Introduction

Like many ‘megacities’ in the South, Jakarta’s water supply system is highly fragmented. The formal water supply system reaches less than 35% of the city’s inhabitants; extending to scattered, mostly higher income areas of the city, the piped water supply system is perhaps better characterized as an ‘archipelago’ rather than a network (Bakker, 2003a). The majority of Jakarta's residents make use of a variety of highly differentiated sources - bottled water, vendor water, shallow and deep wells, public hydrants, and piped network connections - to meet their daily water needs (Bakker 2003b). The majority of the city’s population relies exclusively on water provided, managed, delivered outside of the piped network. Indeed, a significant proportion of households with connections to the networked water supply system continue to rely primarily upon other sources of water supply given low water quality and lack of continuity of supply in the network.

This fragmentation of access to water supply and sanitation has been characterized as one of the key development challenges for the South in the next century. Halving by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation is one of the Millennium Development Goals established by the international community at the World Summit on Sustainable Development in Johannesburg. The World Health Organisation estimates that 1.1 billion people worldwide do not have access to safe drinking water, and 2.4 billion are without access to adequate sanitation (WHO, 2004). An increasing proportion of users without access to adequate water supplies live in urban areas; despite residing in a metropolitan area, poor families in large cities in the South frequently do not have networked water supply access.

Various authors have explored why this fragmentation has emerged, and attempted to explain why it proved to be so generalized and persistent in cities in the South (see, for example, Balbo, 1993; Graham and Marvin 2001; King, 1990). As Graham and Marvin have argued in Splintering Urbanism, the past two decades have witnessed a fragmentation of access, control, and pricing of network infrastructure, including water supply (Graham and Marvin, 2001). This ‘splintering’, Graham and Marvin assert, has occurred along with the restructuring of utility networks in both the South and the North, embedded in wider changes in aid and financial flows, technological innovation, social attitudes, and governance - particularly the reconfiguration of citizens’

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entitlements in light of newly dominant understandings of the appropriate role of the state in services provision. The ‘collapse of the integrated ideal’ in networked utility provision reflects, in other words, a complex admixture of social, economic, and technological changes which, with local variants, is occurring in cities around the world. Jakarta, with its toll roads and gated communities, is positioned alongside other brief case studies of Southern cities as characteristic of a ‘splintered’ urbanism arising from processes of liberalization, privatization, structural adjustment, and financial speculation. This is demonstrated, for example, with brief reference to the perverse system of water pricing in Jakarta, as in many cities in the South, where wealthy consumers connected to the public network pay substantially lower volumetric rates than poor urban residents reliant on water vendors; at the height of water scarcity in the dry season, water vendors may charge prices up to 50 times higher per unit volume than tap water prices (Bakker 2003b).

Like much work which engages with questions of the relationship between society, cities, and infrastructure, Graham and Marvin’s work is rooted in a Northern context. Their concern with the social and environmental impacts of the ‘collapse of the integrated ideal’ presumes the existence of modern infrastructural networks with widespread, if not universal provision. Although they acknowledge the differentiation of service provision which characterizes ‘colonial’ cities (which they characterize as ‘spatial apartheid’), their concern with the interrelationship between splintering infrastructure networks and fragmentation of both urban space and social consensus is based on a narrative which assumes the prevalence of the ‘modern networked city’ as a generic phase, or stage of urban development. Indeed, much of the literature in the field of ‘Science, Technology and Society’ (STS) and in urban studies which engages with questions of urban infrastructure is premised upon detailed case studies of, and intimate familiarity with ‘world cities’ such as Los Angeles, New York, and London. The absence of integrated, universalized networks in cities of the South, such as Jakarta, is compared with these ‘global cities’ and characterized as an instance of failed or lapsed modernity, in which elites are integrated into, and the remainder of the population excluded from infrastructural networks.

This type of approach has been the subject of two sets of critiques within urban studies and geography. First, recent work in urban studies and urban geography has critiqued the rather myopic focus of much of the literature on so-called ‘global cities.’ In particular, researchers have highlighted the dangers of extrapolating theoretical frameworks developed through research on cities such as London or Los Angeles to other cities, particularly from cities in the North to those in the South (see, for example, Robinson, 2002). Robinson argues that analyzing a small range of economic and political activities of a small number of cities within the restrictive frame of the “global” (while contrasting these to poorly serviced parts of ‘non-global cities’) fails to account for the diversity of activities within cities, and for the constant repositioning of global and local links which all cities negotiate (indeed, which all locales negotiate, as Tsing explores in her ‘global ethnography of connection’ (Tsing 2003)). The ‘global cities’ approach characteristic of much of the urban studies literature also presumes an implicit hierarchy, positioning a few nodes of global trade and culture above the (inconsequential, impoverished, marginal) remainder. In response, Robinson
follows Amin and Graham in calling for a new approach which subverts this hierarchy, breaks free of the categorizing imperative of the ‘global, developed city,’ and “embark on a cosmopolitan understanding of ordinary cities” (Amin and Graham 1997; Robinson 2005: 549).

A second critique relates to the categorisation of cities as ‘developed’ versus Third World (Douglass 1998). Thus, implying an urban norm with which cities such as Jakarta clearly do not fit. This categorization has been implicitly resuscitated, argue scholars like Robinson, within the ‘global cities’ literature. Postcolonial theorists have critiqued the resulting (often implicit) academic division of labour which allocates the study of certain cities, places and peoples into sub-disciplines such as ‘urban geography’ or ‘development geography’ (Power and Sidaway, 2004). Robinson (2002; 2003) offers a critique of Euro-American centered forms of theorizing, and calls for the decentering of the parochial focus of urban geography and urban studies through a production of urban theory for the South, in the South. In particular, she asserts the necessity of challenging the assumed universalism of theoretical claims that are developed without reference to cities in the South.

