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Experts' understandings of drinking water risk management in a climate change scenario

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ABSTRACT

The challenges for society presented by climate change are complex and demanding. This paper focuses on one particular resource of utmost necessity and vulnerability to climate change: namely, the provisioning of safe drinking water. From a critical perspective on the role of expertise in risk debates, this paper looks at how Swedish experts understand risk to drinking water in a climate change scenario and how they reason about challenges to risk management and adaptation strategies. The empirical material derives from ten in-depth semi-structured interviews with experts, employed both at government agencies and at universities, and with disciplinary backgrounds in a variety of fields (water engineering, planning, geology and environmental chemistry). The experts understand risk factors affecting both drinking water quality and availability as complex and systemically interrelated. A lack of political saliency of drinking water as a public service is identified as an obstacle to the development of robust adaptation strategies. Another area of concern relates to the geographical, organizational and institutional boundaries (regulatory, political and epistemological) between the plethora of public actors with partly overlapping and sometimes unclear responsibilities for the provisioning of safe drinking water. The study concludes that climate change adaptation regarding drinking water provisioning will require a new integration of the knowledge of systemic risk relations, in combination with more efficient agency collaboration based on a clear demarcation of responsibility between actors.

1. Introduction

Translation between different types of knowledge and experience is crucial to the societal management of climate change processes (Wainwright, 2010). Climate change presents many different types of risks, to ecosystems, the planet and to human society. Risks to human health (Hunter, 2003; McMichael et al., 2006) derive from extreme weather events, effects on ecosystems, sea-level rise and various forms of environmental degradation. Risk identification and risk management are central elements of adaptation to such anticipated changes (Füssel, 2007). Since it transgresses geographical, national, regulatory, scientific, social and cultural boundaries, climate change can be regarded as a paradigmatic transboundary risk issue (Linnerooth-Bayer et al., 2001; Hulme, 2008; Löfstedt, 1998; Marsalek et al., 2006; Renn, 2008; Tait and Bruce, 2001). It presents a global challenge to risk governance and demands inter-organizational interaction, communication and collaboration

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in networks that engage numerous organizational actors with diverging responsibilities, goals and organizational logic (Lidskog et al., 2010, 2011; Linnerooth-Bayer et al., 2001). To be effective, adaptation relies on co-operation and interactions at the local level between a multitude of private and public actors, including non-government organizations, stakeholders and the public (Lundqvist, 2016). All the actors in this wide range have their own understandings of what climate change is, what it means and how the associated risks should be managed in the best way (Otto-Banaszak et al., 2011). Adaptation is a highly information- and knowledge-intensive endeavour. It requires expert factual knowledge and prognostic capacity regarding potential future scenarios and events embedded in a wide array of interconnected management domains, regarding, for example, water, natural resources, urban planning, crises and disasters. Thus, experts from different science fields have and will have a key role. The integration of knowledge from different science fields with the aim of linking knowledge to decision making will be crucial to effective adaptation to climate change (Kirchhoff et al., 2015).

This paper looks at how experts from diverse science fields, with different organizational affiliation (academia, government agency and stakeholder organization) look at risk management in association with climate change adaptation. We focus on one particular resource that is locally provided and distributed and that is generally understood to be at risk from climate change: namely, the provisioning of safe drinking water. Our aim is to explore how experts assess risk issues related to climate change that affect drinking water, and how they look upon the risk management strategies needed. The research questions are: *How do experts identify risk in relation to the provision of safe drinking water in a local and regional context?*, *How do they understand the causes of unwanted events?*, *How do they identify the values at stake?*, *What actions do they propose to manage risks?*, *What problems do they identify in relation to risk management?*, and *How do they understand the role of the public in relation to drinking water safety?*.

We adopt a broad definition of expert, and include experts by nomination by means of employment, experience and scientific qualifications. The experts in this study represent both contributory and interactional expertise (Collins and Evans, 2002, 2007). They are employed at universities and agencies, and taken together, their work covers original research and commissioned research, as well as interacting, advising and negotiating with other researchers, public officials and stakeholders within their field of expertise.

2. Current state of knowledge

This section is divided into two subsections that are relevant to the two interconnected themes of this paper. First, we will address the literature on expertise and the role of experts in risk judgements. Second, we will summarize research opinions on how drinking water provisioning will be affected by climate change.

2.1. The role of scientific expertise in judgements on risk

In the sociological literature on the relationships between science and society, scientific experts are understood to have a key role as agenda setters for discourses on risk issues (Beck, 1992; Lash and Wynne, 1992). Two key issues can be identified in the extensive literature on the role of scientific expertise in society. One set of questions relates to the epistemological foundations of science in relation to other knowledge systems. Another set of questions relates to the political role ascribed to science in the legitimation of decisions and power asymmetries (Jasanoff, 2006). Decisions on risk depend on values, and in order for decisions to be legitimate, a broader inclusion of non-experts is also advocated (Shrader-Frechette, 1995). In studies of public understanding of science and the role of science in society, it has been argued that decision making on risk is inherently normative and therefore cannot, in a democratic society, be an exclusive domain of experts (Jasanoff, 2006; Joffe, 2003; Shrader-Frechette, 1995; Sturgis and Allum, 2004).

In risk research, the role of experts in risk identification, risk assessment and risk management has been a long-standing topic of high saliency. Studies in the late 1970s showed that there were differences in risk perception and assessment between experts and laymen (Fischhoff et al., 1978; Slovic et al., 1979, 1980). Simply put, lay people and experts were shown to assess risk differently. The difference in perceived risk between experts and lay people was understood by a "deficit model" postulating lay people's (insufficient) knowledge of risk. Since lay people make interpretations of risk from heuristics and not from assessment of actual facts and statistical probability, they overemphasize some risks or underestimate others (Sunstein, 2002).

The early studies of risk perception that compared risk perception among experts and the public have been criticized for methodological flaws. For example Rowe and Wright (2001), find little empirical support for the idea that experts judge risk differently from members of the public. When the cognitive heuristics of risk perception are taken into account, risk perception by experts and lay people are actually found to be rather similar (Sjöberg, 2002). Expert opinion, like public opinion, is shaped by a diverse range of personal and professional factors. For example, a study by Thomas et al. (2015) shows that expert judgements of probability estimates (regarding sea-level rise in a climate change scenario) depend on heuristics, choices about what information and methods they use, and personal dispositions towards optimism or pessimism in the face of an uncertain future. The distinction between expert and lay knowledge has also been strongly questioned by sociologists who argue that lay knowledge is equally valid for many risk issues (Wynne, 1996, 2001). While scientific knowledge is understood to be abstract and detached, lay knowledge is characterized as contextual, embedded and practically oriented (Wynne, 1996, 2001). Lay knowledge, although not codified in science terms, must therefore be seriously considered.

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