RELATIONS OF POWER, NETWORKS OF WATER: GOVERNING URBAN WATERS, SPACES, AND POPULATIONS IN (POST)COLONIAL JAKARTA

by

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ABSTRACT

This thesis documents the genealogy of the development of Jakarta’s urban water supply infrastructure from 1873 (the inception of the first colonial water supply network) to the present. Using an analytical framework of governmentality, supplemented by insights from postcolonial studies and political ecology, the thesis explains the highly unequal patterns of water access in Jakarta as the product of (post)colonial governmentalities, whose relations of power are expressed not only through discursive categories and socio-economic relations, but also through material infrastructures and urban spaces.

The thesis presents material from the colonial archives, Jakarta’s municipal archives, and the publications of international development agencies and engineering consultancy firms. This is combined with primary data derived from interviews, questionnaires, and participant observation of the implementation of current pro-poor water supply projects in Jakarta. This data is used to document how water supply is implicated in the discursive and material production of the city and its citizens, and to challenge conventional developmentalist and academic analyses of water supply access.

Specifically, a conceptual triad of water, space, and populations – produced through, but also productive of government rationalities – is used to explain two apparent paradoxes: (1) the fragmentation of access in Jakarta despite a century of concerted attempts to develop a centralized system; and (2) the preferences of lower-income households for non-networked water supply, despite its higher cost per unit volume. This analysis hinges on an elucidation of the relationships between urban governance and urban infrastructure, which documents the interrelated process of differentiation of types of water supply, water use practices, populations, and urban spaces from the colonial period to the present. This, in turn, is used to explain the barriers being encountered in current pro-poor water supply development projects in Jakarta.

The thesis thus makes a contribution to current academic debates over the ‘colonial present’. The contribution is both theoretical – in the emphasis placed upon the materiality of governmentality – and empirical. Finally, the thesis also makes a contribution to the urban and development studies literatures through its reinterpretation of the urban ‘water crisis’. 
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<td>BORDA</td>
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<td>BPLHD</td>
<td>Badan Pengendalian Lingkungan Hidup Daerah (Regional Environmental Planning Board)</td>
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<td>BPS</td>
<td>Badan Pusat Statistik</td>
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<td>CIDA</td>
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<td>DFID</td>
<td>Department of Foreign Aid and International Development</td>
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<td>DKI Jakarta</td>
<td>Daerah Khusus Ibukota (Special Capital District of Jakarta)</td>
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<td>DPRD</td>
<td>Dewan Perwakilan Rakyat Daerah (Provincial parliament)</td>
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<td>Forum Warga Kota Jakarta (Jakarta Residents’ Forum)</td>
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<td>GTZ</td>
<td>Deutsche Gesellschaft fur Technische Zusammenarbeit (German Development Agency)</td>
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<td>Humanist Institute for Cooperation with Developing Countries</td>
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<td>IDRC</td>
<td>International Development Research Center</td>
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<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>IHS</td>
<td>Institute for Housing and Urban Development Studies</td>
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<td>INFID</td>
<td>International NGO Forum on Indonesian Development</td>
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<td>INFOG</td>
<td>Indonesian Forum on Globalization</td>
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<td>INCIS</td>
<td>Indonesian Civil Society Institute</td>
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<td>JICA</td>
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<td>JMP</td>
<td>Joint Monitoring Program for the Millennium Development Goals</td>
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<td>KIMPRASWIL</td>
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<td>KIT</td>
<td>Koninklijk Instituut voor de Tropen (Royal Tropical Institute)</td>
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<td>Koninklijk Instituut voor Taal-, Land- en Volkenkunde (Royal Netherlands Institute of Southeast Asian and Caribbean Studies)</td>
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<td>KKPPI</td>
<td>Committee of Policy for the Acceleration of Infrastructure Development</td>
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<td>KOMPARTA</td>
<td>Komunitas Pelanggan Air Minum Jakarta (Jakarta Water Consumers Community)</td>
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<td>KruHa</td>
<td>Koalisi Rakyat Untuk Hak Atas Air (People’s Coalition for the Rights to Water)</td>
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<td>KTP</td>
<td>Kartu Tanda Penduduk (Personal Identification Card)</td>
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<td>L</td>
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<td>LP3ES</td>
<td>Lembaga Penelitian, Pendidikan dan Penerangan Ekonomi dan Sosial (Institute for Social and Economic Research, Education and Information)</td>
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<td>LPPSE</td>
<td>Lembaga Pengkajian dan Pengembangan Sosial Ekonomi (Institute for Economic Social Studies and Development)</td>
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<td>NEI</td>
<td>Netherlands East Indies</td>
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<td>OBA</td>
<td>Output Based Aid</td>
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<td>Acronym</td>
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<td>PALYJA</td>
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<td>PAM Jaya</td>
<td>Perusahaan Air Minum Jakarta (Jakarta water supply company)</td>
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<td>PBB</td>
<td>Pajak Bumi dan Bangunan (Land and Building Tax)</td>
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<td>PERPAMSI</td>
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<td>PJSIP</td>
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<td>PPMA</td>
<td>Pusat Pengembangan Masyarakat Agrikarya (Center for Agro Community Development)</td>
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<td>PSP</td>
<td>Private Sector Participation</td>
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<td>Rp.</td>
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<td>UFW</td>
<td>Unaccounted for Water</td>
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<td>UNESCO-IHE</td>
<td>International institute for Infrastructural, Hydraulic and Environmental engineering</td>
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<td>UNIKA</td>
<td>Universitas Katolik Soegijapranata</td>
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<td>UPC</td>
<td>Urban Poor Consortium</td>
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<td>UPDATE</td>
<td>Urban Poor Data Acquisition and Technical Evaluation project</td>
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<td>URDI</td>
<td>Urban Research Development Institute</td>
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<td>US-AEP</td>
<td>United States Asia Environmental Partnership</td>
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<td>USAID</td>
<td>United States Agency for International Development</td>
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<td>USAID-ESP</td>
<td>United States Agency for International Development – Environmental Services Program</td>
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<td>VOC</td>
<td>Vereenigde Oost-Indische Compagnie (Dutch East India Company)</td>
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<td>Indonesian Forum for the Environment (Friends of the Earth International)</td>
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<td>WHO</td>
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<td>Yayasan Lembaga Bantuan Hukum Indonesia (Indonesian Legal Aid Foundation)</td>
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Glossary

Air

Water

Air isi ulang

‘Refill bottled water’ – potable water sold by small-scale businesses to customers who bring their own 19 L bottled water containers. Water is sold at between Rp.2,000-3,000 for 19L, in comparison to name brand bottled water distributors, who sell 19L for approximately Rp. 10,000.

Gemeente

Municipality

Indische

Indies

Inlanders

Indigenous (native) subjects of the colonial state

Ingenieur

Engineer

Jakarta Barat

West Jakarta

Jakarta Timur

East Jakarta

Jakarta Pusat

Central Jakarta

Jakarta Selatan

South Jakarta

Jakarta Utara

North Jakarta

Kampong

‘village’- in the urban context a description of an informally planned and unserviced low-income settlement

Kecamatan

Municipal district

Kelurahan

Municipal sub-district

Lurah

Head of Kelurahan government office

UFW

Unaccounted for Water is the volume of water that is lost during distribution, either through administrative or technical leakage; it is usually indicated as a percentage of total water produced.