This paper builds on these critiques, and responds to the call for the production of a decentered theory of urbanization in the South through a case study of Jakarta. Jakarta is situated as a city that has been characterized, since the colonial era, by a high degree of fragmentation of access to public services, and in particular water supply. We explore how this fragmentation has its roots in the colonial era through documenting how a contested and evolving process of social differentiation of classes and races was linked to the differentiation of water supply infrastructures and of urban spaces. Based on this analysis, we argue that the water supply network has been highly ‘splintered’ since its inception, and that the spatial fragmentation of supply was not substantially altered by the rise of the ‘modern infrastructural ideal.’

To explore why this paradigm was not applied in the case of Jakarta, we employ a concept of (post)colonial governmentality (Foucault 1991; Li 1999; Stoler 1997) to document how relations of power were materialized and contested via hydraulic networks through the project of colonial government in the late nineteenth and early twentieth century, and through later attempts to ‘modernize’ selected spaces in the city through the provision of large-scale water supply projects. Although we are wary of any simplistic comparisons between the colonial past and present, we argue that the optic of postcolonialism provides a powerful lens for dissecting the power relations which continue to structure access to water supply and urban space in Jakarta. As we explore in the concluding sections of the paper, this dynamic complicates Northern-rooted narratives of urban infrastructure, and also the developmentalist narratives of international aid and multilateral financial organizations.

We begin our story at the moment of the first major colonial intervention into urban water - the construction of a system of artesian wells in Dutch Batavia in 1870 - and follow the development of urban waters up until the end of the era of colonial rule in 1950. Examining the two major urban water infrastructures of the colonial government - 1870s artesian water, and 1920s spring water network - and the accompanying rationalizations and discourses that legitimated these interventions and prevented others, we demonstrate how an ongoing fragmentation of Jakarta’s water supply
accompanied its concurrent (and current) centralization. We explain the operation of these seemingly contradictory processes as the product of both colonial and post colonial attempts to differentiate people by class and by race, and to create a modern ‘governable’ subject. In the final part of the paper, we examine how layers of multiple ‘rationalities of rule’ created successive archipelagos (rather than networks) of water supply provision that both enable and constrain contemporary efforts to universalize potable networked water supply in the city.

Before documenting the genealogy of water supply in Jakarta, the chapter briefly explores theoretical concepts of governmentality and the socio-natural production of urban water. We discuss how water supply was (and still is) implicated in the discursive and material production of the city and its citizens. We argue that the project of producing ‘modernized’, liberal, productive, ethical and obedient colonial citizens within a hygienic and economic urban environment entailed not only physical reshaping of urban space, but also discursive reworking of the rationales of water supply delivery. As we demonstrate, drawing on archival evidence, the classification of ‘types’ of urban citizens associated with the development of a modern water supply system was actively translated into differentiated urban spaces which persist in the contemporary city. This imbrication of water and constructions of citizenship is, as we argue in the conclusions of the paper, a persistent feature of the urbanization of water supply, and is still visible in the contemporary project of modernizing urban spaces and urban citizens according to neoliberal rationalities.

II Urbanizing Water Supply: Governmentality, modernity, and (post)colonialism

How does a concept of postcolonial governmentality help us to understand urban water supply in cities in the South? As originally employed by Foucault, the term governmentality refers to a specifically modern (and Western) form of rationality which emerged in Europe during the 16th and 17th centuries (Foucault 1991). The term denotes a new, diffuse form of power through which an increasingly administrative, bureaucratic state comes to rely less on physical force and military might, and more on a new set of savoirs or rationalities (such as statistics) which enable an unprecedented degree of control and surveillance over individuals. The twinned concerns of this new form of rationality are population and resources; the interrelationship between societies and environments thereby becomes a central concern of the state (see, for example, Agarwal 2005; Luke 1999).

As developed within the social sciences, the theoretical framework of governmentality is an analytic used to examine the operations and relations of power (for background see Burchell et al., 1991). In this framework, power is defined as relational, operating through both discourse and material practice. Empirically, employing the concept of governmentality implies a focus on power (both domination and subordination) as exercised by both the governors and the governed through both discourses and practices. In other words, a focus on governmentality calls for analysis of the interrelationship between actions and knowledges. It places emphasis on the continual process of constructing knowledges through which ‘subjects’ are governed, and to the resistance of subjects to the production of expert knowledges (Cooper and
This resistance to what Tania Murray Li terms ‘relations of rule’ has been the focus of much recent research from a postcolonial perspective (Li, 2001). Although much scholarship on governmentality has focused on domination and discipline, postcolonial theorists have highlighted a more complex relationality of rule, which involves not only strategies of resistance by ‘subjects,’ which Scott terms ‘weapons of the weak’ (Scott, 1985), but also nuanced negotiations between those who govern, and are governed - which Li (1999) argues result in ‘compromised governmentalities.’

