



An interdisciplinary political ecology of drinking water quality. Exploring socio-ecological inequalities in Lilongwe's water supply network



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ABSTRACT

Urban political ecology attempts to unravel and politicize the socio-ecological processes that produce uneven waterscapes. At the core of this analysis are the choreographies of power that influence how much water flows through urban infrastructure as well as where it flows, thereby shaping conditions and quality of access in cities. If these analyses have been prolific in demonstrating uneven distribution of *infrastructures* and water *quantity*, the political ecology of water *quality* remains largely overlooked. In this paper, we argue that there is a clear theoretical and practical need to address questions of quality in relation to water access in the South. We show that conceptual resources for considering differentiated drinking water quality are already present within urban political ecology. We then contend that an interdisciplinary approach, highlighting the interdependencies between politics, power, and physiochemical and microbiological contamination of drinking water, can further our understandings of both uneven distribution of water contamination and the conceptualisation of inequalities in the urban waterscape. We illustrate our argument through the case of water supply in Lilongwe, Malawi. Our political ecology analysis starts from an examination of the physicochemical and microbiological quality of water supplied by the formal water utility across urban spaces in Lilongwe. We then present the topography of water (quality) inequalities in Lilongwe and identify the political processes underlying the production of differentiated water quality within the centralised network. This paper thereby serves as a deepening of urban political ecology as well as a demonstration of how this approach might be taken forward in the analysis of urbanism and water supplies.

1. Introduction

Despite the implementation of large-scale programs like the Drinking Water Decade (1981–1990) and the Millennium Development Goals, urban dwellers in sub-Saharan Africa are increasingly exposed to health risks associated with inadequate access to clean water (Hunter et al., 2009; Wright et al., 2004; Ashbolt, 2004a,b). At the core of this failure are two fundamental causes. First, these programs have overwhelmingly focused on coverage, while other fundamental dimensions of access, such as quality and continuity of supply, have been largely overlooked (Boakye-Ansah et al., 2016; Bain et al., 2014;). Second, water service configurations continue to fail those most in need. In 2012 coverage in sub-Saharan urban centres had reached 64%, instead of the expected 77.5 % (WHO and UNICEF, 2014), while in-house

connections dropped from 43% in 1990 to 33% in 2015 (WHO/UNICEF, 2015). Such figures are often justified on the grounds of technical and financial limitations (Dagdeviren and Robertson, 2011), as well as patterns of urban growth (Muchadenyika, 2015). The UN-HABITAT world city report (2016), for instance, explains how the particularly rapid increase in people living in slum or informal settlements, grown from 790 to over 880 million between 1990 and 2014, is directly linked with poor access to basic services such as water supply.

Eschewing some of the more technocratic and apocalyptic explanations of water injustice, Urban Political Ecology (UPE) draws out the role of politics and power in shaping water flows and infrastructural developments in cities (Truelove, 2016; Domènech et al., 2013; Ioris, 2012; Swyngedouw, 2004, 1999, 1997; Bakker, 2003; Crow and Sultana, 2002). Nevertheless, there is a tendency to interpret

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inequalities in urban water supply as a split between those who are connected and those who are unconnected. Recent studies in Science Technology and Society (STS) and everyday urbanism have questioned such assumptions, arguing that understanding differentiated access and the full range of inequalities in urban water supply also implies questioning the homogeneity of the centralised water supply network (Alda-Vidal et al., 2017; Björkman, 2014; Misra, 2014; Lawhon et al., 2014; Anand, 2012). If these interpretations have been fruitful, the political ecology of water *quality* remains largely overlooked. Drinking water quality continues to be entrenched in disciplinary studies in microbiology focusing on physico-chemical and microbiological quality (Kosamu et al., 2013; Machdar et al., 2013; Castro-Hermida et al., 2008; Kimani-Murage and Ngindu, 2007; Betancourt and Rose, 2004) and in studies in public health focusing on risks associated with contaminated water (Bain et al., 2014; Fewtrell et al., 2005; WHO, 2000; Ashbolt, 2004a).

In this paper, we argue that there is a material need for UPE to engage with questions of *quality* in relation to water access. We contend that an interdisciplinary approach, highlighting the interdependencies between politics, power and microbiological contamination of drinking water, can further conceptualisations of socio-ecological inequalities in the urban waterscape. We illustrate our arguments in two ways. We first provide a brief review of debates around UPE and the dimensions of inequalities, demonstrating that important critiques of commodification have, perversely, led to a neglect of concerns over quality. By following the process of abstraction through which water is produced as a commodity, many urban political ecologists have failed to attend to the material properties of water. Conversely, while the re-materialisation of political ecology serves to rectify this imbalance somewhat it risks neglecting what urban political ecology has done so well – teasing out the socio-ecological relations through which inequalities are produced.