Vended water

Water from public hydrant distribution points, sold by ambulatory vendors to neighbouring households. Sold in 40 L containers, vended water costs between Rp.1,500-3,000 per 40L, with cost depending on the distance of the household from the distribution point.
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Chapter 1

Relations of Power, Networks of Water: Jakarta, Indonesia

1.1 Introduction: Jakarta’s paradoxes of provision

Water is fundamental to life, and an important condition of meeting essential material needs. This material nature of water is reflected in the pursuit of the Millennium Development Goal for equitable access to clean water supply. However, water is also much more than a biophysical entity. As access to water supply (or lack thereof) may grant a certain quality of life or deny certain ways of living, water also contains and expresses, and is constituted by, relations of social power (Gandy, 2004; Linton, 2006; Swyngedouw, 2004). Chronicling the emergence of the urban water supply network in Jakarta, Indonesia from colonial past to present, this thesis traces how the flows of water in the city have been enrolled within relations of power to alternately grant, deny, enforce, or resist particular ways of living and being. Specifically, identifying how the production of the city’s piped water supply network has been channelled to particular kinds of residents, living within particular kinds of urban spaces, the thesis highlights the resultant co-constitution of waters, spaces, and populations. This conceptual triad, identified as a product of the ways in which relations of power have been worked through networks of urban water supply, is subsequently used to explain the conditions of access within the contemporary city.

Undoubtedly, the conditions of access in the contemporary city of Jakarta are inequitable. Of the city’s twelve million residents, less than half are served by the centralized piped water supply network (JWSRB, 2004), which provides lowest per unit volume cost of clean water in the city. Moreover, access to the piped network is fragmented both socially and spatially - dependent upon both where one lives, and who one is. As a result, the vast majority of the city’s residents rely on a complex mix of types of water and service providers: shallow and deep groundwater, piped network water, river water, and bottled water delivered through pipes, pumps, private wells, ambulatory vendors, depots, tanks, and networks (Waspola, 2007). Reflected within the urban landscape, spaces both above and below ground in the city are traversed by a tangled network of public, private, and communal infrastructure for accessing, filtering, and distributing a variety of water sources.

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1 The eight United Nations Millennium Development Goals were agreed upon at the UN Millennium Summit (2000). The MDGs set a specific target for water supply: reducing by half the proportion of individuals without sustainable access to adequate quantities of affordable and safe water by 2015. See http://www.un.org/millenniumgoals/.
However, while providing a stark contrast to the western urban norm of universal access through centralized networked infrastructure systems, I argue in this thesis that Jakarta’s urban water supply should not be interpreted as evidence of Jakarta’s lack of development. Rather, I argue that differentiated access is the product of specific practices of development structured by relations of power which are embodied in Jakarta’s water supply infrastructure. This argument is admittedly counter-intuitive, given that decades of urban development by colonial and postcolonial governments, multi-lateral development banks, international aid agencies, and the private sector state, have all – since the 1870s - invested in the consolidation of a centralized urban water supply system. A renewed emphasis on achieving universal coverage through this centralized system emerged in the 1990s with the World Bank’s largest ever investment into Jakarta’s piped water supply (World Bank, 1990b). This was followed in 1997 by the efforts of private sector operators to consolidate the piped water supply system, and the ongoing Millennium Development Goal related pro-poor water supply projects\(^2\).

As indicated by the existing multiplicity of water networks in Jakarta, despite over a century of development efforts, including a particular emphasis in the last few decades on improving access by the poor, programs have systematically failed to improve inequitable access through the consolidation of a centralized system of universal distribution. While the official (generous) estimate is that 56% of the city’s residents are connected to the centralized network (JWSRB, 2004), reported figures vary

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2 Jakarta’s water supply provision was privatized in 1997 resulting in 25 year concession contracts with Suez Lyonnaise des Eaux in the western half of Jakarta, and Thames Water International in the eastern half of Jakarta.
significantly, and this figure both includes residents who access the network through public standpipes and mobile water vendors, and excludes the number of households which have a connection but which rely primarily on other sources (e.g. groundwater) due to quality or service concerns (e.g. low pressure). In addition, as is documented in this thesis, the World Bank’s project, the private sector operators, and recent pro-poor initiatives have all been less than successful in increasing access by low-income residents.

The limited access, and service, provided by the city’s centralized network despite the decades of urban development projects targeting improvements in Jakarta’s urban water supply system have been interpreted by aid agencies and multilateral development banks as a failure. Subsequently, the perceived inability of Jakarta to develop according western norms and its concomitant perceived lack of progress along this trajectory of urbanization and modernization has been given two different interpretations. First, some of the analyses of international development programs have rendered the problems of persistent exclusion into technical (by which I mean de-politicized, technocratic) interventions, translating political problems of poverty and equity into technical diagnoses amenable to programs of improvement (see Ferguson, 1990; Li, 2007, Mitchell, 2002). As part of this discursive process of ‘rendering technical’ Jakarta’s water supply problems, various agencies and initiatives have identified the lack of access to water supply infrastructure as a problem of corruption (Server, 1996), lack of finance (Akhtar, 2005; World Bank, 1974, 2005), insufficient regulation of both public and private service providers (Braadbaart, 2007; Jensen, 2005), or of rapid rates of urban growth outpacing infrastructural development (Chifos and Suselo, 2000; Hamer et al., 1986).

Alternately, academic analyses critiquing these interventions point to the effects of neo-liberal restructuring and its concomitant reshaping of urban infrastructure networks (Bakker, 2003; Graham, 2001; Graham and Marvin, 2001). Specifically, as Graham and Marvin have argued in Splintering Urbanism (2001), the failure of Jakarta’s urban water supply network is explained as part of the ‘collapse of the integrated ideal’ seen in networked utility provision around the world. The fragmentation of access, control, and pricing of network infrastructure leading to ‘splintering’ is attributed to the wider changes in aid and financial flows, technological innovation, social attitudes, and governance – particularly the reconfiguration of citizens’ entitlements in light of newly dominant understandings of the appropriate role of the state in services provision.

This thesis proceeds to query both of these perspectives, arguing that they overlook two key characteristics of Jakarta’s water supply which undermine their diagnoses. First, the fragmentation of Jakarta’s water supply network has occurred throughout a century of investment into a centralized piped network system, not merely in the last decade of neo-liberal led development and privatization. In fact, Jakarta’s urban water supply network has been ‘splintered’ since its origins in 1873, and patterns of access remain remarkably similar, with socio-economic class replacing race in the
Second, as documented in this thesis, there is the fact that the urban poor – who are the most disadvantaged over their lack of access to the piped water network – do not seem to be ‘thirsty’ for piped water connections. Although both paying more for access to clean water and suffering disproportionate health effects from lack of access (see Agatini et al., 2005; Bakker et al., 2006; McGrahanan et al. 2001), low-income residents are increasingly relying on multiple types of water services providers, documented in the growth of small-scale water supply systems and distributors (World Bank, 2004a; Waspola, 2007). Providing a puzzling contradiction for technocratic experts, the failures of decades of development projects seeking to improve access by the poor seem due in part to what seem as perverse preferences of ungrateful beneficiaries, who continue to combine multiple sources of water, and pay higher per unit cost prices for the waters that they do purchase.

Using theory generated in and by northern contexts to (mis)understand the South, Western-based analyses of urban development can only cite these facts as anomalies (see Amin and Graham, 1997; cf Graham and Marvin, 2001; Robinson, 2003). Urban geographies of ‘splintering urbanism’ reliant on the development trajectories of western cities fail to explain the historical dimensions of relations of power that contribute to contemporary global economic processes (cf Coutard, 2002). As a result, this analysis obviates the fact that Jakarta’s centralized urban water supply network has been splintered since its inception rather than since its privatization. In addition, the privileged focus on the recent socio-economic processes structuring inequitable access (privatization) fails to consider how relations of power are also embedded within spatial relations and subjectivities. As a result, the theory of splintering urbanism presented by Graham and Marvin (2001) fails to explain why the poor in Jakarta might still not be thirsty for water from a system to which they are denied access, and have subsequently contributed to additional fragmentation through processes of ‘splintering from below’.