As we explore in this paper, these compromised governmentalities have a material, as well as discursive dimension: relations of power are inscribed in physical space and in ecological processes as well as social relations (see also Agarwal 2005; Braun 2000; Scott 1998). In the case of urban water, the social relations of urbanization both shape and are in turn shaped by highly differentiated circuits of water which flow within the city (such as polluted rivers and canals for marginalized, migrant or ‘illegal’ urban populations, which overlap both as supply and effluent with the piped water supply for the affluent). As water supply infrastructure is long-lived (well over one hundred years in many instances), these circuits and networks simultaneously embody successive ‘relations of rule,’ through the patterns of water supply infrastructure and water use practices they both enable and disable. This approach to the government of water and water users is predicated upon an understanding of urban water as a ‘socio-natural’ process (in contrast to Graham and Marvin’s definition of the city as a ‘sociotechnical process’ (Swyngedouw, 1999). Rather than approaching society and nature as distinct, mutually constitutive entities, Swyngedouw argues that analysis should focus on the processes by which specific socio-natural entities are continually (re)produced. This focuses attention on processes of regulation in a Marxian, metabolic sense, where regulation is understood to be simultaneously material, social and discursive, a continuous process of mediation and production of socio-natures (Foster, 2000; Gandy, 1997). ‘Urban water’ is thus understood as the socio-natural outcome of a metabolic process, circulating through a hydro-social (rather than purely hydrological) cycle (Gandy 2004; Illich 1986).

In this paper, acknowledging the socio-natural composition of urban water as the physical and discursive product of socio-cultural, political-economic, and ecological relations of power, we deploy the analytic of governmentality to highlight how these relations are mobilized within particular systems of rule, enacting specific effects upon the production of space and identity. In particular, we illustrate how relations around urban water in Jakarta are both a product, and productive of a system of colonial authority that was based upon creating and reinforcing divisions of class, race, gender, and religion. The ways in which the production of differences between urban populations and urban spaces was both enacted upon, and reacted against through flows of urban water, is the focus of our case study, to which the paper now turns.

III. Colonial Control: Governing urban water, urban populations, urban spaces
The rise of the ‘sanitary city’ is where we begin our history of Batavia’s urban water infrastructure, as the new relationship between water, ‘security,’ and
health led to the development of a new discourse around water, identity and citizenship that was both produced by and productive of a new system of colonial authority. In the following chronology of the development of a ‘modern’ urban water supply in Batavia we illustrate how the construction of the artesian and piped spring water infrastructure intersected with questions of the ‘civilized’ and ‘modern’ colonial subject, and how the strategies of government of these subjects intersected with changing understandings of the cleanliness of urban water and its relationship to hygiene and urban space. Governing water, in other words, implied new categorizations and divisions: most importantly, the delineation of the ‘public’ into different categories of populations (European vs. native; hygienic vs. contaminated), which guided the pattern of provision of this first urban water supply system. These divisions were fostered by (and reinforced) an emerging realignment of colonial hierarchies, whereby authority became located within one’s identity as a ‘modern,’ hygienic citizen - a class of citizenship that both conferred one’s ‘rights’ to the ‘public’ water supply system, and then reaffirmed this and other entitlements through the lifestyle, and association with health and progress which plentiful piped water was presumed to enable.

1. Colonial hydro-governmentality: The development of artesian water supply (1870 – 1910s)

The problematic of urban waters and the ‘unhealthy’ city was a legacy plaguing Batavia from its early beginnings in 1619. High rates of mortality in the 1700s (due to which Batavia, former ‘Queen of the East’, was re-characterized in the Dutch popular imagination as ‘Graveyard of the East’) were later understood to be primarily attributable to water borne disease (Abeyasekere, 1985). However, prior to the 19th century, there were no direct links made between the health of body and consumption of a standardized ‘quality’ of clean water; problematization of the health of the city and its citizens focused more generally on the urban environment’s ‘killing vapours’, and ‘miasmas’ (Blusse, 1985). Flight from the urban spaces and urban populations characterized by death and disease was the only solution, and European residents repeatedly tried to escape the urban ‘ziektenhaard’ (‘breeding ground for disease’) by moving out of, and then further away from the old city. It was not until the mid-1800s that connections began to be made between healthy urban spaces, populations, and water supply, motivating the first significant intervention into the production of a ‘hygienic’ water supply, and marking the beginning of our genealogy.

In 1873, following the conclusion of various special council meetings and the formation of commissions to look into the ‘problem’ of water supply for Batavia the central government (represented by the Council of the Indies in Holland) financed the construction of a series of artesian wells, supplying the European urban population with a water supply through architecturally elaborate communal hydrants (Figures 1 and 2). From 1873-1876 seven wells were drilled, all “wholly provided for by the Central Government” (Maronier, 1929:227), and the initial production capacity was later expanded, so that by 1920, at the end of the era of artesian water, there were 28 wells and 12 reservoirs with a capacity of 750 m3, available for ‘public use’ (Maronier, 1929).
The new mentality of colonial government which arose in the late 1800s was central to the ways in which ‘problems’ of water supply in Batavia were framed as pressing concerns. Abandoning the previous ‘cultuur system’ monopoly, in 1870 the government turned to market capitalism to govern the colony (Robison, 1986). With the development of the colony left to market forces and private enterprise, the stated purpose of government was to encourage the increased participation of the private sector, while fostering the industrious and responsible nature of the native population in state-controlled agricultural production.

