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Designing a knowledge co-production operating space for urban environmental governance—Lessons from Rotterdam, Netherlands and Berlin, Germany

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ABSTRACT

Challenges for a sustainable urban development are increasingly important in cities because urbanization and related land take come up with negative challenges for the environment and for city residents. Searching for successful solutions to environmental problems requires combined efforts of different scientific disciplines and an active dialogue between stakeholders from policy and society. In this paper, we present a comparative assessment of the way policy-science dialogues have achieved knowledge co-production about strategic urban environmental governance action using the cities of Berlin in Germany and Rotterdam in the Netherlands as case studies. The ecosystem services framework is applied as a lens for policy–science interaction and a 'knowledge co-production operating space' is introduced. We show how policy officers, urban planners, practitioners and scientists learned from each other, and highlight the impact of this knowledge co-production for governance practice. We found that the concerted collaboration and co-creation between researchers and policy officers have led to mutual learning and establishment of relationships and trust in both cities. Not only the policy-relevance of research and its policy uptake were achieved but also new insights for research blind spots were created. In our conclusions we reflect on co-production processes with two types of conditions that we introduced to be most influential in the way knowledge can be co-created. These are conditions that relate to the way knowledge co-production processes are set-up and, conditions that relate to the expected value or benefit that the co-produced knowledge will bring across society, policy and practice.

1. Introduction

In 2014, more than 54 per cent of the world's population lived in cities (United Nations Department of Economic and Social Affairs, 2014). Seven years after the United Nations announced that now globally, more people live in urban than in rural areas the urban percentage increased even more and will continue to increase. Newest projections suggest that by 2050 around 65% of the global population will be urban. Next to population increase, global urban land area is expected to grow at a faster rate. Estimations showed that urban land will increase by 1.5 Mio. km^2 by 2030 compared to 0.7 Mio. km^2 in 2001 (Seto et al., 2011). Urbanization is therefore intrinsically connected to urban land area expansion, which is translated into a need for new housing developments to service more city residents (Haase et al., 2013). Initial processes of urbanization and land take are further connected with negative challenges for the environment and for city residents. Negative challenges include increased levels of noise, air pollution and the decrease of urban green spaces. Challenges for a sustainable urban development will, thus, be increasingly important in cities while the need for robust science to inform strategic environmental policy simultaneously grows (Dilling and Lemos, 2011). However, environmental problems are often difficult to handle and successful solutions require combined efforts of different scientific disciplines but also an active dialogue between stakeholders from policy and society (Lemos and Morehouse, 2005).

Environmental science increasingly recognizes the need to engage with stakeholders from different parts of society in order to not only make knowledge relevant for societal problems but also by realizing the imminent interconnections between human and ecological systems that require new approaches to knowledge production (Jasanoff, 2004; Beunen and Opdam, 2011; Negev and Teschner, 2013). In this context, transdisciplinary approaches for knowledge co-production provide insights about the ways and the

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rationale for engaging with multiple knowledge holders: experts and scientists as well as citizens and practitioners (Bergmann et al., 2012; Jahn et al., 2012). In a positive view, the dialogue between different knowledge holders is beneficial for mutual learning: scientists learn more comprehensively about issues important for policy while stakeholders from society (may) learn by seeing things differently or in new formats.

A policy–science dialogue addressing challenges in cities could help ensure a sustainable urban development and in this way, aid all involved actors to adequately respond to current challenges while reflecting citizen's needs. Cities are currently at cross roads of climate change, urban dynamics and resulting pressures (Elmqvist et al., 2013). At the same time, they need to consider changing demands from citizens about use of public space and retrofitting of private space. In this context the scientific framework of urban ecosystem services was brought into the interface between policy and science to inform urban planning and governance (Frantzeskaki and Tilie, 2014; Kabisch, 2015). Analyses of past and recent policy and planning strategies reveal that there are already different degrees and ways that the ecosystem services framework (ES) and rationale have been integrated in informed urban planning and governance (Hansen et al., 2015; Rall et al., 2015). Urban ecosystem services are described as the benefits urban citizens obtain from the ecosystems in cities (Elmqvist et al., 2013; Millenium Ecosystem Assessment, 2005).

Using the ES framework as a lens for policy–science interaction, in this paper we are focusing on the way policy–science dialogues in a facilitated process have achieved knowledge co-production about strategic urban environmental governance action in two large cities in Europe, Berlin and Rotterdam. In particular, we address the following research questions:

1 Did policy makers and scientists learned from each other through the co-production process?
2 Does the ecosystem service framework enable knowledge co-production for sustainability and resilience planning?
3 What is the impact of a knowledge co-production for urban environmental governance?