On the other hand, developmentalist analyses diagnosing Jakarta’s lack of the urban infrastructural ideal – universal access through centralized network – as the product of failed development or failed modernization exclude any consideration of the ways in which relations of power structure access (Ferguson, 1990; Li, 2007). Moreover, these analyses do not only fail to offer an explanation, but completely ignore some characteristics of Jakarta’s water supply, and its urban poor, in order to maintain their expert credibility. Specifically, the contradictions in Jakarta’s water supply sector – highly splintered patterns of provision occurring throughout 100 years of investment into a centralized system, and a population of non-thirsty yet disadvantaged poor - are problematic for development discourses, as they identify gaps in the ‘expert closures’ of the technical diagnoses of problems and solutions within international development (Li, 2007). Unable to acknowledge these realities, developmentalist analyses and attendant official narratives of urban water supply in Jakarta

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3 This is not to be taken to mean that I see categories of class and race as separately constituted, but were rather the categories articulated by the government to differentiate access to water supply, set tariffs, and calculate projections of per capita consumption of piped water. This is discussed in more detail in Chapters Three, Five and Six.
have, until recently, simply ignored both the growth of multiple water sources and services providers in Jakarta, and the population of non-thirsty poor\(^4\).

In response to the inadequacy of the analyses offered by development agencies and western oriented academic theory, this thesis offers a new interpretation of existing patterns of access, inequity, and development in Jakarta. Using the analytical framework of governmentality, outlined below, I explain current patterns of access as the product of ways in which colonial and postcolonial relations of rule have been worked through water supply, constituting specific relations between urban water, urban space, and urban populations. In this analysis, I argue that it is this imbrication of urban infrastructure, identity, and space which explains how the splintering of the city’s water supply continued parallel to the development of the centralized network – dividing the city along the axes of difference rationalized by government as necessary for rule; primarily, race and socio-economic class\(^5\). Similarly, the co-constitution of waters, infrastructures, and subjects explains why the urban poor might not be thirsty for connection to the piped network, as their identity forecloses some options, and makes other more preferable.

This alternative explanatory framework is, I argue, both able to acknowledge, and subsequently explain, the reasons why Jakarta has multiple networks of water if there has been over a century of concerted development into a centralized system, and why the poor – who are the most disadvantaged over their lack of access to centralized system – do not seem to be thirsty.

1.2 A new analytic: Historicizing, politicizing, and materializing inequitable access

The conceptual framework deployed in this thesis focuses on the relationship between governmentality, urban infrastructure, urban space, and populations. Using Foucault’s analytic of governmentality (Foucault, 1991) together with critiques from postcolonial studies (Howell, 2004; Legg, 2006, 2007; O’Malley, 1996; Watts, 2003) and analyses of the relations between power-nature-society (Agarwal, 2005; Braun, 2000; Goldman, 2005; Li, 2007), I construct the genealogy of Jakarta’s urban water supply infrastructure development to trace how relations of power mobilized through government have been productive of patterns of provision within contemporary Jakarta.

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\(^4\) It is only in the last few years that development analyses have begun to acknowledge and examine the multiple forms of provision, and preferences of the urban poor who are not served by the formal, centralized network (see ADB, 2002; Waspola, 2007). I explain in Chapters Four and Six, how these analyses focusing on ‘consumer choice’ and market options derive from a different theoretical framework, and I illustrate how they do not fundamentally address the problems of inequity.

\(^5\) The co-constitution of socio-economic class and race in both colonial and postcolonial eras is detailed in Chapter Five, specifically how the constitution of ‘European’ racial identity in the colonial era was informed by middle-class moralities, and the hidden racialization of middle and upper class in the Indonesian New Order era as dominated by Javanese and Chinese-Indonesians.
In this analysis the term ‘government’ is not exclusive to apparatuses of the nation state, but rather describes a complex assemblage of discourses and practices, exercised through state and non-state actors both above and below level of the nation, which shapes the conditions in which lives are lived (Li, 2005). The term governmentality refers to a specifically modern set of social relations of power between subjects and the state, in which the central problem for the state is the optimization and/or control of the relationship between population and resources. This relationship is articulated through ‘relations of rule’ in which states and subject interact. Subjects internalize, but also modify (and sometimes resist) the ways in which the state seeks to control their behaviour and social relations. States seek to control, but also modify (and sometimes abandon) specific projects. This last point is extremely relevant in the colonial context, where governmentality operated in modified and sometimes very incomplete ways (Howell, 2004; Legg, 2006; Prakash, 1999).

The framework of governmentality has both specific methodological and analytical implications. First, the methodologies through which relations of power are analyzed involve historical, discursive, and political economic dimensions; this is discussed further in the next chapter section. Second, the analysis of relations of power mobilized through government requires a focus on subjects and populations from multiple perspectives, the subversion of binary categories, and attendance to the processes of enacting social relations of power. This means that the construction of subjects, and their abstraction into populations amenable to rule, is explored from multiple perspectives – both the colonial administrator and the ‘native’, for example; or the development expert and the ‘poor’ urban resident, while the binary categories upon which governmentalities rely so heavily, such as modern/traditional or Western/native are questioned, and in some cases, subverted. A framework of governmentality also requires that we pay close attention to the process of enacting social relations of power; in this thesis, I focus on the process of ‘rendering technical’, which describes the process of depoliticizing, simplifying, and abstracting specific aspects of urban space and urban populations in order to render them amenable to development interventions. These points are explored in different ways in each chapter of the thesis, but particularly Chapter Six, which focuses on the problematic and contested constructions of Jakarta’s ‘poor’ urban residents.

In addition, the thesis makes a contribution to the governmentality literature through focusing specifically on what I have termed the ‘materiality of governmentality’. This term is a response to a trenchant critique of much of the governmentality literature, a critique which suggests that this literature has focused too narrowly on discourse and abstract, intangible subjectivities, without acknowledging and incorporating the material aspects and expressions of power (see Harris, 2004; Jacobs, 1996; McEwan, 2003). Of course, governmentality has always been material; my use of the term ‘materiality of governmentality’ is simply intended to suggest my call for a greater focus on these material dimensions. In my case, I will focus on the ways in which both colonial and post-colonial governmentalities construct (but are also transformed and ultimately limited by) not only subjectivities,
but also urban spaces, infrastructure, and the bodies they seek to control. Subsequently, attending to the ways in which government operates through both discourse and practice, I highlight how relations of power are worked through physical technologies (like urban water supply infrastructure) and actual, tangible, and visceral ‘matter’. This focus on the material in balance with the discursive, and in particular understanding discursive categories as being worked through physical environments - to be both affected and effected by materiality – can contribute to the analysis of conditions of postcoloniality in ways that speak to the current lived geographies of inequity of the present (Yeoh, 2001).

As part of this project of illuminating the materiality of governmentality, and using this to explain how conditions of access in the contemporary city remain informed by the colonial past, the thesis illustrates how the ‘layers of relations of rule’ as described by Li (2001) are grounded not only within socio-economic relations and discursive categories – but also within material infrastructure, physical spaces, and ecological processes. As such, this analysis can explain how the moment of origin of Jakarta’s water supply in 1873, and the ways in which it articulated legitimacy of access to piped water, continues to inform patterns of provision and preferences in the contemporary city. I stress that this analysis does not simply superimpose the past upon the present, or suggest a simplistic influence of the colonial upon the contemporary. Rather, in following the examples of Li (2001) and Moore (2001) I highlight how the relations of power from previous systems of rule that are layered both within the discourses and physical environments of contemporary places interact with the present in unpredictable ways. Therefore, while the post colonial era does not obviate effects of previous relations of rule, it is also not prescriptive or derivative for conditions of the present, including conditions of access to urban water supply.

In conclusion, by combining three methods of analysis (historical, discursive, political economic) to interrogate the construction of subjects, binary categories, and the process of enacting social relations of power, the thesis thus traces how relations of power mobilized through government have been productive of patterns of water provision within contemporary Jakarta. Through this genealogy I make particular conceptual claims relating to the analysis of relations between power-nature-society, and the understanding of urban space in the Global South. I posit that these claims, outlined below, are relevant both conceptually for the analytic of governmentality, but are also of direct practical significance for the current ‘programs of improvement’ seeking to improve equity of access to clean water in Jakarta. The following paragraphs identify these claims through an outline of the arguments of the thesis.