Ensuring the growth of a healthy and productive population in turn justified the modernization of infrastructure, and unprecedented government-led initiatives to combat public health issues that threatened economic productivity (Argo, 1999). The provision of public infrastructure to facilitate private sector profits (providing the conditions for capital) as a new purpose of colonial government was reflected not only in the provision of the 1870s artesian water supply, but also in the concurrent (1870-1890s) building of railways, harbours, steam trams for intra-city transport, and electricity networks (see Mrazek, 2002). The project of creating a ‘modern city’ with all of the attendant infrastructure to support the influx of European bodies and European capital had begun, setting in motion a process that would change the urban landscape and the relationship between urban populations (see Milone, 1966).

Paralleling the government’s new concern over the productivity of its population was a new scientific understanding of water; new connections made between water supply and human health both rationalized government investments and initiated the development of new discourses around ‘safe’ water supply sources and water use practices. Emerging in the mid-19th century, developments like the microscope, and the study of bacteria began to change the ways in which water was viewed, altering the ways in which people evaluated properties of water, its quality, its risk to the human body, and the basis for technological interventions which would then ‘control’ for quantity and quality (see Gandy 2004; Goubert 1989; Luckin 1986). With the advent of new scientific technologies, the definition of water - its properties and characteristics, and potentials - became standardized, with the methodologies of analysis and ‘scientific properties’ of water circulating through the professional journals of Europe. In the Netherlands East Indies, an increasing uniformity of taste and understandings of quality was fostered by analyses of drinking water quality by military doctors (Moens 1873). Amongst the colonizers, previous appreciations for the distinct qualities of different waters (with specific properties of water linked to treatment of specific ailments, or religious rituals, see Hamlin, 2000) were replaced by a more unified understanding of water as defined by a ‘scientific’ analysis of its biophysical properties (although, as recent ethnographic work has indicated, the hegemony of these scientific understandings was only partial, even in the North (Parr 2005; Strang 2004)).

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3 From 1840-1870 the Dutch colonial government imposed the ‘cultivation system’, a form of monopoly capitalism whereby 1/5th of all plantation land on Java and other colonial territory was obliged to be planted with products under the direct supervision of the colonial government.
The shift from recognizing ‘many waters’ of various beneficial properties, to only one scientifically defined ‘nature’ for water with its quality determined by what it did not contain, precipitated the development of centralized systems of water supply throughout the world (see Melosi, 2000). Within the Netherlands Indies this new understanding of water also circulated a new discourse around ‘modern’ identities and ‘development’ that re-rationalized colonial authority upon the basis of technological mastery and built upon previous divisions between urban spaces and urban populations. The earlier movement of the European population into the new capital of Weltevreden (two miles south of the old city) to settle upon healthier, higher ground areas between the natural watercourses had already replaced previous reliance upon surface waters with shallow groundwater wells. With the introduction of water quality studies, associated norms of hygiene, and underlying conceptions of disease transmission (Maronier, 1929:230), the creation of new water supply sources became a project which associated specific water supply technologies with differentiated consumer identities. The distancing of the European population from surface water both spatially (proximity of residences) and bio-physically (replacing drinking water sources with groundwater) was reinterpreted as an indication of their modernity, as scientific understandings of water quality began to redefine surface water as contaminated, and well water (along with adequate treatment) as ‘more pure.’ In contrast, native spaces remained crowded alongside the surface water ways that they continued to rely on for all of their water needs (Argo, 1999). Both the native population and the use of surface water and its questionable quality was relegated to the ‘past,’ an effect of the first phase in the development of Batavia’s urban water supply. Colonial accounts of the water supply history of Batavia (see Moens, 1873 and Maronier 1929) located native bodies/identities spatially and temporally: physically removed from areas of ‘modern,’ hygienic, European settlements, native populations continued in a mode of living characteristic of the ‘past,’ emblematized by their ‘traditional’ understandings and unhygienic habits of use of surface water.

The division of urban spaces and populations according to their level of modernity was then built into the water supply infrastructure of the late 19th century. This infrastructure was intended only to provide for a ‘modern’ European population who had begun to care about a scientifically defined quality of drinking water. The artesian hydrants were located within the newly concentrated European settlements, and not extended to include native spaces/populations until 1909. The fragmentation between populations, urban space, and water supply continued within subsequent phases of the water supply network, as ‘more modern’ waters flowing through pressurized piped networks were built upon the existing physical and discursive artefacts of the artesian hydrants. In 1910, the ‘advancement’ of European water supply from non-piped provision to private household connections was made possible by the initial construction of the artesian water hydrants and reservoirs within ‘European space,’ and in turn, it made possible the redefinition of ‘native’ and ‘traditional’ water supply as non-networked. Artesian water supply from the hydrant (not piped into the home) became the new ‘native’ water supply, and high reservoirs and piped networks providing a pressurized water supply to European households contrasted the emerging development of ‘networks’ of native water vendors and communal hydrants that began to serve select...
kampons (slums) (Figure 3), another pattern of provision still evident in present day Jakarta (Figure 4).