To do so, a comparative assessment is presented using the cities of Berlin in Germany and Rotterdam in the Netherlands as case studies. Both cities deal with challenges of population increases and respective pressure on urban open land for residential purposes. For Berlin, the focus is on the overall green space development of the city, while for Rotterdam the development of the city as a delta city with social-ecologically productive urban ecosystems is particularly important next to green space development planning. In two city contexts we designed and facilitated a policy–science co-production space by building on urban governance context analysis work, transition scenario work and backcasting. In this, we introduced the ES framework to map the multiple benefits of urban ecosystems with the aim to develop a vision and strategic transition pathways at city-scale.

2. Knowledge co-production in the policy-science interface for urban governance

2.1. Identifying the conditions for successful knowledge co-production in the policy-science interface

Scholarly work on co-production of knowledge has emerged in the last years and elaborates on what makes knowledge usable in an interaction process especially at the policy–science front (Aeberhard and Rist, 2009; Armitage et al., 2011; Beunen and Opdam, 2011; Dilling and Lemos, 2011; for a comparative case study see Healey, 2008; Kemp and Rotmans, 2009; Lemos and Morehouse, 2005; Pohl, 2008) and on the different good practices surfacing from successful knowledge co-production processes (Jahn et al., 2012; Bergmann et al., 2012; Hirsch Hadorn et al., 2006; Pohl, 2008; Wickson et al., 2006; Polk, 2014; Maasen and Lieven, 2006; Aeberhard and Rist, 2009; Russel et al., 2008; Klein et al., 2001). ***Co-production*** refers to the active involvement and engagement of actors in the production of knowledge that takes place in processes either emerging or being facilitated and designed to accomplish such active involvement (Voorberg et al., 2014).

From reviewing the literature we identified two types of ***conditions*** that influence the way knowledge can be co-created: (a) conditions that relate to the way knowledge co-production processes are set-up and (b) conditions that relate to the expected value or benefit that the co-produced knowledge will bring across society, policy and practice. The conditions that relate to the way knowledge co-production processes are set up include *openness* of the process in the form of an open discussion format that enables sharing, *inclusivity* of actors from multiple disciplines and with different expertise and experiences, and *legitimacy* of the knowledge contributed to the co-production process. The conditions that relate to the expected value or benefits to be gained from the uptake of the new knowledge include the *usability* of the co-produced knowledge in dealing with real world problems, and the *quick uptake* and/or use of this knowledge to a contemporary policy debate or to an issue that is high on the political agenda.

(a) Conditions that relate to the way knowledge co-production processes are set-up

Openly shared knowledge: From transdisciplinary science writings, it is highlighted that bringing together actors from multiple disciplines and with diverse experiences in an open process for sharing and learning is a precondition for co-creating new knowledge for problem solving, altering worldviews and understanding diversity of values and beliefs (Bergmann et al., 2012; Hirsch Hadorn et al., 2007; Polk, 2014). Leith et al. (2014) also point at the importance of connecting different actors to address sustainability challenges especially when these challenges require a learning mode for solution searching. A long-term success story in which scientists and policy officials were engaged in a co-production process is extensively described in Kemp and Rotmans (2009). The authors highlight the critical success factors that resulted in the inclusion of transition management as a key concept for the ministerial administration in energy innovations in the Netherlands. Among others success factors were the development and use of an open discussion format with a common language, a free and safe environment allowing discussing openly, as well as the willingness for engagement through the whole process (ibid). The design of the engagement process is most effective when it is deliberate and when the needs from both sides are openly discussed and clearly presented right from the beginning. Mutual understanding can be ensured and increased through a repeated interaction process between science and policy (Lemos and Morehouse, 2005).

Inclusive to multiple types of knowledge: The value of integrating different types of expert knowledge is already well argued in interdisciplinary, and transdisciplinary research writings. Empirical work points at the fact that including different types of knowledge (like tacit knowledge and knowledge from experiences) not only produces a more creative output but also ensures the accountability and applicability of the new knowledge for society, policy and practice (Wiek et al., 2004; Polk 2014, Maasen and Lieven, 2006; Aeberhard and Rist, 2009; Miller et al., 2008; Wyborn 2015).

Legitimate knowledge: Cash et al. (2003) summarized that credibility, legitimacy and salience need to be considered as determinants of a successful use of scientific information.

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