First, in documenting how Jakarta’s water supply has been splintered since its inception over 100 years ago, I argue that the fragmentation of access observed in Jakarta is not a recent phenomena, as analyses of both failed modernization and splintered urbanism would suggest. On this basis, I claim that Jakarta’s splintered network and persistently inequitable access to clean water is the product of
colonial and postcolonial relations of rule that differentiated access to clean water by urban populations first by race, and then by class. The socio-spatial fragmentation evident within the contemporary city is thus a historical product, a pattern of provision which was first inscribed within the city’s first urban water supply infrastructure in the 1870s. In turn, this means that the current splintered nature of piped water in Jakarta is not an example of delayed development, but rather it is the product of relations of rule that - contested, contradictory, and not always intentional in its effects - have never had universal access as a political goal.

Second, building on the documentation of socio-spatial fragmentation in Jakarta’s water supply, I identify how relations of power mobilized within government linked the production of urban water supply, urban space, and urban citizens. Highlighting the relationship between urban governance and urban infrastructure that has often been overlooked in analyses of relations of power and production of urban spaces in Jakarta (see Effendy and Kusumawijaya, 2004; Firman, 1998; Kusno, 2000), I identify urban water supply infrastructure as a material artefact of governmentality. I claim that the technologies of production, treatment, and distribution of Jakarta’s physical infrastructure systems are the product of contested and contradictory relations of rule. Moreover, I argue that these particular infrastructure systems and the socio-natures (waters) they produced, were both necessary to, and constitutive of, rule (cf Braun, 2000), as they facilitated the production of particular kinds of (differentiated) urban citizens, and urban spaces. Thus, I agree that infrastructure networks are implicated in the production of urban space and identity, but not necessarily in the ‘splintering urbanism’ thesis way.

Third, by tracing the imbrication of infrastructure with identity, I claim that the constitution of subjectivity is related to the material environment – but in a much broader sense than argued by Agrawal (2005). While Agrawal (2005) retains a binary notion of nature/society, and thus limits the contribution of material environments to identity formation by considering only those subjects who consciously articulate and self-regulate actions according to environmentalist practices of conservation and protection of biodiversity as having an ‘environmentality’, I argue that we are all, consciously, or unconsciously ‘environmentalized’. Considering environment as a socio-natural entity, and thus expanding the scope of our interactions with nature to include urban natures, like water, I illustrate how the daily circulation of urban water supply through the bodies of all urban residents has also contributed to the formation of particular identities: illegal vs. legal residents, hygienic vs. contaminated, modern vs. traditional, and moral vs. unethical. Subsequently, as the articulation of particular identities (European vs. native, hygienic vs. contaminated, modern vs. backwards, urban vs. rural, developed vs. in need of development) were made more or less easy in relation to the type of water that one was physically able to access, this gives emphasis to the materiality of government – which I argue constituted citizens not only through discursive categories, but through material practices.

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Fourth, I argue that governmentality is both a discursive and material project. Relations of power mobilized and contested through government are inscribed in physical space, material objects, and ecological processes as well as socio-economic relations and discursive categories. This avoids the binary of material/discursive or nature/society, replacing it with an understanding of an iterative relationships between discourse and practice, nature/society, or identity and infrastructure. In addition, it highlights the relevance of past relations of rule for the present, as colonial water supply infrastructure (and the spatial relations and subjectivities it alternately enforced and enabled) continues to inform patterns of supply within the contemporary city.

Fifth, I claim that the relationship between governmentality and materiality is in fact iterative. Government rationalities and relations of rule were not only constitutive of physical spaces and material natures, but were also constituted in relation to the physical environment (Braun, 2000). In particular, the ‘uncooperative nature’ of water highlights the ways in which objects other than human have made a difference in the ways in which social relations unfolded in Jakarta (see Bakker and Bridge, 2006). Following chapters of the thesis illustrate how the biophysical and kinetic properties of water and the material components of infrastructure systems (electric pumps, aeration systems, iron pipes, PVC networks) either facilitated, or frustrated the ‘conduct of conduct’ that sought the establishment of ‘right relations’ within different urban populations, and between urban residents, waters, and spaces.

The remaining arguments of the thesis relate to the ways in which the relations of power involved in the production of Jakarta’s urban water supply have been misunderstood, or ignored by development projects, in particular where they have ‘rendered technical’ the problem of equity of access. Specifically, I claim that these misunderstandings, and subsequent policy decisions and infrastructure projects, have in turn had their own material effects, exacerbating the fragmentation of access. This is illustrated by documenting the effects of technical interventions of multi-lateral development banks on the fragmentation of the centralized piped network, and the failures of pro-poor water supply development projects.

The following section of the introduction presents my research methodology and the ways in which research methods and sources have shaped both the conceptual claims and structure of the thesis, but before proceeding further, the term ‘urban poor’ requires clarification. Laden with relations of power, the act of defining, categorizing, and identifying a group of urban residents as ‘the poor’ is acknowledged to be both a technical and political exercise (Escobar, 1995; McClintock, 1992; Mitchell, 1988). In the thesis I do not undertake an attempt to provide a definition of ‘the poor’ of Jakarta, a classification already fiercely debated amongst academics, activists, development banks, and national governments (Amis, 1995; Mitlin, 2005; Mitlin and Satterthwaite, 2002; Satterthwaite, 2001;
World Bank, 2006e; Wratten, 1995). My use of the term ‘the poor’ refers to populations of low-income and politically marginalized households who are excluded from access to the piped water supply network through failing to meet socio-economic and/or socio-political criteria set by the state. However, while I focus on aspects of legality (I.D. cards and land ownership in particular) and socio-economic status, I do not seek to under-emphasize the multiple aspects to urban poverty, or the many different relations which condition, mitigate, or define urban poverty. Rather, my emphasis on these two criteria reflects the ways in which they have historically been, and currently are, conditions of access to piped water supply.

The focus on legality and socio-economic status, basic criteria for access to urban service such as water, does not however support the popular ‘thirsty poor’ discourse of international development programs equating lack of access to piped water supply as a condition of poverty. In Chapter Six where I document the results of field research on urban water supply in low-income communities, I provide a more detailed description of how communities of ‘disconnected’ low-income households are defined by the state and development agencies – but rarely themselves - as ‘urban poor’. As Chapter Six explains, low-income households negotiate relations of access through various relations of power, and indeed may choose to remain disconnected from the centralized piped network that their legal and socio-economic status precludes.

1.3 Hydraulic Histories and Research Methods

The theoretical framework of governmentality carries with it certain methodological implications, which in turn have informed the limits of the analysis and the structure of the thesis chapters. A discussion of the analytical and structural implications of research methods follow after an outline of research methods and sources used in my research.

First, a framework of governmentality requires a genealogical approach, requiring careful attention to the historical dimension of the analysis, and extensive use of archives. Second, it relies heavily on the use of discourse analysis (interpreting discourse as a practice), which requires the analysis not only of official documents but other textual and non-textual sources. Third, it also deploys aspects of political economic analysis, but builds upon this approach with the genealogical and discourse analysis methods mentioned above. In this thesis, the combination of these three forms of

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6 Classification of ‘the poor’ in Jakarta by national government according to socio-economic criteria is explained in Chapter Six.

7 In fact, as many studies document, socio-economic and socio-political characteristics are strongly related, with other determinants of urban poverty: lack of social stability, vulnerability to crises, lack of political voice, access to formal and informal social safety nets, and lack of access to urban services (see DFID, 2002; INCIS, 2005).
analysis towards an investigation of the conditions of the present through the framework of
governmentality entailed the following research methods.

First, my research into the ‘history of the present’ for Jakarta’s urban water supply involved
examination of over 100 years of the development of Jakarta’s urban water supply infrastructure. Out
of practical necessity, an interest in both the past and present requires the use of different research
methods, guided by availability of sources and feasibility of data collection. Over the duration of 2003-
2007, the process of research involved different combinations of archival investigation (reliant upon
primary and secondary sources), and primary research consisting of in-depth interviews, quantitative
surveys, and focus group discussions.