The connections established between one’s ‘developed’ status and one’s knowledge of the scientific properties of water supply supported the new differentiation between water sources, and the type of people who used them. The continued use of, and preference for untreated surface water by native populations for drinking, bathing, and washing served to reinforce in a variety of ways the superiority and advanced knowledge of the European population and led to the production of a discourse linking ‘undeveloped’ native bodies with surface water, disease, and contamination. The fact that “natives take pleasure bathing, washing and defecating in streaming water” demonstrated “their insensitivity to cleanliness and order” (Van Leeuwen, 1920:198). Moreover, the recorded ‘distaste’ of the native population for artesian water (Van Breen, 1916) - a water supply that needed to be aerated and cooled after it was pumped - affirmed their evident ‘lack of modernity’, and their status of non-citizens within a modernizing urban landscape. While the native population remained reliant upon the ‘traditional’ and ‘unscientific’ properties of water (colour, clarity, taste, smell) to determine its quality, a ‘modern’ citizen (a member of the ‘public’ for whom the artesian water supply system was intended to serve) was one who saw water through a microscope, one who possessed a scientific rationality and hence came to appropriately ‘value’ a clean water supply. In contrast, those who demonstrated ignorance of science and a lack of concern for bodily health by clinging to ‘habits’ of using untreated surface water were not yet considered citizens of an increasingly modern, liberalized colonial state; a rationalization which dovetailed with the racialized colonial hierarchy of the ‘Liberal’ era of colonial rule.

However, as emphasized in theoretical framework of colonial governmentality, the strategies of rule, and relations of power flowing through water, were not only shaped by the rulers. The resistance of the native population to artesian water supply is recorded in colonial accounts as an “unwillingness to pay for such a supply” (van Leeuwen, 1917:89). Nevertheless, this apparently ‘irrational’ valuation of different waters, generating ‘unhygienic’ water use practices, must also be recognized as an act of agency. Repeated attempts of the colonial government to restrict access and regulate relationships between native bodies and water failed (see Moens 1873; Maronier 1929). The persistence of the population in their ‘rooted habits’ indicated their resistance to adopting an understanding of water that was not rational given the present spaces in/around the city, and the present place in the colonial hierarchy that they occupied. The subsequent discourses relating identity and ‘modernity’ to different water supply sources, and their limited provision to certain sections of the population, can also be considered as what Tania Li (1999) terms an ‘act of compromise’ by the colonial government, rationalizing its failure to regulate the native body, and to restrict certain native practices of water supply use. However, it was also the inability to transform native relations around water that rationalized what have come to be persistent demarcations between urban populations and the spaces they inhabit. These divisions were made in the 19th century between the modern, civilized, ‘rational’ European population whose water use became guided by scientific reasoning and relied on a system of self-regulation, versus the ‘ignorant’, diseased, backwards, native population who put themselves and
others in jeopardy through their continued ‘irrational’ practices around surface water. Indeed, this has initiated a discourse still present in contemporary patterns of water provision between the present day ‘kampungs’ (slums) and modern estates and highrises of Jakarta.


The second colonial intervention into urban water supply emerged gradually after the adoption of a new mentality of ‘ethical’ government in 1901. It concluded with the construction of a new water supply system delivering mountain spring water through 53 kilometres of iron pipe into the city’s piped distribution network. Seeking to address the increasing anti-colonial criticism arguing for a more ‘ethical, and humane’ government of the East Indies (Gouda, 1995), the 1901 ‘Ethical Policy’ laid out intentions for new relations between the population and the state. The state repositioned itself as a parental ‘caretaker’ of the native population, still authoritarian in nature, but now with the ‘development’ of the native population into modern, self-productive citizens laying at the heart of its policies. The new priorities, purposes, and political strategies of government were embedded in the changing rationalities around urban water supply. Public health and economic efficiency (of water supply and of the population as a whole) became sometimes contradictory guiding principles determining decisions made about urban water: the selection of technology (high pressure vs. low pressure networks; public hydrants vs. household connections), water supply sources (spring water vs. artesian water), and patterns of provision for different populations.

Although the transition between what was now described as an ‘inadequate and antiquated’ artesian water supply system and a modern, centralized, high pressure, spring water supply was stretched out over two decades (1900-1920), colonial chroniclers (e.g. Maronier, 1929) describe the technological shift as though it were a notable ‘break’ with the past eras of water supply. Tremendous significance was invested, at the time, in this new symbol of a new kind of government. With the transition to the source water network, water production capacity increased to over 350 l/s, reservoir size grew from 780m3 to 20 000 m3, the city network was extended by over 150 kilometres (Smitt, 1922), and best of all - the water from the pipes could be used ‘straight out of the tap’ without need for purification, or cooling, as was the case for artesian water. The planned provision of 90% of European households with a supply of 140 L/capita/day (van Breen, 1916) enabled a new kind of life, “imparting to the Batavia house a more European character”...as “most bathrooms have nowadays a shower from which the fresh water from the tap may be showered over the body” (Gemeente Batavia, 1937:70). Based upon scientific knowledge, demonstrating technological mastery and engineering capacity, and facilitating a ‘modern’ urban lifestyle, the source water network symbolized the emergence of a new kind of colonial government, a new kind of city, and a new kind of urban citizen.

