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Risk perception: The social construction of spatial knowledge around climate change-related scenarios in Lima

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ABSTRACT

Lima's environmental sustainability is threatened by increasing water scarcity, heavy rain events and limited attention for water vulnerability and climate change scenarios. In this paper we examine how knowledge construction and risk perception on water-related disaster risks and vulnerabilities affects decision-making and implementation in urban governance networks, specifically looking at some of the reasons behind high levels of risk tolerance and the lack of decision-making initiatives in putting adaptation and/or preventive measures in place.

New forms of metropolitan governance have constructed spatial knowledge about water-related vulnerabilities using inclusive scenario-building processes. These unpack complexities, uncertainties and spatial inequalities in water governance, making them visible by mapping and spatial representations as strategic instrument for social and policy learning.

This article analyzes two case studies, which either already are or can become disasters (scenario-building). The first, concerns the long-term plausible scenario of water scarcity and droughts analyzing population growth rates, water distribution and consumption through the Chance2Sustain research project and presenting spatial representations. The maps were used to define possible spatial intervention priorities to deal with future water vulnerabilities in Lima. The second, refers to short term extreme weather events that already manifest as mudslides and floods and El Niño in Chosica, eastern Lima. We investigate the first at the metropolitan city scale level and the second at the scale of vulnerable communities. The cases illustrate iterative spatial knowledge construction, in which processes of risk prioritization, normalization and tolerance occur, and the resulting [in-]action by a variety of actors so far.

The methodology used collective and iterative mapping processes, using technical, organizational and geographical knowledge from a variety of governance, experts and practitioner networks in Lima. The main outcome is the social learning derived from bringing together different kinds of knowledge and integrating several dimensions through spatial representations. This has raised awareness, increased capacities for dealing with uncertainty and contributed to the approved metropolitan Climate Change Adaptation Strategy, but not implemented by the Lima Municipality yet.

The main conclusions are two: 1) spatial planning is a quite political process (c.f. Flyvbjerg 1998), in which knowledge is contested or even when acknowledged, does not necessarily steer decision-making processes, either by local communities, authorities and private institutions. And 2) existing models linking knowledge construction to risk framing, risk tolerance and how these influence decision-making processes and actions to prevent disaster may ignore the issues of risk tolerance, through normalization and prioritization at their peril.

1. Introduction

Recent global reports point to the importance of both creating and using knowledge about vulnerabilities, climate adaptation and disaster risk reduction, as well as identifying and strengthening

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governance processes. The latest IPCC report (2014) highlights the need to link climate change, risk reduction and socio-economic development, and ending poverty and stabilizing the climate are meant to be the two challenges of the century. With the potentially greater effects of climate change being already an obstacle to poverty reduction, the IPCC chapter on cities underlines how the people hardest hit[1] will be those living in informal settlements in low- and middle-income countries, where greater and more vulnerable agglomerations continue to grow (see also UCCRN 2015). It also stresses the importance of building resilience and enabling sustainable development in support of climate change adaption. The UNISDR Sendai Conference (March 2015) coming from a Disaster Risk Reduction (DRR) perspective, also outlines the connections between understanding risks, governing them, preventing them by investing in resilience measures and 'building back better' when disasters have struck.

Cities' water-related vulnerabilities are related to existing socio-economic inequalities as well as environmental phenomena related to climate change. Vulnerabilities concern unsafe areas due to environmental risks such as floods or mudslides as well as people's lack of access to better quality living conditions (safe housing, clean drinking water, sanitation, etc.) (cf. *Environment and Urbanization* 2015: vol. 27, no.2). Such conditions are exacerbated by the expected effects of climate change, including the El Niño System Oscillation (ENSO), which is set to change water temperatures, rainfall patterns, water currents and fish stock availability in the coming Peruvian summer (Economist, August 22, 2015; WMO 2015; NOAA, 2015)[2].

The ways in which knowledge on vulnerabilities and risks is integrated and combined with preventative measures is a political process. Both the IPCC and Sendai reports presume that linking knowledge and governance processes will occur, without indicating the possibility of tension and conflicts, which can prevent the acceptance of adaptation measures and the concomitant investments required. However, existing situations of climate change denial and the lack of preparedness for dealing with disasters across multiple scale levels globally show that even when better knowledge is available about risks, other issues prevent governments, private sector and communities from implementing stronger adaptative or preventive actions.