The particular amalgam of methodologies used was divided according to four different time
periods:

- 1870-1950: archival investigation;
- 1950-1990: archival investigation supplemented with interviews;
- 1990-2004: investigation into World Bank project and privatization relying on primary and
  secondary documentation, interviews, media analysis;
- 2004-2007: ethnographic investigation into issues around urban water supply for the urban
  poor involved quantitative and qualitative methodologies (surveys, focus group
  discussions, participant observation, forums, in-depth interviews). In the interests of
disclosure, I note that data gathered in 2007 was facilitated by my employment as a water
supply project advisor for an international NGO. More information on the research
chronology, methods, sources, and timeline is in Appendix 3, a list of interviews conducted
over 2004-2007 is provided in Appendix 4.

The research itself was undertaken in a chronological sequence, as I traced the development of
urban water supply infrastructure in Jakarta from past to present. Although my interest in Jakarta was
initially piqued by the ‘conditions of the present’ - the privatization of Jakarta’s water supply in 1997
and subsequent protests (see Harsono, 2003)- I began the research project at the origins of Jakarta’s
urban condition, the construction of the city’s first urban water supply system in the 1870s. Archival
research into the colonial era was conducted in the Netherlands in the summer of 2003, with analysis
continuing into 2004. This archival study of the colonial era was then followed by four months of
research in Jakarta in 2004 (March; July-October). During these months I used the archives and
resource centers of multi-lateral development banks, government departments, aid organizations,
national NGOs and Indonesian research institutes, supplemented with interviews, to trace the
development of urban water supply infrastructure from 1950-1990. From 2005 until 2007 I conducted
the third and fourth phases of the research, tracing events from 1990-present by investigating the World
Bank development project of that decade and the subsequent privatization, and the current impacts for
and responses of the urban poor. The following paragraphs provide more detail on the specific methods, objectives, sources, locations, and limitations for each of the four research phases.

As already stated above, the first phase of research documented urban water supply infrastructure constructed throughout the colonial era, when the city of Jakarta was still the Dutch colonial capital of Batavia\(^8\). Archival sources were used to document both the physical development of the piped water supply system (1870s-1940s), as well as the rationalities that initiated, problematized, and enrolled urban water supply as a technology of government. The gathering of empirical evidence and discourse analysis relied to a large extent on engineering documents, many of them published in the official journal of government water engineering (Waterstaats Ingenieur), now housed in the archives of Delft University of Technology. In addition to the feasibility studies, technical plans, and discussions recorded by the engineers in charge of designing the system in Batavia (and similar systems in Surabaya, Bandung, Semarang), the colonial archives of KITLV and KIT provided: records of minutes of the Municipal council meetings in which issues of water supply were discussed; documents on urban planning and municipal regulations published by the Municipality of Batavia (Gemeente Batavia); other primary documentation of the conditions of life in the city, as recorded by residents, local government, “concerned citizens’, and tourists. Dutch language lessons in the spring of 2003, and employment of a native Dutch speaker enabled translation of archival documents from Dutch to English language. All Dutch language documents cited in the thesis are original translations.

The second phase of research constructed the chronology of Jakarta’s urban water supply infrastructure development from 1950-1990. This phase of research was also heavily reliant upon archival sources, with both primary and secondary texts recording the history of Jakarta, urban government regulations, and records of life in the city post-independence. Indonesian government records on the operation of the urban water supply prior to the late 1980s were difficult to locate, and where possible interviews with key informants were used to supplement the incomplete archives of national and municipal government departments and agencies (PAM Jaya and Public Works). In-depth interviews were conducted with key personnel in the water sector, government departments, and MDBs who were involved in urban water supply projects during this time period in Jakarta. The entry of multi-lateral development banks and international aid agencies into the water sector in the late 1960s provided empirical evidence relating the construction of the urban water supply systems (from feasibility studies, master plans, and infrastructure projects funded by the Japanese and Dutch governments and the World Bank). Documents were found in offices and resource centers of MDBs, and bi-lateral aid agencies financing the studies and construction of the water supply system, and

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\(^8\) Established in 1619, the colonial city of Batavia was under the control of the Netherlands East Indies until the invasion of the Japanese army in 1942. From 1945-1949 during Indonesia’s war for independence, the city was nominally under the control of the Dutch. Following Indonesian independence in 1949, the city changed to the present name of Jakarta. See Abeyaskekere (1989) and Cobban (1970) for a complete overview of the city’s historical development.
engineering firms and consultants who designed and constructed the systems (Degremont, Nippon Keoi, Amsterdam Water Supply Company).

The third and fourth phases of research were conducted simultaneously, over a three year period in Jakarta (2005-2007). First, following the chronology of Jakarta’s urban water supply infrastructure development, I traced the construction of the network from 1990-2005. This involved two major events, the World Bank’s PJSIP project (1990-1998), and the subsequent privatization of Jakarta’s water supply (1997-present). The physical development of network occurring over this time period, and the effect on access for particular socio-economic and socio-political classes of residents, were investigated through interviews, media analysis, and primary and secondary documentation. Documents were collected from World Bank offices, JICA office, consultancy agencies who did feasibility studies etc (IWACO, NERA), the Jakarta Water Supply Regulatory Board, PAM Jaya, and the two private sector partners at the time (Thames Pam Jaya and PAM Lyonnaise des Eaux)\(^9\). Interviews were conducted with key informants in World Bank, JICA, independent consultants and engineers working on the project, Jakarta Water Supply Regulatory Board, PAM Jaya, Palyja, TPJ, local professional water supply associations (PAM Jaya union, Forkami, Akaindo), and local NGOs who mobilized against the privatization (KruHa, INFID, Amrta, Walhi, YLKI). A list of interviews is presented in Appendix 4.

The fourth component of my research was an examination of the impact of the World Bank’s 1990-1998 PAM Jaya System Improvement Project project and subsequent privatization on access to water by low-income urban households. However, although I originally arrived in Jakarta with the expectation that events of privatization would be of negative impact for access to urban water supply for low-income households, engagement with local NGOs working with the urban poor in Jakarta, and dialogue with members of these low-income community members broadened the scope of research into a wider investigation into how preferences and patterns of water use connect in complex ways to urban space and identity. This in turn brought to light the relationships between different kinds of residents (socio-economic class, place of residence and employment, legal status, land tenure status) and various types of urban water supply in Jakarta which were not represented in the official chronology of centralized network infrastructure development.

Subsequently, through collaboration with a local NGO, the Urban Poor Consortium (UPC), I conducted qualitative research into perceptions, preferences, and patterns of water access and use in low-income neighbourhoods, particularly in communities where residents were not legal in the eyes of

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\(^9\) PAM Jaya is the municipal water supply company (Perusahaan Air Minum Jakarta); Thames PAM Jaya (TPJ) is the private sector operator now serving the eastern half of the city, originally owned by Thames Water International but sold in 2006 to Singapore based consortium, Aquatico. PAM Lyonnaise des Eaux (Palyja) is the private sector operator in the western half of the city, owned by French multi-national ONDEO.
the state, or had no formal ownership of land and/or housing\textsuperscript{10}. A series of visits over a period of six months, conducted in eight communities across three municipalities in Jakarta\textsuperscript{11}, provided opportunity to conduct focus group discussions and in-depth interviews, particularly with women, who were responsible for the household’s water supply\textsuperscript{12}. A map of the research sites is found in Appendix 5. The selection of these communities was determined primarily by their prior engagement with UPC. The communities were largely characterized by their illegality (although not in all cases), having been previously or currently involved in struggles over evictions, resettlement, and land rights. During the duration of the field research none of the communities were engaging in any specific political action over land, nor were they threatened with immediate eviction, although in late 2007 almost 4,000 households of a UPC community in Kelurahan Penjaringan, North Jakarta were evicted from their settlement under the toll-roads\textsuperscript{13}. To mitigate against too much of my own interpretation being ‘read into’ the responses of community members, information from interviews and focus group discussions was cross-referenced between communities, with other staff of UPC, with a field research assistant, and with primary data collected from other local and international NGOs (PPMA, LP3ES, Mercy Corps, AcF). Language training in bahasa Indonesia and the employment of a field research assistant assisted this period of field research. Unless otherwise indicated, all Indonesian language translations into English are original.

