Geoforum special issue Editorial: The Hydrosocial Cycle

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The once deeply engrained idea that water management should be considered as a technical endeavour that is appropriately confined to hydrological science and hydraulic engineering has now largely ceded to the recognition that water issues also comprise important social and political dimensions that call for the involvement of social science and multiple stakeholders. As such, in recent years, increased attention has been paid to the nature and effects of water policies, the roles of different water users in decision-making, and the emergence of conflicts and cooperation around water at various scales. These social and political dimensions of water have been subject to significant theoretical advances, drawing especially on insights from the broadly-defined political ecology tradition (including elements of science studies and anthropology), that seek to transcend Cartesian dualisms between humans and the environment in favour of the co-constitution between society and nature. Unlike conventional studies that focus on the relationship between humans and water conceived of as two distinct categories that interact with one another, considering water as socioecological makes it impossible to abstract water from the social context that gives it meaning and from the socio-political processes that shape its material flows and its discursive representation.

In line with this perspective, the notion of a *hydrosocial*, as opposed to a *hydrological*, cycle has gained traction as a means of both capturing and integrating the socio-political and biophysical processes that constitute water, as well as highlighting the limitations of traditional science and practice. The hydrosocial cycle is purposefully contrasted with the hydrological cycle, which is a dominant and enduring concept for portraying the physical states and flows of water, yet arguably regards water and water processes as asocial and apolitical. However, as the use of the term (alongside and beyond other uses of the term 'hydro-social' or 'hydrosocial') has proliferated, different meanings and usages have become apparent that suggest the need for further scrutiny. The concept of the hydrosocial cycle has hitherto been deployed to capture the deepening entanglement of water flows and power relations, and to shed light on the politicised nature of water management, with a view to reinterpreting the social and ecological implications that emerge as effects of power relations rather than of policy styles (Bakker 2003a, 2003b; Swyngedouw 2006, 2009). To date, the flows of water and social power embedded within the hydrosocial cycle have been examined in a range of contexts and through different perspectives, including through the capitalist production of urban environments (Kaika 2005; Swyngedouw, 2004), the historical construction and mobilisation of the concept of the hydrological cycle (Linton 2008, 2010) and the production of hydrological assessments that reinforce unequal access to water (Budds 2008, 2009) (see Linton and Budds, this issue, for a comprehensive review of previous scholarship employing the term 'hydrosocial cycle').

This special issue on the hydrosocial cycle responds to the need to more precisely define and theorise the concept as a means to interrogate and elucidate hydrosocial relations and change, as well as to explore and articulate its analytical and political purchase for critical water research and action. The endeavour commenced through a shared interest among the organisers in the politics of hydrology, and an aspiration to integrate this aspect more fully into the growing and vibrant body of work around political ecologies of water, little of which had hitherto paid much attention to the construction and implementation of hydrological concepts, methods and data. We pursued this interest through a series of panel and paper sessions at the Association of American Geographers annual meetings in 2008 (Water, Science, Humans: Adventures of the Hydrosocial Cycle), 2009 (Water, Science, Humans: Advancing the Hydrosocial Cycle) and 2010 (The Hydrosocial Cycle: Between Hydrology and Critical Social Science), which attracted wide interest and participation from human

geographers and cognate scholars. Through our engagement in these sessions, our initial aim to reflect on the nature and place of hydrology in political ecologies of water developed into a much broader endeavour to further understandings of the relationships between water, people and science, with a view to further refining the nature of the concept of the hydrosocial cycle and contemplating the ways in which it might support and advance critical political ecologies of water within academic scholarship, that may in turn inform water policy and practice, as well as feed new perspectives into interdisciplinary water education.

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The primary aim of the collection of papers assembled in this special issue is thus to further consolidate the concept as a framework that focuses attention on the materiality of water flows in conjunction with the social and political practices and discourses that shape and are shaped by them. This need is justified by observations that hydrological processes are increasingly shaped by human activities and institutions with specific visions and motives, that hydrological data and knowledge are acknowledged as socially constructed and politically mobilised, that water is increasingly recognised as being characterised by multiple and context-specific cultural meanings, and that the material and symbolic characteristics of water also play an important role in shaping social relations and forms of governance. A core contention of this collection of papers, therefore, is that, while the hydrological cycle remains a widely used framework for understanding biophysical processes, it is lacking for the analysis of water governance, politics and conflict. Unlike the hydrological cycle, the hydrosocial cycle is not concerned with *water* per se, but with *hydrosocial relations*. The hydrosocial cycle directs analysis to how social and power relations – especially connected with power and capital - shape the nature and dynamics of water and its circulation, and how water is influenced by social processes occurring at a wide variety of spatial and temporal scales beyond the basin unit. As the lead article contends, the hydrosocial cycle thus potentially constitutes a theoretical framework for political ecologies of water.