Earlier research showed that knowledge is socially constructed by the interaction between different social groups, such as communities, experts, governments and companies over time; spatializing such knowledge makes visible concentrations of risks and inequalities, and scenario-based maps on vulnerabilities indicate likely dynamics over time (Baud, Pfeffer, Scott, Denis, & Sydenstricker-Neto, 2014; Miranda Sara, in press). Combining the focus on knowledge concerning water-related risks and the extent to which such knowledge is embedded in governance processes provides a better understanding of how and why knowledge building concerning potential disasters is not always sufficiently recognized and given priority (Miranda Sara, Hordijk and Khan 2014). For example, the difficulties for flood management knowledge to 'travel' across institutional boundaries have also been examined in the case of Chennai, India (Jameson and Baud, this volume).

In this paper we examine how knowledge construction on water-related disaster risks and vulnerabilities affects decision-making and implementation in urban governance networks, specifically looking at some of the reasons behind high levels of risk tolerance and the lack of decision-making initiatives in putting preventive measures in place. We understand risk tolerance to be the combined result of individual and social processes of risk prioritization and normalization.

Our first question examines the perceptions of the actors concerned. People in local communities have a wide diversity of risk perceptions and risk tolerance, which leads to quite different risks reduction strategies (Van Voorst, 2015; Karpouzouglou and Zimmer, this volume). This alerts us to the second question of how specific risks are prioritized and/or normalized within the socio-economic or physical context where water-related vulnerabilities may not be the worst expected situation facing various other risks. This means that the tolerance for some specific risks may be much higher than outsiders would expect; the ways that actors construct knowledge about risk prioritization needs to be examined explicitly in order to understand why people react (or not at all) the way they do. It also means that how varieties of knowledge are constructed and used in decision-making within local socio-political contexts needs to be understood. Thus, our third question deals with how these processes influence the outcomes that are produced, examining how disasters are socially constructed through risk tolerance and/or normalization in decision-making and implementation.

We focus on different scale levels within and around Lima metropolitan city; both because cities are strategic locations for socio-economic development, where awareness and prevention need to be built up (IPCC, 2014), but also because they illustrate the full complexity of vulnerability issues and governance processes in which construction of disaster processes are embedded (cf. Miranda Sara and Baud 2014). With this article we set the basis for a future in-depth analysis of how risk perceptions and tolerance, spatial knowledge and iterative and interactive governance processes are linked to interventions, which can reduce or increase vulnerability and potential disasters at metropolitan, city and settlement scale levels.

2. Current debates on water-related risk perceptions and climate change

2.1. Risks, disasters, and climate change

Three strands of current debates in the literature on water—related risks, disasters, and climate change are relevant for this article: the social construction of disaster, disaster risk reduction and climate change governance.

The first strand is the social construction of disaster, a concept well-developed in the Latin American literature (e.g. Aragón-Durand, 2009). Already in the 1980s, Peruvian and Colombian contributions from La Red, coordinating with international support, NGOs and academics (Maskrey 1993; Blaikie, Cannon, Davis & Wisner, 1996; Fernández, 1996) focused attention on the concept of risk management and realization that disasters are not "natural"; they are not part of the landscape, but rather a result of how humans construct physical infrastructure in the landscape. Current forms of urbanization actually ignore natural processes; nature is not to blame for disasters, but the way that cities are built, is. Going beyond the socio-ecological system approach to vulnerability, this political ecology perspective is firmly anchored in ideas on socio-natural relationships (Zwarteveen & Boelens, 2014). The social construction of disaster in the Latin American context refers specifically to risks related to high levels of informality, 'laissez-faire' construction policies in parallel with a history of 'self-help' forms of urbanization to combat housing deficits (Fernandez-Maldonado & Romein, 2010). High levels of migration and informal city

[1] Such as higher temperatures, heat stress, water insecurity or extreme weather events affecting a higher number of people exposed to these events, in particular urban communities.

[2] http://www.un.org/apps/news/story.asp?NewsID=52570#.Vkt8QHYve1s, visited 17.11.2015.