In addition to the qualitative research conducted in low income neighbourhoods, a quantitative household survey was conducted. This survey covered 110 households in four of the five municipalities of DKI Jakarta (North, Central, East, West), documenting water use patterns and preferences. The households were selected by random sample from a list of urban poor communities who were the recipients of government funded pro-poor water supply programs. Some of the data from this survey is

\textsuperscript{10} Illegal residents of Jakarta are identified by the state as not having proper identity document (KTP-Kartu Tanda Penduduk) granting government permission to reside in the city. The total number of illegal residents living in Jakarta is undocumented, as this population is excluded from census and elections. From 2005-2006, the government documented an average of 150,000 unregistered migrants (BPS, cited in The Jakarta Post, 6 October 2007); and according to Jakarta’s Social Welfare and Self-Development Agency, the number of ‘illegal residents’ captured in population raids annually averages at 15,000 (The Jakarta Post, 22 October 2007). Others have estimated that 21% of the city’s residents are not properly registered with the Population and Civil Registration Agency (The Jakarta Post, 31 October 2007). Distinct from the category of illegal residency, illegal settlement in Jakarta is synonymous with the classification of ‘squatters’, residents who live on parcels of land which is either legally prohibited (alongside riverbanks, along railways, under toll-roads, on flood plains), or living on publicly or privately owned empty land for which they do not have legal land tenure.

\textsuperscript{11} As the largest urban center in the country, the capital city is a special provincial region (DKI-Daerah Khusus Ibukota), consisting of five municipalities (North Jakarta, Central Jakarta, East Jakarta, West Jakarta, South Jakarta).

\textsuperscript{12} As documented in Dian Desa (1990), and Waspola (2007) there is a strong division of labour between genders. While the small-scale water supply industry of vendors, hydrant operators, bottled water vendors are almost all solely male dominated, women are primary decision makers concerning the selection, treatment, and use of water inside the home.

\textsuperscript{13} According to data from the Urban Poor Consortium (UPC), in August 2007 4,646 families (18,584 people) were living under the 11-kilometers of elevated roads stretching from Tanjung Priok to Penjaringan, North Jakarta. All were evicted in October 2007.
presented in Chapter Six, and published in entirety in Kooy et al (2006); a map of the communities surveyed is in Appendix 5, and the household questionnaire used is in Appendix 6. Although a survey of 110 households in a city with an estimated twelve million residents is of limited scope, the data is cross-referenced and found to be very similar to other data sets generated by NGOs and development agencies (AcF, 2007; Kooy et al., 2007; PPMA, 2007; USAID-ESP, 2007b; Waspola, 2007).

Finally, throughout 2007, qualitative and quantitative data was collected through participant observation of the implementation of pro-poor water supply development projects. This period of research also involved participation in urban water supply development forums, and on-going discussion with the private sector water supply providers, MDBs, bilateral aid agencies, international and local NGOs in regards to ‘water for the poor’ in Jakarta.

To conclude this section of the Introduction, I draw attention to the ways in which the above outlined research methods, sources, and timeline of research activities all contributed to shaping the ways in which my conceptual claims around the inter-relationships between waters, spaces, and populations have been explored in the subsequent Chapters. In this discussion I note the ways in which the above outlined research methods structured my analysis of co-constitution of waters, spaces, and populations, but I leave a more detailed discussion of the limitations and avenues for future research for the concluding Chapter of the thesis (Chapter Seven). My intention here is to articulate the ways in which this thesis content has been informed by methods and sources, acknowledging the other possible avenues which could have been, but were not, pursued in this particular research project.

I first call attention to the ways in which the genealogical analysis implied by governmentality led to a reliance on particular research sources, and how this informed – and limited – my focus on particular sources of water supply (piped), and subsequently privileged my attention upon particular residents of the city. As detailed above, my analysis has derived from a reliance upon source documents that were written down, and written down primarily by a particular sub-set of colonial and postcolonial rulers (the largely European middle class who made up government bureaucracy, and elite Indonesian citizens enrolled within postcolonial bureaucracy). Using documentation derived from rulers, who decided what aspects of urban water supply, government, and urban development were relevant to document, led to a particular bias upon the importance of piped water supply, and largely omitted the voices, agency, and interests of residents other than these elites, including the ways in which they themselves articulated identity in relationship to other types of water sources. Indeed, living only on the margins of archival documents, non-elite subjects often only come to life when abstracted into populations who are defined by government as problematic, and whose identities, behaviours, and relationships with waters (as defined by authorities) required intervention.

As a result of the bias in research sources available in archival records, my analysis of the relationships between urban waters, spaces, and populations has been influenced most heavily by the account from ‘above’, rather than ‘below’. In turn, this has resulted in an overt focus on the role of the
piped network water supply over time, and the relationship of populations to this source of water supply was given precedence over other possible avenues of research which would have examined in more detail the relationships between production of urban spaces, populations, and non-piped water sources.

Following from this focus on the role of networked water supply within my examination of relationship between waters, spaces, and populations, the use of archival sources and documentation by elites also limited my research on the constitution of subjectivity in relationship to the material environment to a focus on the subjectivities of elite populations. This focus derives from the simple fact that certain populations received more detailed documentation in archival sources. In particular, for discussions of urban water supply in the colonial city, archival documents pay significant attention to relations between water supply and the European and native races, but did not distinguish between the different indigenous ‘native’ ethnic categories that today constitute the Indonesian (Javanese, Sundanese, Balinese, Madurese et cetera\(^\text{14}\)), and did not accord proportionate attention to relations between urban water supply and the Chinese or what was termed the ‘Foreign-easterner’ (Indian and Arab). Therefore, analysis of the co-constitution of subjectivity and urban infrastructure (Chapter Five) is driven by the availability of archival material and follows the priorities of colonial and postcolonial governments who gave attention to particular groups of subjects who held privileged identities as the ‘European’, or the ‘developed’ and ‘modern’ citizens within the (post)colonial city.

In addition to the implications of relying upon source documents from the colonial and postcolonial rulers, my focus on the particular sub-set of engineering documents which chronicled the development of the piped water supply resulted in an overt emphasis on the role that technologies and technical aspects of urban water (L/capita/day, numbers of household connections, L/s produced) played in relation to the formation of urban spaces and populations. This emphasis on technical aspects of urban water supply occluded equal focus on the non-technical aspects of urban waters (cultural, social, ecological, and political properties of waters) and the ways in which relations between urban waters, spaces, and populations – and the negotiation of relations around piped water supply -- were also informed by these relations of power.

Finally, I note that my reliance upon source documents from colonial and postcolonial authorities, and subsequent emphasis on the role of piped water supply and technical aspects of its development was exacerbated by the particular chronology structuring the timeline of research activities I undertook. As outlined earlier, it was not until the last phase of my research when I conducted field research within low income neighbourhoods in contemporary Jakarta that I ‘discovered’ a population of disadvantaged yet non-thirsty poor. Therefore, by beginning my research by tracing the origin and subsequent development of Jakarta’s piped water supply network from 1870s-1990s, and largely reliant upon engineering documents for these development details on network

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\(^{14}\) See Castles (1967) for a historical account of urban population and ethnicity in Jakarta.
expansion, it was not until I began my final phase of research that I became aware of the noticeable gaps in (post)colonial water supply development chronologies (which omitted non-piped water use). This discovery did prompt revisiting of the empirical documentation of the chronology of Jakarta’s urban water supply infrastructure development to consider how and why colonial engineers and government officials, development experts, and Indonesian government documentation all omitted documentation of the multiplicity of urban water supply networks, but it was not possible to revisit the colonial and Indonesian archives to search for different sources of research material. Therefore, although increasingly aware of the discrepancy between ways in which subjects articulated identity in relationship to waters and the ways in which government problematized populations in relationship to waters, this was only able to explored within the present day. A more iterative undertaking of research, shifting from past to present, or beginning in the present city and moving backwards through time instead of beginning in the colonial city and moving forwards, would have guided me towards different sets of research sources and archival materials.

