



## Stakeholders and experts: a wide perspective on expertise in hydrological modelling

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In this paper we reassess the distinction between stakeholders and experts in the context of hydrological modelling, taking a wide perspective on expert opinion. We begin by discussing the inevitable, though frequently informal, role of expert opinion in any model, exposing informal model assumptions and modeller subjectivity. We then document the increasingly formal uses of expert opinion in models and expert systems through a literature review, highlighting the substantive value of non-scientific knowledge. We argue that superficial distinctions between experts and non-experts potentially discount valuable information, and we thus adopt a definition of an expert as anyone with the right kind of experience. It will be crucial to demonstrate this experience as opinions are incorporated in models and expert data should be treated as any other data, including propagation of associated uncertainties. The result is a broadening of the knowledge base which is expected to enhance the scientific enquiry and models, not least through creative conflict between scientific and non-scientific knowledge. It is here that our wide perspective on expert opinion is synergistic with participatory modelling and collaborative decision making. However, the distinction between stakeholders and experts becomes increasingly blurred: not all stakeholders will classify as experts, but it can be argued that all experts are stakeholders in the sense that they can affect the outcomes of models and thus the outcomes of using models (such as policy and management decisions). In addition, cases exist where experts have a more tangible stake in that they are affected by the outcomes of using models. It follows that no expert will give a strictly impartial opinion. Adherence to the rational consensus argument for expert accountability and against expert anonymity will further increase the expert's stake in the use of their opinion and bias the elicitation process. We thus suggest that expert accountability necessitates a process in which expert critics are equally accountable, that is open and transparent, and that embraces the evolutionary nature of knowledge.