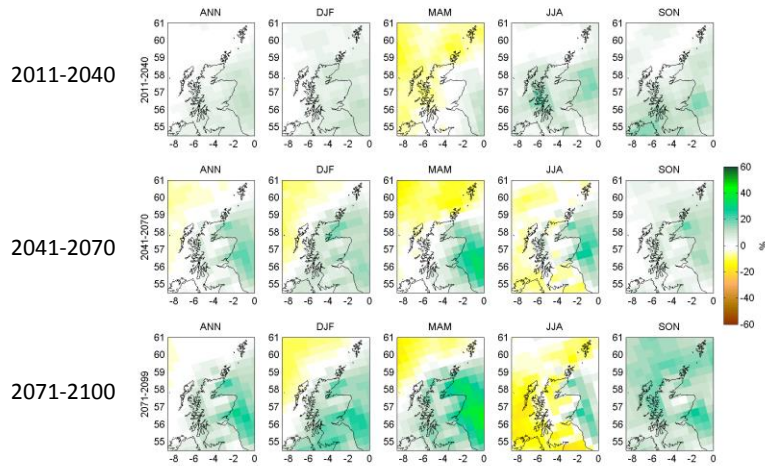
RCP8.5 precipitation changes (%) for Scotland from CMIP5

Timeslice	RCP	25%	50%	75%
2016-2035	RCP8.5	1.3	2.3	4.7
2046-2065	RCP8.5	2.0	3.9	5.3
2081-2100	RCP8.5	5.5	9.0	13.7

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Seasonal precipitation change for RCP8.5



HadGEM Earth System Model downscaled with the RCA regional model at a spatial resolution of 50km. Changes relative to 1981-2010.



Method: 20 interviews with participants

- Spring-Summer 2015
- Qualitative, semi-structured interviews
- Focused on the individual, behavioural and institutional conditions and decision-making processes that underpin adaptation





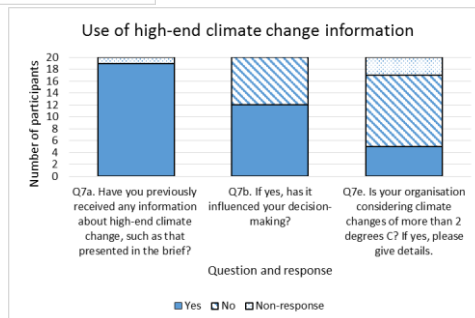
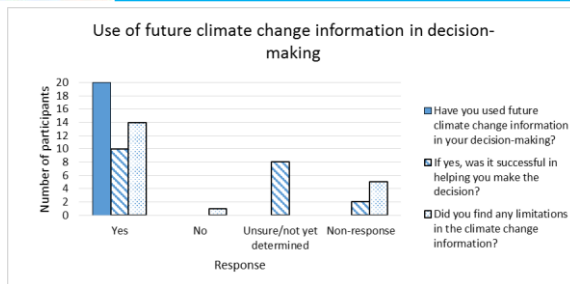
Key research questions

- Is the magnitude and likelihood of high-end climate change common knowledge for stakeholders who will need to deal with the potential impacts?
 - If so, are they acting to adapt in line with the high-end impacts? Or do they consider only more moderate scenarios of change?
- What are the critical knowledge needs of decision-makers acting at local to global scales, for considering high-end scenarios?
- What are their current capacities, barriers and drivers for using scenario-based information? Are these different for high-end scenarios?

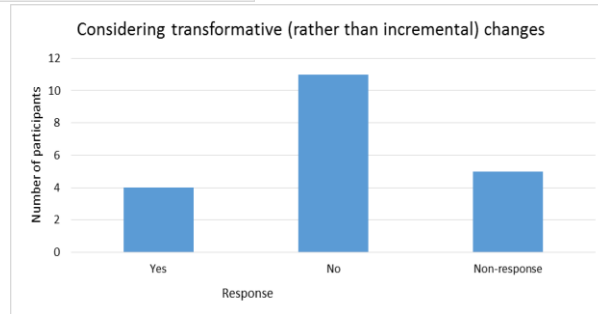
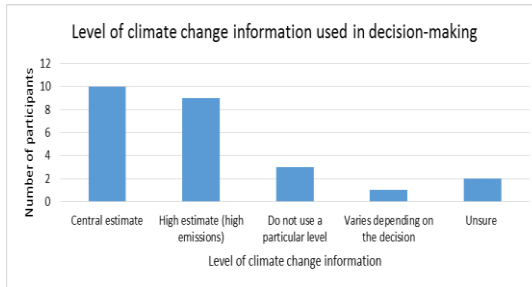
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Knowledge and use of high-end climate change



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Drivers for using scenario-based information

Can use it within their sector to make the case for adapting to climate change, because:

RANGE OF PLAUSIBLE FUTURES

FITS WITHIN EXISTING SCENARIO THINKING

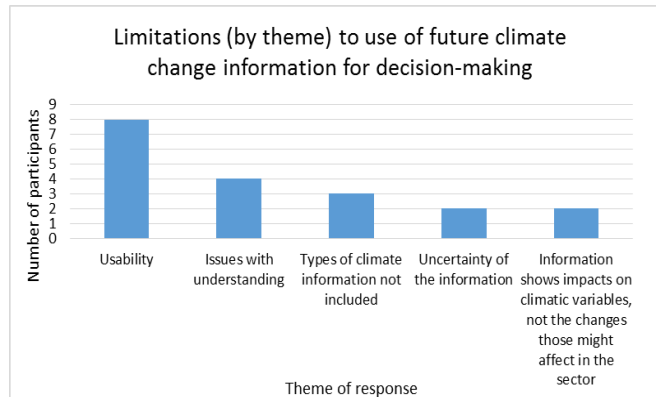
(Drivers are not different for high-end scenarios)



Categorised barriers to use of (any level of) climate change information

(The term 'barriers' here refers to the perceived limitations to the extent of whether and how climate change information is used)

- The key limitations centre on usability and issues of understanding, not around uncertainty of information.