In conclusion, although I have delineated here the limits to my analyses of relations of power, water, space, and populations in (post)colonial Jakarta, I stress that I am not creating an apologetic for the following Chapters. The conceptual triad of waters, spaces, and populations as applied to an examination of the conditions of the present piped water network in Jakarta did elucidate the claims made in the above section, and, I argue, provides a particularly productive explanation for the patterns of provisions and conditions of access around piped water in the contemporary city.

1.4 Chapter Outline

Subsequent chapters of the thesis present the genealogy of Jakarta’s urban water supply infrastructure development, a narrative which seeks to both make visible the contradictions within Jakarta’s urban water supply (ignored or obviated by developmentalist and splintering urbanism analyses), and explain their existence as the physical, spatial, and discursive product of relations of power. The structure, and order, of the chapters themselves follows from the methodological implications of the framework of governmentality; specifically, Chapters Three, Four, and Five each foreground a particular element of the historical, political economic, and discursive analysis. Chapter Six follows this with a focus on the problematic, and contested, construction of Jakarta’s ‘thirsty poor’. The paragraphs below provide an outline of the contents of each of the following six chapters, their relationship to each other, and a rationale for the particular temporal structuring of the material.

In the following chapter (Chapter Two), I present the theoretical framework I use to understand the current patterns, and paradoxes, of urban water supply in contemporary Jakarta. Utilizing
Foucault’s analytic of governmentality by bringing it into conversation with postcolonial critiques, and insights from the production of social nature, I articulate how an understanding of the iterative relationship between materiality and governmentality can explain current characteristics of urban water supply in Jakarta, provide insights into conditions of (post)coloniality in cities of the Global South, and contribute to understanding of relations between power-nature-society. I explain how the analytic articulates ways in which relations of power mobilized within government link production of natures, spaces, and populations; and how subjectivity is constituted in relation to material practices and physical environments. Highlighting the inscription of relations of power with physical space and ecological processes, as well as discursive categories and socio-economic relations presents an understanding of how relations of colonial power continue to affect conditions within contemporary cities.

Following this conceptual outline, I conduct a historical analysis of Jakarta’s urban water supply through a genealogy of the city’s water supply infrastructure. Chronicling the development of Jakarta’s urban water supply infrastructure from 1870 (the origin of the physical construction of the city’s first piped water supply system) until 1990, Chapter Three illustrates how the piped water supply system was splintered since its inception and demonstrates that the universal provision of clean water through centralized piped network was never a goal of (post)colonial governments.

The genealogy of Jakarta’s urban water supply development is continued in Chapter Four, where I continue the chronology of the city’s piped water supply network development from 1990 until present day. Examining the largest international development project to date for Jakarta’s urban water supply (PAM Jaya System Improvement Project) in the 1990s, through privatization, until present day (1990-2007), the chapter documents how and why the two most recent development interventions led by both public and private sector management have exacerbated fragmentation, and failed to improve equitable access. This section of the genealogy of governmentality of urban water in Jakarta combines historical analysis with discourse analysis, and brings a specifically political economic focus on the last two decades of infrastructure development which were rationalized in terms of neo-liberal economic policies. In addition, in this Chapter I foreground the ways in which both public and private sector development failures were premised upon a misunderstanding of the pattern of network development from 1870-1990, in particular the parallel processes of centralization and fragmentation and the resultant growth, over time, of non-piped water supply sources in the city.

Following the completion of the chronology of Jakarta’s water supply network development documented in Chapters Three and Four, in Chapter Five I review and extend this time period of 1870-2007 to conduct a discursive analysis. The discursive analysis in this Chapter highlights the inter-relationships between governmentality and materiality, as I document the ways in which infrastructure was used to configure – and contest - particular natures, spaces, and populations. Extending the timeline followed in Chapter Three, in this Chapter I read the chronology of Jakarta’s water supply
infrastructure development alongside the shifts in colonial and postcolonial government which consistently preceded problematizations of urban water supply, and led to particular technical solutions as political rationalities were, literally, ‘rendered technical’ within physical technologies of water supply production, treatment, and distribution. In this Chapter I give particular emphasis to the origin of the governmentality of Jakarta’s water supply, and describe the ways in which relations around waters preceding the city’s first centralized water supply system became problematic to rule over the course of the 19th century.

In Chapter Six I complement the colonial focus of Chapter Five by examining the implications of the co-constitution of water, spaces, and populations within the contemporary city; I explore in particular the problematic and contested construction of Jakarta’s ‘thirsty poor’. With a specific focus on how relations of power co-constituting this triad of water, space, and populations are resisted, I discuss how the patterns and preferences of water supply associated with the urban poor (and ascribed as ‘ignorant’ and ‘undeveloped’) are responses to relations of rule, and identify how they are contributing to the progressive fragmentation of Jakarta’s splintered network, and frustrating current pro-poor water supply development initiatives in Jakarta.

Finally, Chapter Seven presents a summary of the arguments of the thesis, identifies limitations of the research and analysis, and highlights directions for future research. Not surprisingly, most of the limitations of the conceptual framework and the acknowledged boundaries of research and analysis suggest interesting avenues for future work. I limit my discussion in particular to issues of scale and subjectivity, concluding with thoughts on how a more detailed exploration of these issues carries implications for further development of the analytical framework of governmentality.

1.5 Conclusion: Imagining Jakarta

The politics of water supply in Jakarta are imminently material: the consumption of contaminated water explained the death of seventeen low-income residents in June 2005 and the death of seven residents from another community in November 2007 (Jakarta Post 27 June 2005; Jakarta Post 29 November 2007). Across Indonesia, nineteen percent of the deaths of children under five are caused by diarrhoea due to consumption of poor quality water (WHO, 2005). With over 80% of the shallow groundwater sources in the city contaminated with e-coli and/or heavy metals, and water borne and water related diseases such as cholera, dengue, polio, leptospirosis, and chikungunya on the rise, a concern for lived geographies of inequity demand an analysis able to engage with “material practices, actual spaces, and real politics” (Yeoh, 2001:457). I argue that the analysis deployed in this thesis is imminently relevant for the current material lived geographies of inequity: highlighting the materiality of governmentality attends to the effects of relations of power within socio-economic, spatial, and
discursive processes, and is thus able to make visible the continuing relevance of past relations of power within the contemporary city in ways that speak to current politics of the present (Barnett, 1997; McEwan, 2003; Yeoh, 2001).

Part of this politics is making visible what is currently erased from the developmentalist narratives and neo-colonial chronologies of development in Jakarta: disrupting the dominance of the western hydraulic discourse and acknowledging other trajectories of urban development, identifying the failures of development models based on the western hydraulic discourse, highlighting the culpability of the state and international development actors, and recognizing the agency of low income households who make very rational, informed choices opting out of piped water supply.

