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How does uncertainty framing affect whether a question is answerable?

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Abstract: Environmental modelling exercises often aim to answer specific question(s) that arise from particular environmental management problems. But these questions are not always answerable given current knowledge, and where they are considered unanswerable, this perceived knowledge gap can be used to justify action or inaction, as invoked respectively by the precautionary principle and climate change denialists. Whether a question is judged answerable can turn on how the role of uncertainty is communicated when providing scientific information, that is, on how uncertainties are framed. Uncertainty framing can hence be manipulated to influence how information is used in decision making, for example through influencing what criteria are used to determine if the information is fit for purpose, and hence how actions to address uncertainty in the information will be prioritized. Managing scientific uncertainty with integrity requires awareness of how selection of uncertainty framing affects the path taken in a modelling study. We provide an initial analysis of how a set of identified uncertainty frames might affect whether a question is considered answerable, and how this might influence both the treatment of uncertainty in the modelling process and how the underlying environmental management problem is solved. Hypothetical examples are given based on Integrated Water Resource Assessment and Management problems.

Keywords: uncertainty; modelling; uncertainty framing; science communication