Through the framework of the hydrosocial cycle, therefore, our aim is not to simply integrate water and socio-political factors, but rather to elucidate how water is produced through social and political processes, and how water shapes social structures, relations and identities, and with what effects across space and time. The authors of this collection of papers show how a focus on hydrosocial relations rather than water per se enables us to advance analyses of the political ecology of water from (external) relationships between people and water, to the (internal) co-constitution of water itself through social and political processes and the production of hydrosocial relations. An important contribution of these papers, therefore, is their explicit interrogation of how 'water' is never simply H_2O but always *produced* as a particular 'water', materially and discursively, and within specific moments, contexts and relations. To this end, they collectively consider how water itself is conceptualised, how water knowledge and concepts are constructed, how elements of the waterscape embed and express politics, and how water integrates with other processes and things within the hydrosocial cycle.

This perspective, we contend, opens up fresh possibilities of knowledge and understanding of water and its circulation: whereas the hydrological cycle is deemed to present the universal and natural behaviour of water that continually circulates as H_2O, the hydrosocial cycle draws attention to the complex and context-specific social production, discursive construction and political mobilisation of 'water', and the dialectic process through which such (produced, constructed and mobilised) 'water' in turn configures society.

Nevertheless, a challenge that remains for a future opportunity is to explore how the concept can be usefully mobilised politically, with a view to inspire change in hydrosocial relations within policy, advocacy and practice. By making manifest the politicised nature of water and its circulation, the hydrosocial cycle has the potential to engage wider audiences to open up possibilities for democratic and/or emancipatory *change*.

The special issue comprises a lead article reviewing and conceptualising the hydrosocial cycle, followed by eight papers that engage the concept and develop it through empirical

work drawing upon case studies from around the world, which collectively illustrate how a focus on the *production of water* rather than H_2O *per se* directs our attention away from simply the politics *of* or *around* water, and towards those that are embedded *in* and pursued *through* water, as water and society shape and reshape each other to produce new hydrosocial arrangements over space and time (Bear and Bull 2011; Budds 2013; Linton 2010, Loftus 2009; Swyngedouw 1999, 2007).

The first article by Jamie Linton and Jessica Budds traces the emergence of the hydrosocial cycle in critical geography and political ecology, building on literature that critiques the desocialised treatment of water in political, managerial and administrative practice and discourse (e.g. Budds and Sultana, 2013; Loftus 2009, 2011; Swyngedouw, 1999, 2004, 2007) by further developing the concept in relation to water governance. The paper puts forward a conceptualisation of the hydrosocial cycle as a process through which water and society make and remake each other over space and time, and develops it as an analytical framework to underpin critical political ecologies of water, by reflecting upon what water is, how water is known, the co-constitution of water and politics, and the need to look beyond the water itself in hydrosocial relations.

The following paper, by Jessica Barnes, explores the re-use of agricultural drainage water among farmers along the River Nile in Egypt. She shows how water is continually recycled among farmers, accumulating ever higher saline concentrations. Irrigation water in the Nile is thus characterised by inherently uneven patterns of circulation over both space and time, in terms of flows of water, salts and chemicals, as well as access by farmers of varying levels of income. Barnes thus emphasises the varying nature of water within the hydrosocial cycle, arguing that water is not simply water, but becomes different waters, in terms of quality and quantity, as well as continuity over space, time and social group.

Peter Mollinga also examines the hydrosocial cycle in relation to large-scale surface irrigation, this time in the context of south India. Drawing on debates around the role of social structure and both social biophysical agency in hydrosocial change (e.g. Bakker, 2003b; Barnes and Alatout 2012; Bear and Bull 2011), and similar to Barnes, he explores the ways in which hydrosocial relations are shaped by spatial and temporal dimensions, as farmers are regulated by the storage and release of water within irrigation systems, and by the seasonality of irrigation as well as longer-term processes of agricultural development and prosperity.

