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Disputed water: Competing knowledge and power asymmetries in the Yali Alto basin, Chile

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ABSTRACT

Hydrological information – which plays a crucial role in resolving conflicts over water allocation and distribution – is commonly seen as apolitical. However, this type of information is seldom objective and free of biases. Instead, it is used to position arguments and interests in accordance with the prevailing political agendas. Information is structured by complex and conflicting networks of public and private stakeholder interests, further reconstituted in different periods of time and place. Based on a study of the upper Yali basin in the municipality of San Pedro de Melipilla, Chile, we show how knowledge about water is produced, circulated and applied in the context of water scarcity and emerging conflicts over access to groundwater. Building on the notion of the hydrosocial cycle, the qualitative study shows how the production of hydrological reports and its application in political decision-making have reinforced asymmetrical relationships between the stakeholders locked in water conflicts. The lack of capacity of local farmers and community organizations to translate experiences into codified hydrological knowledge further exacerbates these asymmetries. Agro-industrial companies operating in the basin use hydrological assessments to locate and shift the water scarcity problems to the users, whereas locals blame them for accumulating disproportionately large concentrations of water extraction rights. Results contribute to the existing literature on environmental knowledge, arguing that discourses on water scarcity are not objective but shaped by socio-political contingencies. Overemphasising on data and techno-science based information to support certain decisions may be misleading without first unveiling the knowledge production processes operating across power-laden landscapes.

1. Introduction

Technical studies such as environmental modelling are generally considered central to define the most effective, efficient and sustainable mechanisms to manage natural resources. Exchanges between political and scientific actors commonly produce and circulate such knowledge to various stakeholders (Bijker et al., 2009; Jasanoff, 2013; Weingart, 1999). Although this type of knowledge is commonly claimed to be neutral and objective, science has historically failed to remain neutral from political interests (Demeritt, 2001; Feenberg, 2010; Forsyth, 2003). Knowledge production processes involve constant interaction of agents, artefacts and institutions, which are embedded in specific socio-political and geo-climatic contexts.

Political ecology has sought to understand how the production of (scientific) knowledge is shaped by asymmetrical power relations among actors involved and consequences of creating regulatory and normative frameworks for resource management (Goldman et al., 2011; Perreault et al., 2015; Walker, 2005). In case of water conflicts, the concept of the hydrosocial cycle has emerged as an attempt to analyse both the socio-political and geo-climatic factors shaping the water cycle (Bakker, 2012; Boelens, 2014; Budds et al., 2014). This approach focuses on how the interaction between actors concerning the control of water resources leads to different hydrosocial regimes and unequal access and distribution (Boelens, 2014; Budds, 2008, 2009; Palomino-Schalscha et al., 2016). It has also explored how actors and political rules and regulations shape the discourses of technical expertise. The concept has been proven useful to uncover how the so-called 'scientific assessments' have impacted water policies in perpetuating existing inequalities (Budds, 2009).

In a neoliberal context, private actors have amplified influence on

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the political sphere. Chile has been experiencing significant political transformations since the 1980s which established highly deregulated and privatized systems in sectors such as mining (Kronenberg, 2013), forestry (Manuschevich, 2016) and fisheries (Barton and Fløysand, 2010), as well as education (Torche, 2005), labour (Leiva, 2012), health (Helmke, 2011; Olavarria-Gambi, 2011), and housing (Hidalgo et al., 2016). Conflicts over the control of resources and access to basic goods and services have affected the country ever since (Mascareño, 2010).

In the case of water, the creation of a market-based system that allocated private water usage rights has seemingly led to severe problems of accumulation and concentration of water rights with specific actors. It is also blamed for over-exploitation of water resources in some catchments (Bauer, 1998; Galaz, 2004; Larraín, 2010). Albeit several legislative reforms (Szigeti-Correa, 2013), problems of over-exploitation and distribution of water persist. One of the reasons identified is the failure in improving the institutional structure of water management (Larraín, 2010; Modrego et al., 2011; Valenzuela et al., 2013). This is particularly problematic in the arid regions of Northern and Central Chile (Larraín, 2010), where dry periods with low precipitation are expected to become more frequent (Falvey and Garreaud, 2009). Management problems have also escalated significantly in areas relying on groundwater systems because of its increased exploitation since the 1990s (CEPAL, 2012) vis-à-vis a historically prevalent scarcity of groundwater in the region (Peralta, 1993).

Previous research on water management in Chile focused on water availability and land use change (Aitken et al., 2016; Donoso et al., 2014; Molinos-Senante et al., 2016; Oyarzún and Oyarzún, 2011; Valdés-Pineda et al., 2014). Studies analysed the operation of the water market and its impact on access to and availability of water (Bauer, 1998; Donoso, 2006; Galaz, 2004; Valenzuela et al., 2013) as well as resulting conflicts (Romero Toledo et al., 2009; Larraín, 2010; Prieto, 2015). Some studies also explored the implicit narratives of rationality and efficiency of water exploitation (Molina-Camacho, 2012; Palomino-Schalscha et al., 2016), and assessed how the implementation of free-market policies transformed local identities and traditions (Budds, 2010; Prieto, 2016).

