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Metering water: Analyzing the concurrent pressures of conservation, sustainability, health impact, and equity in use

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ABSTRACT

This study focuses on the impacts of water and sanitation (WatSan) development with particular attention to how the technopolitical practice of water metering prompts critical discussion on the conflicting pressures of conservation, sustainability, health impact and equable access to water resources. The very act of metering is imbued with political and social expectations stemming from development organizations. The study utilizes a mixed-method approach, triangulating data from interviews, focus groups, surveys, participatory mapping, and participant observation over a period of two years. Data show that while metering regimes were designed by NGOs to ensure equal access, system sustainability and safety, and deforestation prevention (goals that community members supported), through both the meters' presence as technological constructs and due to the cost of water as gauged by the meters the practice placed undue pressure on certain groups, including large families, students, renters, and households with low incomes or seasonal income shortages. In short, water metering served to delimit true and equal access to safe water. This calls into question the utility of the ubiquitous practice and the continued proliferation of water metering in WatSan development, especially in areas that are water-rich and already have non-capitalocentric and/or locally-generated water management and conservation practices, policies, and trainings (whether formal or informal). This discussion is useful as a window into the unforeseen and hidden aspects of implementing power-laden development technologies, such as metering, and the ways in which individuals may eschew such systems in passive ways that go unchecked by monitoring and evaluation schemas. Additionally, the work critically interrogates the pairing of metering with systems that require water to remove waste from households (e.g., through flush toilets) and the appropriate design of these systems.

1. Introduction

In Bolivia, choices about which communities receive funding for improved water and sanitation systems are often highly political and correspond to both NGO and government-led political aims (Cairns, 2014; Verbyla, Cairns, Gonzalez, Whiteford, & Mihelcic, 2015). The landscape for water and santation (WatSan) in the region is decidedly neoliberal, with western agencies' programs and policies often eschewing any local, regional, or state-based regulation or leadership. In most of Alto Beni, Bolivia, development agencies are the only guarantors of improved water and sanitation resources. Yet development agencies, even prolific ones, often cannot ensure that all have access to water in a certain region due to funding availability, limitations of their requisite political agreements and agendas (e.g., nonproliferation of coca), topographic conditions, and/or community buy-in. Lack of inclusion for these reasons is expected. However, *unexpected* inequality and lack of inclusion for those who *do* gain access to water through WatSan development is more difficult to parse, especially when this marginalization is related to cost of water. This study focuses on inequality and lack of access within an area that was a recipient of an agency-funded WatSan program, including piped water delivery, sewage removal, and wastewater treatment, and particularly focuses on how this inequality hinged on the choice to meter water and have residents pay by water consumption per household.

This work shows that metering practices, while ostensibly designed to ensure that water was equitably distributed, water sources conserved in perpetuity, and deforestation stymied, actually served to economically exclude certain groups within the community, including large families, students, renters, and households with low incomes or seasonal income shortages. This, coupled with the fact that the system was designed to use water to flush waste (thus exacerbating costs for water), calls into question the efficacy of the system's design and the management practices chosen. The study shows that metering actually further ingrained existing

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inequalities. This study posits that critiquing development schemes that require ongoing pay-by-use metering for WatSan system sustainability, as well as a providing critical view of the technopolitical assumptions embedded in metering in the first place, is of utmost importance in ensuring that water and sanitation development is effective and inclusive.

Four main points are raised throughout the article's discussion: 1) Water metering, implemented by NGOs, is a technopolitical practice that changes water use practices and proliferates the values and perspectives of NGOs as well as westernized assumptions related to water use, 2) Water metering as a practice to forward conservation was at odds with local community perspectives and needs in the region, despite overarching values of sustainability and conservation being shared, 3) Water metering placed undue burden on certain groups, and 4) Water metering was particularly inappropriate due to the design of the system including the use of water to remove waste. These points together encourage a redraw of existing assumptions related to water metering and capitalocentric WatSan development sustainability/maintenance programs.