The ‘sharp shift’ between the past and present water supply technologies, mirrored the shift in governmentality. The ‘new era’ of water supply also marked a new era of rule. This is evident as the source water
network continued to circulate previous ideas of the relations between water, ‘modern’ identities, and contamination, the discourse became inserted within a new rationality of rule, and entailed new rationalities guiding flows of water in the city. Previous concerns over the threat of contagious diseases had led to the isolation of the European population from an ‘eternally traditional’ native population, and the contentedness of the government to leave natives ‘in the past’ informed previous policies of non provision. However, as the government’s new mandate to ‘develop’ the native population meant that their location in the past was no longer static, the native population could now also become ‘modern’, and the strategy for securing the public’s health changed; rather than isolating the native population from modern urban spaces and modern water supply, they were now to be modernized through water. With the decision of the Municipal Council in 1923 to increase the supply of water to native areas of the city, new relations between the state and the native population, and new relations between the ‘modern body’ and water, began to flow into the kampongs, as the government project of establishing more modern mentalities amongst native residents paralleled the provision of an ‘adequate water supply’ which was, in itself, one of the “demands of modern life” (Brandenburg, 1924:150). If a more ‘modern’ life was not “appealing to the native population, or seem to ‘oppose their customs,’ then the government has simply not finished its rearing task” (Brandenburg, 1924:150). ‘Teaching’ the Indische population the ‘proper’ (and private) relationship between water and the body, and how to keep one’s body clean and healthy reflected the new responsibilities of the colonial ‘parent,’ who must use their “‘upbringing power’ (‘opvoendende kracht’), and match their professional knowledge with love to impart the proper forms of urban life to the undeveloped population” (Van Breen, 1919:138). Guiding their ‘children’ in the correct relationships around water that would lead them to eventually take over responsibility of their bodies and/or literally embody the new colonial policy of the Dutch government, who was assuming rule of the East Indies until the ‘growth’ of the Indonesian population into a maturity that would allow for self-rule.

The project of modernizing the native population, and the need to ‘urbanize’ their traditional habits around water supply not considered conducive to the modern city supported both the construction of a source water network and subsequent interventions of the colonial government into these ‘problematic’ urban spaces, for if it was “the intention of the Municipality to keep the population out of the kali’s [canals],” there would naturally have to be an alternative supply provided - a hygienic supply would have to be “more easily placed under everyone’s reach” (Van Raay, 1915:142). Public health professionals believed that “the first requirement for improving kampong conditions is seen as the adequate supply of good drinking water...adequate supply is important because every necessary reduction [in supply for natives] can lead to the use of suspect water” (Gomperts, 1916:11). Therefore, previous plans for the source water network which intended supply to only European (profitable) areas of the city were revised, and the cost calculations increased from 8.5 million guilders to 10 million guilders in order to extend the supply into kampongs (Van Leeuwen, 1917). This seemingly altruistic behaviour of a new ‘ethical’ government was a political technology used to target native bodies within kampongs as new interactions between the native body and water establishing new modernized, hygienic identities, and
new demarcations of how the body inhabits public/private urban spaces were implicit in the kampong water supply programs of the early 20th century. Through the provision of public bathing and washing facilities in the kampongs, more ‘private’ spaces for washing the body were established; dividing the spaces - and differentiating the waters - in which to wash one’s self, clothes, and household items, and rationalizing the use of urban spaces according to what was ‘hygienic’ and proper. Bathing in open waterways was “distasteful and a potential source of disease,” and the “dignified [i.e. educated] adult native” was to be taught the proper ways to divide bathing and cleaning from recreation, and the proper spaces and sources of water for these newly distinct functions (Karsten,1958:42). What were formerly ‘public,’ undifferentiated and spatially unregulated activities within water (Figures 5 and Figure 6) were to be disciplined through new kinds of kampong water infrastructure.

Identified as a crucial strategy for securing public health, and an important component of government’s mandate to develop a modern, productive, and efficient native population, the spring water supply to native communities was at first provided free of charge from public hydrants (1922-1926). However, as the financial health of the newly established municipal water supply company (1918) became strained by the high costs of construction of the spring water pipeline, the ‘efficiency’ of the native population was targeted as in need of improvement, and the payment for water supply was justified on the grounds that a new system of ‘valuation’ around water supply would help to develop more economically efficient users. Water that was ‘paid for’ would “gain more value in the eyes of the population so that it is no longer wasted in despicable ways” (Brandenburg, 1924:153). When the Municipality established a system of ‘paid delivery’ (1926) that formally appointed native water vendors to sell water taken from the public hydrants at a determined profit margin (Eggink, 1930), the introduction of new economic regulations around water supply through a system of ‘paid kampong water delivery’ were supposed to circulate a new understanding of water, and its economical value, amongst the kampong population.

The use of hydrants and water vendors for ‘kampong water supply’ was therefore only seen as a ‘transitional’ measure, an early stage in the development of universal water supply, because the ‘willingness and ability to pay’ for direct connections of all kampong households was supposed to follow the adoption of sufficiently efficient and economically rational identities by the native population. The ‘development’ of the native population into modern citizens whose health, economic productivity, efficiency, and aspirations led them into a higher socio-economic class would “stimulate water use from house connections” (Maronier, 1929:236). At the same time, whoever was not sufficiently spiritually and economically ‘motivated’ to maintain a sufficiently ‘modern’ and hygienic lifestyle was subsequently displaced, as the necessity of ‘recovering the costs’ of the expensive iron pipes that stretched 53 kilometres between the spring and the city meant that the occupation of these native urban spaces now ‘modernized’ through the provision of piped water supply were only affordable to a certain type of urban resident (van der Wetering, 1939). The provision of water supply services and other ‘improvements’ to the kampong areas increased land values and house rents, and moved poorer families to the outskirts of the city boundaries, or to more undesirable ‘unimproved’ kampongs. The changing demographic composition of these
‘improved areas’ into middle class housing areas (Abeyasekere, 1989) is reflected in the decreasing number of hydrants, and increasing number of house connections within ‘improved kampongs’ (see Maronier, 1929).

