



Understanding the transformation of climate futures. A conceptual framework illustrated with urban adaptation policy



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ABSTRACT

Projects in which science-based futures are produced indicating the relevant impacts of climatic changes are proliferating, in tandem with the increasing attention for climate change adaptation. Constructionist science studies have put forward the concept of ‘co-production’ to understand how knowledge claims become stable, authoritative, get institutionalised and reorder science and society. Moreover, knowledge and structures of power are co-evolutionary. Exercises in constructing futures are interesting practices where what is and what ought are enmeshed, and where knowledge claims may in turn be performative for societal reordering. This article presents a conceptual framework to understand the transformation of knowledge claims about the future in more analytical detail. Five concepts are suggested to aid the analysis of transformations: reduction, extension, rhetorical packaging, modification and redefinition. This conceptual framework is used to present a qualitative, in-depth study about the transformation of the volatile issue of urban warming in the face of climate change in the Netherlands, and the related knowledge claims on the future of this issue. As this case makes clear, the constant erosion of legitimacy for urban warming as a matter of collective concern is important to understand the transformation of knowledge claims. Also, the context and organisational embedding in which the projects originated had direct consequences for the construction of relevant knowledge on future urban warming. Moreover, the pre-existing methodologies science brings to the production of knowledge functioned as important templates which transformed the issue of urban warming.

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1. Introduction

With the increasing awareness for climate change adaptation, the urban climate also regained attention in urban climate adaptation strategies (Bulkeley, 2013; Carter, 2011; Den Exter, Lenhart, & Kern, 2014). Global temperatures are projected to rise in the coming century and weather extremes such as heat waves are predicted to occur more frequently, intensely and

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for longer periods of time. The 2003 and 2006 European heat waves resulted in peaks in morbidity and mortality, causing a sharp controversy across the continent (Kovats & Hajat, 2008; Lass, Haas, Hinkel, & Jaeger, 2011) and a rise of the question of whether to install or strengthen heat risk governance. Consequently, debates emerged on how to maintain urban regions as attractive, productive and safe places. This has raised the question whether urban warming should be an object for governance (Boezeman & Kooij, 2015). And, if so, whether it should be a matter of social cohesion policy (Klinenberg, 2003; Poumadère, Mays, Le Mer, & Blong, 2005), town planning (Hebbert & Mackillop, 2013), public health (Kovats & Hajat, 2008), or any other field of collective organisation.

The exchange of knowledge between science and policy is, as in many policy fields, problematic in the context of climate change adaptation (Jones et al., 2014; Kirchhoff, Lemos, & Dessai, 2013). The circulation of knowledge from urban meteorology in urban planning practices is considered a particular failure (Eliasson, 2000; Hebbert & Jankovic, 2013; Hebbert & Mackillop, 2013; Kleerekoper, Van Esch, & Salcedo, 2012; Lenzholzer & Brown, 2013). In a knowledge transfer (Meagher, Lyall, & Nutley, 2008) or a supply-and-demand (Sarewitz & Pielke, 2007) perspective on knowledge, facts are clearly distinguishable from values and travel without mutation to be used (or not) in the policy process.

These perspectives fail to account for the idea that developing an understanding of potential urban futures in the face of climate change demands a dialogue between desires and different bodies of knowledge, in which representations of how we know the world get constantly enmeshed with ways of how we choose to live in that world (Jasanoff, 2004). Authoritative knowledge claims on future issues are the product of power struggles, while, in turn, particular representations of an issue reshape structures of power (Boezeman, Vink, & Leroy, 2013; Fujimura, 1992; Latour, 1987; Shackley & Wynne, 1996). Exercises in constructing anticipatory knowledge are interesting practices where what is and what ought are enmeshed, while its outcomes may be performative in societal reordering (Nelson, Geltzer, & Hilgartner, 2008). The perspectives in science studies align with theories which understand governance as the practice of making sense of the issue at hand and mobilising power for that particular understanding (Vink, Dewulf, & Termeer, 2013), in which both the issue itself, as well as the knowledge claims on it, *transform*.

The emergence of urban warming in the Netherlands provides a particularly interesting case to study the transformation of knowledge, as a different understanding of this phenomenon for the urban future co-evolved strongly with attempts to mobilise power to make interventions based on particular understandings. Different guises of the phenomenon changed rapidly and co-existed: ‘urban warming’, ‘heat stress’, ‘urban heat islands’, ‘urban climate’, and ‘urban heat risks’ are all examples of concepts used to grasp the phenomenon. I will show that these concepts signify different things in different discourses, and connect particular sets of knowledge.

This article seeks to advance the understanding of the construction and transformation of knowledge on urban futures in the face of global warming by developing a typology for different forms of transformation. The research question is twofold. Firstly, how did the phenomenon of urban warming and the related knowledge claims on its future get transformed in the process of developing urban adaptation strategies in the Netherlands? And secondly, which factors influenced the transformation of the phenomenon and the knowledge claims on it? The next section outlines the theoretical and methodical foundations for a typology to understand the transformation of knowledge. I then present the construction and reconstruction of urban warming in the Netherlands and zoom in on the practices in three cities. The fourth section discusses different types of transformation and the factors that influenced transformations. Section 5 concludes on transformations in the process of redeveloping global warming into authoritative science-based futures that inform climate adaptation governance.

2. A conceptual framework for the transformation of knowledge claims

2.1. Knowledge use

The relation between scientific knowledge and the policy process has received ample scholarly attention. The conceptualisation of this relation was often inspired by positivistic thought in which facts produced by science are transferred to, and consumed by, society to make policies more rational. Concepts like ‘knowledge transfer’ or ‘evidence based policy’ reflect that understanding. The literature on knowledge utilisation has challenged simple and linear thinking, pointing to both the various ways knowledge influences policies (Weiss, 1998), as well as to the reciprocity and interactions needed to facilitate use (Meagher et al., 2008). Sarewitz and Pielke (2007) point to the many barriers and difficulties in bringing together the supply of and demand for knowledge. Notwithstanding the value of this body of literature, by assuming clear distinctions between a world of science producing knowledge and a world of politics putting that knowledge to use (or not), it assumes knowledge as ‘packages’ to reach decisions in a more or less distorted state. As such, it overlooks how authoritative knowledge claims themselves are made.

2.2. Co-production

To overcome the downsides of the supply-and-demand understanding of knowledge, I build on a constructionist understanding of knowledge. The notion of ‘co-production’ (Jasanoff, 2004) enables a perspective to understand how knowledge claims become stable, authoritative, get institutionalised and reorder science and society. Scientific knowledge is not understood as a mirror of reality. “Durable representations of the environment [...] do not arise from scientific activity alone, through scientists’ representations of the world as it is, but are sustained by shared normative and cultural

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