2. A framework for examining water metering as a practice

Embedded in the hydrosocial cycle (see: Bakker, 2007; Linton and Budds, 2014; Perreault, 2013; Swyngedouw, 2009), are the networks of water provision, including water meters. Leveraging understandings of the technopolitics, or the political assumptions and practices that are embedded in and enacted through technologies themselves, along with the spaces they create (e.g., Von Schnitzler, 2008, 2013), and infrastructural regimes (or, an overwhelming assumption and hegemony of one type of infrastructure to handle a specific need, such as water delivery), embedded in infrastructure studies, this work argues that metering has taken on a force of its own in the wider WatSan development machine, resulting in a ubiquitousness that oft goes unquestioned (in the United States, water utilities and service rates are ubiquitous (Teodoro, 2018), as they are throughout much of the Western world). Meters are known to change household costs where they are implemented (Brown and Pena, 2016). This work focuses on considerations related to materiality, wherein we use ethnographic attention to things to make "social systems and collective understandings visible" (Carse, 2014), in this case a focus on water and metering as a way to highlight these systems. It also builds on understandings of reification (also referred to as "thingification", which describes the "manner in which people are reduced to things and things come to acquire social characteristics" (Loftus, 2006, p. 1025). In this study the idea of reification is used to consider the social expectations and orchestrations that are inherent to water metering. This work combines these understandings of technopolitics, materiality, and reification with triangulated data from mixed-method ethnographic fieldwork and a wider political ecological approach forward a nuanced view of human-technology relationships in metered hydrosocial spaces. This work takes the direct approach that meters are capitalist forms (Loftus, 2006) being proliferated through neoliberal development. They are technologies that impact people in recipient communities through the power they hold over their access to resources as well as in the way that they carry the metering paradigm's designer's assumptions about water use and value. Community-based efforts against meters (whether for water or energy) are documented. They are parsed as struggles, fights, or active types of resistance (e.g., Loftus, 2006; Von Schnitzler, 2013). A novel contribution of this work is the look at the ways in which residents in Alto Beni, Bolivia, utilized passive techniques to eschew abiding by the meter's control. As well, the community's overarching affinity with both the NGOs (NGOs were widely regarded as a positive influence in the area) and their conservationist aims to protect water resources throws into relief the mismatch and inappropriateness of the metering strategy, which aimed to promote conservation through chiefly monetary means. This study additionally offers a critique of metering in an area of Bolivia that is water-rich. As well, this work provides a clear discussion of the nuance of water and cost equity in situ. Equity has been found to be a particularly problematic and vague concept to be researched–in fact, an issue that due to its very subjectivity it has been pushed aside (Tsur and Dinar, 1997; Teodoro, 2005, p. 144). This work dives into that subjectivity and sheds some light on equity realities by utilizing ethnographic techniques. It additionally does not allow for the "silencing of water" and the networked spaces behind the tap (Kaika and Swyngedouw, 2000, p. 135), but rather, upon an urge to make these spaces visible, brings them to the forefront. Many metering studies are also chiefly quantitative (with some notable exceptions, e.g., Loftus, 2006), so centering an ethnographic approach to understanding water metering offers some excellent counterpoints and a certain depth to existing metering work.

3. Water metering and human rights

The main aims of implementing a WatSan system through the process of international development are to provide use and benefit to the people who are beneficiaries, and to improve individual health and livelihoods. Water and Sanitation was named a Human Right on July 28, 2010, through UN Resolution 64/292 (see also, Meier, 2013). A human right to WatSan approach, or human rights-based approach (RBA) both requires ensuring that people have access to their rights and asks that achieving those rights be a clear focus of development (Filmer-Wilson, 2005). Moreover, rights-based approaches center on the *affordability* of water for domestic uses being a key component of rights allocation (see General comment No 15, as well as discussions in Smets, 2009). Rights-based approaches are complicated, however, and often critiqued. The very idea of rights and their potential applications are contested—Richard Wilson (2008) argues that the construction of rights is fragmented and imbalanced, Patrick Ball reminds us that the nature of and the actions surrounding rights can be influenced by individuals and by NGOs (2008, p. 77), and Stammers (1999) argues that these constructions of rights themselves can be power-laden, especially in nationalist settings. Still, in the Bolivian context, rights understandings are contextual, and derive from UN-focused constructions of rights, rights as forwarded by the Bolivian government, and in indigenous understandings of the rights of Mother Nature and the right to water (Goodale, 2009; Postero, 2007). WatSan issues are often parsed as human rights, but then are privatized, centralized, or commoditized (Johnston, 2003, p. 90). Water metering treads a jagged line of both potentially forwarding equity through the long-term conservation of water resources and conservative allocation of those resources (as argued by NGOs) and possibly stymieing access (as shown through this study). Thus, a focus on metering engages rights considerations on both sides, making it a particularly important focus for those engaged in providing water resources and/or who are interested in theoretical or practical tenets of water and sanitation rights. Interrogating this multilayered rights/use relationship is a key component of this work.

4. Water metering and conservation aims

One of the main objectives of water metering is to ensure that water sources are conserved for future use (Udea and Moffatt, 2013)—and one of the main machinations of NGOs is to ensure that water is preserved in the environment (Takahashi, 2002). The goals