Despite these contributions of previous studies, little attention was paid to the production of hydrological information, its role in decision-making, its political consequences, and its impact on water systems. Budds (2008, 2009, 2012) has sought to understand how water studies are produced in the Aconcagua river basin in Chile from a hydrosocial perspective while considering their territorial consequences. However, more studies are needed in other areas of the country to better understand how knowledge on water is produced, applied and shaped by geophysical and socio-political conditions of the territory.

We aim to contribute to the existing discussions based on findings from our empirical study in the upper Yali basin in the dry coastal area of Chile's central zone, which entirely relies on groundwater resources. In the Yali basin, land use change and the unregulated allocation of water rights appear to have led to serious water shortages affecting agriculture, household consumption and basic needs. The crisis has further exacerbated because of scarce precipitations over the last years (Rojas et al., 2010).

Following the framework of the hydrosocial cycle (Budds, 2009; Linton and Budds, 2014; Swyngedouw, 1999, 2009), we analyse the production, circulation, and application of information in the Chilean water management system and the resulting territorial impacts in the Yali basin. We especially focus on the relations among actors participating in such a cycle and the impact of groundwater information within the management processes and in conflict resolution. Findings highlight that hydrological information is selectively scaled and employed to position different interests and demands. This constricted participatory spaces in the decision-making process for some while allowing greater spaces to some other actors. We contribute to the ongoing discussions by showing that asymmetrical relations not necessarily result from lack of knowledge, but are related to the powers and authorities of mobilizing actors and stakeholders, drawing evidence from the hydrological data and models.

2. Water information, ecology and politics: The emergence of the hydrosocial cycle

Political ecology has effectively analysed water and development, conflicts over water and water governance (Birkenholtz, 2008; Boelens et al., 2016; Budds and Sultana, 2013; Loftus, 2009; Sultana and Loftus, 2013). Over the course of a little over a decade, the concept of the hydrosocial cycle has evolved as a key concept for analysing water-society interrelations (Bakker, 2012; Boelens, 2014; Linton and Budds, 2014; Palomino-Schalscha et al., 2016; Swyngedouw, 2009). Drawing from political ecology and critical geography, the concept looks at the dialectics between water and social power by defining them as hybrids that constantly shape and reshape each other (Swyngedouw, 2006, 2009). It analyses socio-political and geo-climatic factors with equal importance while assessing hydrological dynamics, overcoming the idea of water as a natural element behaving in a consistent, uniform and rational pattern. The notion of hydrosocial cycle includes a multiscalar perspective that moves beyond the concept of a strictly defined watershed (Budds, 2009; Budds et al., 2014; Swyngedouw, 1999, 2009). The strengths of the approach lie in its acceptance that water is "inherently political" (Linton and Budds, 2014, p. 175), shaped by social relations and power structures. Water is conceived not as a passive element, but as an asset immersed within a complex network of stakeholders (Bakker, 2012; Schmidt, 2014). While implementation of new technologies and subsequent management mechanisms affect water behaviour, the variability of the flow or the occurrence of an extreme event generates new responses from the local stakeholders and decision-makers.

For Budds (2009, p. 420), "the hydrosocial cycle provides a framework for approaching the role of environmental science in relation to water in two key ways: by extending existing work on the production of 'expert' knowledge by technical water managers, and by exploring the production and use of hydrological data". Water knowledge, according to this approach, is not neutral but situated and shaped by the hybridity of water and society (Linton and Budds, 2014; Swyngedouw, 2009). Thus, its production, circulation, and application are power-laden (Goldman et al., 2011; Linton and Budds, 2014, p. 171). In words of Boelens (2014, p. 236), "water control discourses – beyond just language and conceptual ideas – put knowledge and power to work to establish and legitimize water governance practice".

Understanding knowledge as shaped by socio-political and geo-climatic factors moves beyond the simple idea of knowledge as grouped facts, theories, and ideas mentally developed by individual actors. This approach attempts to recognize knowledge production as a process in which certain explanations are considered to make sense of the world, while other opinions and experiences are excluded from the discussion (Forsyth, 2011; Turner, 2011). Such understandings are embedded in enduring and extensive sociotechnical networks of people, artefacts and institutions that interact with each other (Edwards, 2010). Studying knowledge production is the exploration of how and by whom facts are articulated in order to give coherent explanations of reality (Latour, 1999). Defined by Callon (1984) and Callon et al. (2011) as a translation of the social and natural worlds, this explanatory process is the mechanism by which certain entities achieve to represent and talk in the name of other actors. It is a constant negotiation between and delimitation of identities, possibilities of interaction, and margins of action of the actors involved. Knowledge production, then, is the process in which problematization, interessement, enrolment and mobilization of actors – the four moments of translation – are coherently and explicitly articulated (Callon et al., 2011).

If knowledge is understood as an explanatory process by which the world makes sense, information concerns mechanisms used to describe and understand reality based on the analysis and interpretation of facts