Best practice principles for the communication of climate change information and associated uncertainty for effective decision making

Why this is important: Uncertainty is omnipresent in communications about climate change projections and may reflect conflicting evidence, weak expert consensus, imprecise probabilities and impacts of rare extreme events. Communications of uncertainty have the potential to restrict informed decision-making, delay public action on climate change, promote a 'wait and see' approach, and increase public polarization about climate change. Target audiences of these communications such as members of the public, non-expert decision makers as well as climate advisors from government, business and the third sector, often lack formal training in climate science adding to the challenge and the risk of misinterpretation. Some published studies have provided valuable insights into how the design of such communications effects perception, understanding and subsequent decisions regarding a changing climate, the communication needs of different non-expert audiences, and the general policy implications of communicating uncertainties alongside climate information. However, in the climate domain, such recommendations have remained sparse and dispersed throughout literature from multiple disciplines. Clear design principles are needed for the communication formats and visualisations that allow audiences to make adequate adaptation decisions, and to integrate uncertainties into their decision-making process.

What the UKCR programme is doing: A qualitative systematic review of the published literature was urgently needed to synthesize effective communication strategies, facilitate descriptions of the findings and recommendations and identify any gaps in the existing literature. This work reviewed empirical studies from cognitive, psychological, and behavioural sciences exploring responses to uncertain climate information and its visualisation. It also describes different information formats and visualisations studied for communicating different types of climate change projections and uncertainty, as well as the individual climate-relevant differences between users that may affect their responses to information. It derives a set of cognitive design principles for communicating climate information and associated uncertainties in more accessible and transparent ways for informing urgently required climate policy decisions.

Results so far: The study has provided several recommendations for the communication of uncertainty and visualisation of climate information, these include:

- uncertainty should be communicated within an open problem-solving process acknowledging diversity in viewpoints;
- initial user feedback should be sought to ensure communications address users' informational needs, levels of numeracy and climate change knowledge;
- effectiveness testing is needed to identify the most effective communication strategies and designs; and

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- visualisations should focus on one main message with simple, clear, consistent titles/captions, short sentences with no jargon, clear use of units and careful selection of colour schemes.

What is next? Two papers have been submitted for peer review publication. The recommendations provided by these will help support communicators such as policy makers and climate experts in designing climate information and associated uncertainties in more accessible and transparent ways to allow easier interpretation by target audiences.

References:

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- Kause, A., Bruine de Bruin, W., Fung, F., Taylor, A., Lowe, J., (2020) Visualizations of Projected Rainfall Change in the United Kingdom: An Interview Study about User Perceptions, *Sustainability*, vol. 12(7), 2955; https://doi.org/10.3390/su12072955