Barriers to use of *high-end* CC scenarios

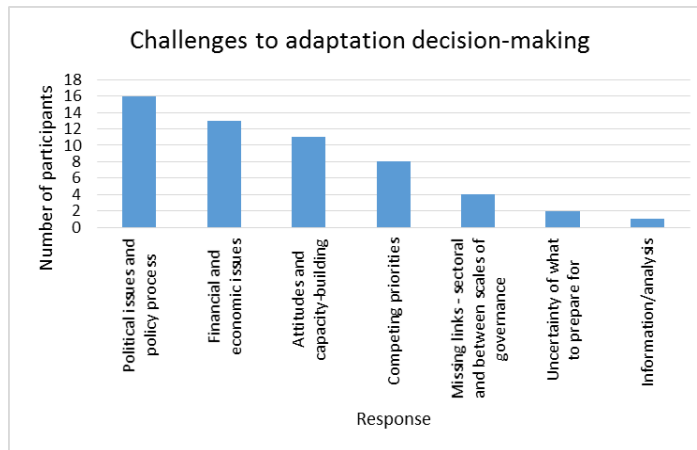
Participants indicated that:

- scenarios seem **“far-fetched”**
- decision-makers **do not necessarily believe** that world emissions are tracking in line with the **high-end**;
- the **spatial scale is not adequate**;
- decision-makers are **considering general trends rather than specific figures** or rates of change;
- **numerous other (socio-economic) factors** are considered to **have a bigger influence over decisions**; and
- in some (limited) cases, decision-makers are **not very familiar with how to correctly use or interpret the information**



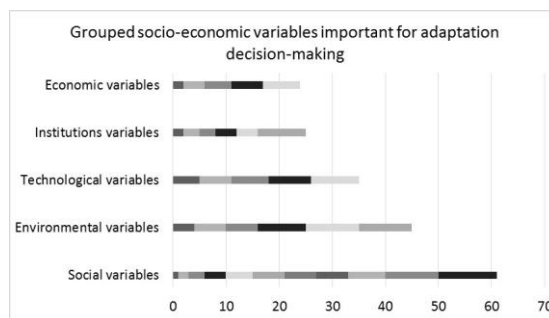
Challenges to implementing adaptation measures - summary

Majority of challenges to implementing adaptation measures are not based around information (or lack thereof), but rather, around institutional decision-making processes, including political issues, the policy process, and financial and economic issues



Socio-economic factors that influence adaptation decision-making

- Adaptive capacity is more greatly affected by non-climate (socio-economic) factors than by climate factors
- Top five socio-economic factors chosen were: technological developments (11 participants); health and well-being; land-use change; waste; and water resources (each with 10 participants)





Critical knowledge needs of these decision-makers for considering high-end scenarios

DON'T NEED:

- more specific figures or rates of change for climatic variables
- more certain information – because work primarily with trends only
 - I.e. It's not more *climate* knowledge that's needed – there's enough of this!

DO NEED:

- information about the ***practical implications for sectoral and cross-sectoral impacts under high-end scenarios***
- information about **direct and indirect impacts across sectors**
 - E.g. *If water resources decrease, what are the implications for the Scotch Whisky Sector?*
If climate change causes changes to ecosystems, e.g. loss of heather, what are the implications for tourism in Scotland?
- **integrated socio-economic factors** – as we've seen here these are *at least* equally as important as climate
- **decision-centred information!**

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An example: stakeholder developed socioeconomic scenarios

- Participatory workshops
 - Developed 4 different socioeconomic scenarios of potential futures for Scotland up to 2100
 - Developed a vision for Scotland towards 2100
 - Explored different policy measures in the context of achieving this vision under the different socioeconomic scenarios
 - Iterative work between researchers and decision-makers



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Conclusions

- Uncertainty is not a significant barrier for decision making – but qualitative descriptions of uncertainty are more usefully employed than quantitative descriptions;
 - *However*, uncertainty does affect the ways in which decision-makers choose to adapt (incremental vs transformative)
- Non-climate drivers are at least as important as, and in many cases more important than, climate drivers when it comes to adaptation decision making;
- No need for more *climate change* information to support adaptation decision-making – but *there is* need for more information about the *implications of particular sectoral and cross-sectoral impacts*;
- Need to make the business case for adaptation to high-end CC
 - Link adaptation to high-end CC into how it can help fix the current issues decision-makers face – their existing decision-making issues

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Take-home messages: participants' recommendations on how to improve usability

- CONTEXTUALISE INFORMATION – MAKE SURE IT'S RELEVANT
- DECISION-CENTRED (RATHER THAN CLIMATE-CENTRED)
 - Focus on society and the decision space rather than climate
- MAKE THE BUSINESS CASE!
- INTEGRATE SOCIO-ECONOMIC CHANGES (DIRECT AND INDIRECT)
 - Consider conflicts and trade-offs between adaptation options to address cross-sectoral impacts
- PROVIDE MORE GUIDANCE ON CROSS-SECTORAL IMPACTS
- FOCUS ON NEAR-TERM (5 YEARS) INITIALLY – MAX 30 YEARS
- MAKE BETTER USE OF VISUAL TOOLS AND APPROACHES
- CHANGE HOW THE INFORMATION IS PRESENTED

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Questions

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