Jeffrey Banister's paper also explores the role of biophysical agency in hydrosocial relations, illustrated by a case study of irrigation management in arid north-west Mexico. Introducing Deleuzian notions of matter, flux and flow, he emphasises the intersection between the non-linear behaviour and amorphous nature of water and people's strategies to subvert control and rule. He reappraises Wittfogel's relationship between water infrastructure and state control in the case of Mexico, by showing how irrigation infrastructure installed as an attempt to impose bureaucracy and foster private capital accumulation was challenged by the unruly nature of water entangled with the persistence of localised indigenous practices.

Continuing with Mexico, Katie Meehan examines the agential role of water-related objects in the production of state power. Based upon an analysis of water laws and treaties, flood control and drinking water supply infrastructure, and common technologies in low-income households such as tanks and buckets, in Tijuana, she shows how these artefacts produce unevenness in state power over space and time. Meehan argues that these water-related objects are not simply 'tools' that are used by the state to consolidate power and control over water, but embody and produce power in themselves, in ways that reshape hydrosocial relations and state power.

The paper by Rachael McDonnell continues the theme of the relationship between water and state power, by examining the production of water through boreholes, desalination and wastewater recycling in Abu Dhabi. Critically assessing commonly held ideas around the rentier state and centralised state control in arid regions, she shows how the harnessing of energy by Abu Dhabi has resulted in the production of new sources of water, which in turn

has transformed formerly arid landscapes and traditional water-saving cultures. McDonnell argues that Abu Dhabi's hydrosocial cycle cannot be understood in isolation of energy, and that new modes of the production of water challenge existing theories around state power.

We next turn to Rutgerd Boelens, who draws on the cultural and experiential dimensions of water (e.g. Mosse 2003; Orlove and Caton 2010; Strang 2004) to examine an Andean indigenous conception of the water cycle, and its relationship with contemporary hydrosocial relations that have developed in the highlands of Peru. He explores the notion of a 'hydrocosmological cycle', showing how water processes are understood and framed by Quechua villagers as interconnecting physical, human and spiritual factors that follow a cyclical pattern over time. Boelens argues that Western notions of water have served to naturalise existing hydrosocial relations and legitimise exclusionary water distribution.

Similar to Boelens, the final two papers draw on science and technology studies to examine the historical and political construction of water knowledge and concepts and their subsequent naturalisation and depoliticisation (e.g. Budds, 2009; Cohen and Davidson 2011; Linton, 2008, 2010). Gabrielle Bouleau's paper explores the co-production of water science and its effect on social order, through the case of the differential development of the French concept of hydro-system (*hydro-système*) in the Rhône and Seine River basins and its adoption in river basin management. She demonstrates how the concept was defined differently in each context, according to the nature of each river basin and the expertise of each lead scientist, yet served to reorient river basin development. Bouleau argues that such concepts rest upon context-specific definitions of water, which can be stabilised and destabilised according to the circumstances within which they are produced.

In the final paper, Sara Fernandez also examines the epistemological dimensions of water through the hydrosocial cycle, by providing a rich genealogy of the Minimum Flow Requirements and their implementation in France. She explores the context-specific discourses and practices involved in the production of these indicators, shedding light on the social and political implications of the manner in which they portray rivers and determine what needs to be measured and how. Fernandez argues that the MFRs were promoted as scientific, which obscured the politics that shaped their production, as well as the powerful interests that were served by their practical implementation.

Themes

- The co-constitutive/dialectical relationship between water and the state - Banister, Meehan, McDonnell
- The internal relation between (water) science/knowledge and social structure/order (naturalisation of concepts, time and space specific production of these concepts) - Bouleau, Fernandez, Boelens
- Relationship between technology/infrastructure and social order - Banister, Meehan, Mollinga
- Relationship between and roles of humans and non-humans – Banister, Meehan
- Variability, agency, unruliness, complexity of water – Banister, Mollinga, McDonnell

Illustrations of some of the points in Linton & Budds

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- How water is known – Bouleau, Fernandez, Boelens
- Meaning of water – Barnes, Boelens, McDonnell
- Water is not water, but is always produced - Banister, Barnes, McDonnell
- Variability, agency, complexity of water – Banister, Barnes, Boelens, Mollinga

- time – Barnes, Mollinga
- space – Banister, Meehan, McDonnell
- Wittfogel – Banister, McDonnell
- Cycle as making and remaking, not circulation – Banister, Boelens
- Looking beyond the water – all in different ways McDonnell (energy), Boelens (cosmology), Mollinga (success of irrigation interventions), Barnes (quality and reuse)
- Top down expertise not working in local contexts – Banister, Boelens

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