Reflecting the conflicts contained within colonial policy, the ‘raising up’ of a relatively small percentage of the Indonesian population entailed creating new divisions of urban populations, spaces, and access to services, along the new colonial hierarchy of ‘modernization.’ Modern natives, with suitability economically rational and productive identities ‘motivated’ to their socio-economic status occupied urban spaces provided with urban water, and the larger lower class of ‘undeveloped’ Indonesians still reliant upon day labour and low paying wages remained in the unserviced areas of the city, or moved outside of the municipal boundaries altogether. Urban water supply also embodied other conflicts that became acute in the last years of the colonial government. The conflicting ‘ethical’ mandate to uplift versus desire to dominate; the project to modernize but yet retain distinctions and hierarchal relations between authority and subject - provide a partial explanation for how the construction of the first centralized water supply system intended for universal coverage facilitated new fragmentations of populations and urban spaces. With a design that planned for 140 L/day to be distributed to 90% of the European households in Batavia, in contrast to an ‘expected’ delivery of only 65 L/capita/day to only 33% of the native population (van Breen, 1916), in 1929, the European population, comprising only 7% of the population, consumed 78% of the residential urban supply.

The fact that, after thirty years of ‘ethical’ policy the pattern of provision of urban water was still intimately connected to identity and colonial authority, is we argue – the result of both the (in)ability and/or desire of the native population to ‘develop’ into modern urban citizens, as well as the ‘failures’ of a compromised colonial government. The contradictory nature of colonial governmentality is reflected through a system of rule that worked to centralize, modernize and universalize water supply, populations and urban spaces, while maintaining and reinforcing divisions between them. It is important to remember that this program of government was also a contested rule. Conflicts within the government itself over the priorities of an urban water supply were exacerbated by native residents resistant to the expansion of ‘state space’ into their own lives. The sometimes contradictory projects of modernization were not imprinted upon a passive population, and so the ‘failure’ to universalize provision of water supply through a piped water network points not only to the ‘failures’ of the colonial state to uplift, to educate, and modernize the population, it also hints at the ‘obstinacy,’ the partial or complete resistance of the native population to state interventions. The clinging to ‘old habits’ around water supply attributed to natives in colonial commentaries is used to explain their ‘irrational preferences,’ but the fact that these preferences were maintained, and described as difficult to ‘root out’ can be understood as the colonial rationalization for their ‘failure’ to transform certain relationships around water that they alone deemed problematic. Resentment over the fact that water now had to be paid for,

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4 In 1929, 6 926 kampung households were supplied with 24L/s, while 10 392 European households were supplied with 84 L/s. The European population in Batavia in 1930 was 37 067, while the native Indonesian population was over 400 000 (Eggink, 1930).
whereas before it was obtained free from wells and rivers, led some kampongs to resist the introduction of ‘modern’ water (Argo, 1999). After the initiation of the system of ‘paid kampong water supply’ in 1926, the amount of water used by the native population decreased. An additional focus of resistance was water meters; indeed, the colonial authorities found that “the issue of water metering demanded full attention” (Maronier, 1929:237) for the first decade of the water network. Various regulations and technologies were implemented to control illegal connections and ‘tampering’ with meters, and even then a proposed ‘solution’ to water theft—coin operated hydrants—were found to be too vulnerable (Maronier, 1929).

The tightening of regulation and surveillance of the water network throughout the 1920s did eventually manage to ‘increase control’ and ‘reduce irregularities.’ This occurred at the same time as the colonial government was tightening regulations and increasing the surveillance of native urban communities (Karsten, 1958; Toer, 1997). The movement of native residents outside areas provided with piped water supply, although prompted by lack of affordability, was also likely motivated by a desire to escape the government’s project of “normalizing kampongs [lives and spaces] though interventions in hygiene, housing supervision, and improvement of water supply and sanitation” (Van Breen, 1919:134).

The parallels to the contemporary city are striking. Given their lack of land tenure, highly variable daily income levels, and tenuous legal status (given their lack of residency permits), poor residents of (and particularly seasonal migrants to) Jakarta often prefer informal relationships with water vendors which provide reliable, flexible, easily accessible, ‘no questions asked’ water supply. Both wealthy and poor residents perceive groundwater to be of better quality and often reliability than tap water, further reducing incentives to connect to the water supply network when groundwater technology (a simple pump) is readily available. In other words, poor residents of the city may not only be excluded, but also may not wish to be ‘connected’ to hydraulic infrastructures which demand specific, constrained patterns of income, land tenure, and water use.6

III. Conclusions: Flowing from past to present

Constructed according to the rationality of the colonial government in its last decades of rule, the 1920s source water network attempted to centralize and universalize supply by fusing the former fragmented networks of the artesian system. However, being built according to relations of rule that connected modernity, citizenship, and entitlement to water supply services, it

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5 The correlation between decreased demand in 1926 and instituted paid water supply is noted by Maronier (1929) who graphs the l/s drawn from water network reservoirs.