We therefore develop an interdisciplinary perspective that produces a more multifaceted understanding of water inequality. Such an interdisciplinary perspective is not without its difficulties and we reflect on the methodological implications of an interdisciplinary UPE of water quality drawing out the range of different perspectives from which we find inspiration. In the latter part of the paper we draw from research undertaken in Lilongwe, Malawi. Our political ecology analysis starts from an examination of the physicochemical and microbiological quality of water supplied by the formal water utility across urban spaces in Lilongwe. We then develop the topography of water (quality) inequalities in Lilongwe and identify the social and political relations through which differentiated water quality is produced within the water supply network. We conclude that approaching the materiality of water through this interdisciplinary analysis serves to articulate inequalities from multiple perspectives and provide wider breadth to examinations of urban water as a socio-natural question.

2. Urban Political Ecology and the question of *quality* in relation to water supply

2.1. Introduction: water quantity as key focus in UPE

At the heart of UPE is an attempt to unravel how power controls and redirects resources and flows, thereby producing urban configurations and outcomes that are unevenly experienced in environmental, social, and economic terms (Brand and Thomas, 2013; Castree, 2001; Gandy, 2003; Ekers and Loftus, 2008; Heynen et al., 2006; Kaika, 2005; Keil, 2003, 2005; Swyngedouw, 1996, 1999). Processes of urban metabolism are, therefore, never neutral; instead they are at the root of uneven geographical developments (Heynen et al., 2006; Gandy, 2005; Swyngedouw, 1999), which more strongly affect low-income and vulnerable groups, even in cases where pro-poor policies are explicitly adopted. In framing water injustice in this way, UPE has mainly focused on understanding the political ecology of cities through the way

infrastructural configurations and (water) circulation shape processes of urbanisation (Lawhon et al., 2014).

Swyngedouw's work on Guayaquil, Ecuador, was path-breaking in its analysis on how urban transformations and water distribution by the public water utility worked to marginalize the urban poor (Swyngedouw, 1997). Similar studies have subsequently shown the impact of neoliberal reforms on differentiated access to services (Bakker, 2010; Heynen and Robbins, 2005; Budds, 2004; Smith and Hanson, 2003; Bakker, 2003; Loftus and McDonald, 2001) as well as the role of gender, class and race as key variables in producing uneven water infrastructure development and differentiated access to water (Truelove, 2016, 2011; Ge et al., 2011; Sultana, 2011; Sultana and Loftus, 2013; Bakker, 2003, 2009). In a succinct summary, Bakker (2003: 333) writes that “for the urban elite, water supply is often relatively abundant, and relatively cheap. For the urban poor, the scarcity of potable water is a daily hardship”. Except for a few studies focusing on the relationship between modernity, scientific knowledge on waterborne diseases, hygiene and technologies (Kooy and Bakker, 2008; Gandy, 2006), urban political ecologists have been less attentive to questions of quality. In the section that follows we discuss why UPE scholarship has placed less attention to the material properties of water. We then turn to methodological considerations of an interdisciplinary perspective on urban water quality.

2.2. *Quality and quantity as different measures of inequality*

“Quality no longer matters. Quantity alone decides everything”

Marx [1847] 2008: 57

If Urban Political Ecology approaches have been particularly effective at critiquing the relations that produce uneven access to water, they have frequently been less effective at dealing with questions of quality. Paradoxically, this relative lack of attention to questions of water quality runs counter to the broader project of rematerializing nature within UPE (Demaria and Schindler, 2016; McClintock, 2015; Rice, 2014; Mee et al., 2014), which builds on the earlier turn to materialities in Political Ecology (Bakker and Bridge, 2006), the more recent focus on the agential properties of matter (Bennett, 2010) and the force-full characteristics of specific objects (Meehan, 2014). Addressing urban political ecology directly, Demaria and Schindler (2016) suggest that there is a need to broaden its scope through a conversation with industrial ecology and ecological economics. They suggest that a first wave of UPE has been overly focused on capital as a determinant of ecological processes, whereas a second wave has developed a more convincing analysis of the role of non-humans. They therefore seek to “balance critical urban theory [drawn from UPE] with attention to materiality [drawn from ecological economics and industrial ecology]” (2016: 308). This balancing act is, however, not as simple as they suggest and risks eliding areas of intellectual dissonance. Elsewhere, in a highly generative and richly suggestive paper, McClintock (2015) has shown how a conversation with Critical Physical Geography can enable new ways of interpreting (and transforming) lead contamination in West Oakland. In contrast to Demaria and Schindler (2016) McClintock's approach is to deepen the resources available within UPE, rather than simply supplementing. Similarly, Rice (2014) deepens existing UPE to demonstrate how climate change governance might be re-interpreted through paying particular attention to the materiality of carbon. We see much scope for conversations with such contributions; however, in contrast to Demaria and Schindler's (2016) approach, we consider whether it might not be possible to find resources *within* urban political ecologies of water and an approach that is attendant to a range of different determinants while remaining open to the question of nature's matter.

Part of the reason for the emphasis on water quantity over quality within some urban political ecologies of water is suggested in the quotation from Marx with which we began this section: the increasing

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