6 This ambiguous relationship of the city’s residents to the water supply network is not confined to the poor. As the water supply system founders under the weight of Korupsi, Kollusi and Nepotisme (Corruption, Collusion, and Nepotism), substantial middle class sections of the city have also opted out of the network, either refusing to have a connection or refusing to consume. Approximately 20% of the water network customers in Jakarta are ‘zero consumption’ customers who have turned to other sources of water supply—a potent symbol of widespread political and economic disconnection from the network.
led to further divisions of the population, and the urban spaces they occupied. The 1920s source water network is an artefact of the divisions made between modern and non-modern citizens, urban spaces, and forms of water supply -- the distinctions established between those who had the ‘right’ to be provided with a ‘modern hygienic’ piped water supply. Consequent relations between water supply, identity, and urban space are still informed by this legacy. Although reconfigured within postcolonial Indonesian governmentality, these colonial patterns of supply are still evident, with both the provision of a ‘public’ water supply to only a certain sector of the public (middle/upper class), and the attainment of a household connection to the network water supply linked to one’s socio-economic status and one’s identity as a ‘modern Indonesian citizen’ with subsequent ‘economically rational’ choices (Kusno, 2000).

The construction of the 1920’s source water network upon the remaining artesian water supply network of 1870s, and the subsequent post-colonial constructions on top of both of these water supply technologies points to continuities not only in the spatial extent of water supply (where the post-colonial pattern of provision is overlaid upon, and extended from the original 1870s network), but to continuities in the relations of power embedded within such infrastructure. The ways in which these relations of power have been mobilized within systems of rule have not remained static, but each successive reformation builds upon the existing structures of socio-cultural and political economic power. Li’s (2001) concept of the ‘layers of relations of rule,’ in which the rationalities of past governments become the sediment upon which successive socio-cultural and political economic and ecological relations are constructed becomes materially evident through the excavation of the history of Jakarta’s water supply development. Highlighting the ways in which the various relations of power within ‘rationalities of rule’ are both dissolved into the socio-natural production of urban water, and ‘fixed’ into built infrastructure - affecting both physically spatial and temporally spatial continuities between successive eras of government and water supply -- the analytic of governmentality signifies the importance of the past to the present. Past relations of power that defined the ‘right relations’ between the state and its citizens, and between different types of citizens, remain relevant to contemporary re-interpretation of Jakarta’s fragmented urban water supply.

In particular, we should be wary of viewing cities such as Jakarta through a Northern lens. Fragmentation of utility services such as water is due not to the recent trends of ‘splintering’ urbanism characteristic of cities in the North, but rather to a model of urbanization with roots in the colonial era which produces persistent pattern of differentiation of spaces, classes, and races. Moreover, we should closely examine the rationalities of those excluded from access to water supply networks. Reinterpreting the relations established around water supply, identity, urban space, and agency in the colonial era can also hopefully be used to reform today’s understanding of water supply provision in Jakarta, where the continued existence, and importance, of the informal water sector and the variety of overlapping ‘networks of supply’ used to serve differently situated consumers in different areas of the city is not a simple outcome of the ‘failed modernization’ of the city and its citizens. Those who remain reliant upon more ‘traditional’ and communal forms of supply (public hydrants, water vendors) are perhaps not a homogenous entity of ‘the
thirsty poor’ waiting to be quenched through formal models - whether ‘colonial’, ‘modernising’ or ‘neoliberal’ -- of networked service provision.

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References

Abeyasekere S, 1987, “Death and Disease in 19th Century Batavia”, in Death and Disease in Southeast Asia: Explorations in Social, Medical and Demographic History Ed N Owen (Oxford University Press, Singapore)

Abeyasekere S, 1989 Jakarta: A history (Oxford University Press, Singapore)

Afdeeling Waterstaat, 1880 Photogrammen van eenige bestaande gebouwen in de residentie Batavia en der artesische drinkwaterleiding te Batavia (Afdeeling Waterstaat, Batavia)


Drost D, 1918 *Ontwerp Brondwaterlieding voor Batavia* (Gedrukt bij Albrecht and Co., Weltevreden)


Gemeente Batavia, 1937 *Batavia als Handels-, Industrie-, en Woonstad* (Kolff, Batavia & Amsterdam)


Gouda F, 1995 *Dutch Culture Overseas: Colonial Practice in the Netherlands Indies 1900-1942* (Amsterdam University Press: Amsterdam)


Kusno A, 2000 *Behind the Postcolonial: architecture, urban space and political cultures in Indonesia* (Routledge, New York)


Melosi M, 2000 *The Sanitary City: urban infrastructure in America from colonial times to the present* (Johns Hopkins University Press, Baltimore MD)


Moenen Bernelot J C, 1873, ”Het drinkwater te Batavia: Geschiedenis van het drinkwater te Batavia, rapport omtrent een ingesteld onderzoek” *Geneeskundig tijdschif voor Nederlandsch-Indie* **15** 275-488


Robinson, J. 2005 *Ordinary Cities: Between Modernity and Development* forthcoming


Smitt A, 1922 *De Waterleiding van Batavia* (Landsdrukkerij, Batavia)


Strang, V. 2004 *The meaning of water* (Berg: Oxford)


Van Leeuwen C A E, 1917, "Het huidige vraagstuk der watervoorziening van Batavia en Mr.Cornelis: voordracht, gehouden in de openbare vergadering der afdeeling Batavia van 14 Februari 1917* De Waterstaats Ingenieur* 3 81-103.

Van Leeuwen C A E, 1920, "Het rioleeringsvraagstuk in Nederlandsch-Indie" *De Waterstaats-Ingenieur* 5 196-212.

Van Raay, 1915, “Watervoorziening van Batavia I” *De Ingenieur* 7 115-130.

Van Raay, 1915, “Watervoorziening van Batavia II” *De Ingenieur* 8 135-144.

Vervoort M, 1926. “Glimpses along Batavia’s Canals” *Inter-Ocean* 7(5) 265-72