Making visible that which is currently erased or obviated in mainstream discourses of urban development in Jakarta ultimately seeks to contribute to new ‘imaginings’ of a more equitable Jakarta, echoing the visions of the Indonesian architects, planners, artists and academics who were ‘Imagining Jakarta’ in new ways in 2004, illustrating new possibilities for the structure and function of urban space, and suggesting more equitable relations of engagement between residents, infrastructure, public space, and the built environment (Effendy and Kusumawijaya, 2004). However, to make possible the articulation of new kinds of identities in relation to water (the political poor, the rational and strategic low income household), the production of more inclusive urban spaces, and the more equitable flow of urban water supply, it is first necessary to break with the prescribed script of the dominant discourses of developmentalism and failed modernization and suggest new ways of seeing and understanding (Yeoh, 2001). This is the project to which I now turn.
Chapter 2

Govermentality: Governing (post)colonial natures, spaces, and subjects

2.1 Introduction

This chapter presents the theoretical framework I deploy in subsequent chapters to analyze the current patterns, and paradoxes, of urban water supply in contemporary Jakarta. The analysis is grounded within Foucault’s theory of governmentality (Foucault, 1978, 1991), using his analysis of the relations between the production of governmental rationalities and the technologies of modern power to examine the specific conditions under which Jakarta’s urban water supply network emerged, developed, and continues to exist. Foucault’s original concept of governmentality is however revised in reference to postcolonial critiques of the contradictions, contestation, and difference in the operation of relations of rule. Insights from analyses of power-nature-society are also read through governmentality to draw attention to ways in which power works through the environment to link the production of nature with space and subjectivity.

At the core of my analysis is a conceptual triad - nature, space, and subjectivity – through which I interrogate the mutually constitutive relationship between materiality and governmentality. I argue that an emphasis on the materiality of governmentality is of both practical and conceptual use: it makes visible the relationships between urban governance and urban infrastructure in Jakarta by identifying and explaining the contradictions within patterns of urban water supply, and it foregrounds the physical environment (and concrete infrastructures) as a field of power through which socio-natures are produced, but also productive of, rationalities of rule.

Building upon the work of scholars who have already initiated conversations between governmentality, postcoloniality and relations of power-nature-society (Agrawal, 2005; Braun, 2000; Goldman, 2005; Li, 2007; Moore, 2005), in this chapter I explain the co-constitution of the triad of (urban) nature, space, and subjects as the product of shifting colonial and postcolonial governments, who through the ‘conduct of conduct’ effected (consciously and unconsciously) particular physical, spatial, and discursive relations between urban waters, residents, and urban spaces. The core of my analysis seeks to explain how relations of power mobilized through government have been productive of networks of urban water supply that were (and still are) implicated in both the discursive and material production of the city and its citizens; I do this through exploring two particular relationships, that between governmentality and materiality, and between relations of power and resistance. Articulating the iterative relationship between governmentality and materiality, my analysis highlights
the role of material objects and uncooperative natures in constituting or resisting discursive categories, and in facilitating or frustrating relations of rule.

The materiality of governmentality is also, I argue, a useful contribution to the theoretical and political projects of (re)materializing postcolonial studies (Harris, 2004; Jackson and Jacobs, 1996; Yeoh, 2001), and constructing more ‘cosmopolitan’ conceptual frameworks for understanding urban development in the Global South (Amin and Graham, 1997; Robinson, 2002, 2006). When governmentality is reworked through the analyses of postcolonialism and power-nature-society, it provides a provocative and flexible theoretical framework for exploring the nature(s) of the postcolonial, particularly in urban areas. First, recognition of the ways in which relations of power work through both discourse and material practice to co-constitute identity and infrastructure uncovers some of the ‘hidden ways’ in which the colonial past shapes conditions of the present (Gandy, 2002). Second, when combined with the concept of ‘layers of relations of rule’ – a phrase used by Li (2001) to describe the layering of social, cultural, and economic relations of power that do not simply disappear when government rationalities change, but continue to generate new, and often unpredictable, relations – attention to the materiality of governmentality can highlight the ways in which these layers of relations of power are embedded within physical space and ecological processes as well as social-economic relations and discursive categories. Acknowledging the continuing material effects of past relations of rule respects current lived geographies of inequity, and provides a particularly productive explanation for the contemporary contradictions within Jakarta’s urban water supply.

Prior to reviewing the initial development and further applications of governmentality as a field of study, I emphasize that while the theoretical framework I articulate in this Chapter builds upon the foundation of Foucault’s writings on governmentality, I go beyond his particular genealogy of the liberal state. Drawing from Foucault his analytic of governmentality, to examine the emergence, existence, and changes in government, I construct a theoretical framework applicable to different articulations of rule, outside of the West. This is given further explanation in the following section. Accordingly, while scholars from a variety of disciplines have used and revised Foucault’s original writings on governmentality, this chapter is limited to a discussion of the ways in which the analytic of governmentality has been extracted and extrapolated by scholars to analyze conditions of (post)coloniality (Legg, 2007; Li, 2007; Watts, 2003) and articulate relations between power-nature-society (Agrawal, 2005; Braun, 1997; Goldman, 2005). Although many scholars have provided cogent critiques of what Foucault’s analyses of relations of power, and his original outline of governmentality does – and does not – provide adequate explanation for, in particular the social and economic bases of state power and processes of capital accumulation (see Braun, 2000; Li, 2007; MacKinnon, 2000; Rose-Redwood, 2006), I do not address all of these critiques toward a project of advocating the universal utility of governmentality.
Instead, following the scholars of postcolonialism and relations of power-nature-society mentioned above, I focus more specifically on what a framework of governmentality does usefully elucidate – that is, when it is revised to include an understanding of the operation of government beyond the state, and through the production of social nature, and when in conversation with postcolonial criticism. Theoretically, I argue that it draws attention to the co-constitutive relations between nature, space, and subjectivity, and highlights the ways in which subjectivity is constituted in relation to the physical environment, and performed through material practices that resist or reify discursive categories. Practically, I argue that the analytic makes visible the relationships between urban governance and urban infrastructure. In Jakarta, this allows us to identify, and explain the contradictions within contemporary patterns of water supply in Jakarta, and offers a different way to understand, and thus to affect, possible futures.

The above apologetics for how I understand and employ governmentality does not however meant that I am not attendant to the criticism it has received. In the following sections of this chapter I review the ways in which governmentality has been revised and extended by scholars within postcolonial studies, geographers, and other scholars who analyze relations between power-nature-society.

The remainder of the chapter proceeds as follows. I begin by outlining Foucault’s original articulation of governmentality as marking the emergence of a distinctly new form of thinking about and exercising of power that arose in Western Europe over the 16-18th centuries. I then discuss the ways his work has been both contested and extended, reviewing the work of scholars who have extracted the analytic of governmentality and applied it to understand the operation of relations of power within those states, spaces, subjects, and substrates excluded from Foucault’s original analysis. Through this discussion, I follow how the application of governmentality within postcolonial and power-nature-society studies has provided a more complex understanding of relations of power within government - its different modalities, uneven effects, and operation outside of borders of nation-state. In particular, I highlight how these two areas of study (often in combination) have been used to articulate relations of power and resistance, and elucidate the iterative relationship between governmentality and materiality. In the conclusion, I outline the conceptual framework provided by the conversation between governmentality, postcolonial studies, and analysis of relations between power-nature-society, which I use in subsequent chapters to articulate relations between urban water, space and subjectivity within the (post)colonial Jakarta.
2.2 Governmentality: From Foucault and Beyond

In this section I outline Foucault’s original conceptualization of governmentality within its origins as a genealogical project of the history of the modern liberal democratic state. Setting aside the (mis)conceptions of governmentality as an evolutionary progression to a superior form of rule (Harris, 2004; Li, 2007), I employ a conceptual framework of governmentality to analyze how different modalities of power are mobilized, and operate, to what end, through projects of rule seeking to shape conduct for definite but shifting ends, with a diverse set of unpredictable consequences, effects and outcomes (Dean, 1999).

The concept of governmentality was originally used by Foucault to describe what he identifies as the emergence of a distinctly new modality of rule, that of government, or the ‘conduct of conduct’ (Foucault, 1978). Stemming from Foucault’s interest in the development of disciplinary power, biopolitics, and technologies of subjectification (Foucault, 1983, cited in Rose-Redwood, 2006), and emerging out of an intellectual project that sought to highlight the contingency of the present day liberal democratic state in western Europe, Foucault’s articulation of governmentality resulted from his investigation into the broader mechanisms, techniques and technologies by which power came to be enforced in modern Europe (Legg, 2005). In particular, Foucault sought to demonstrate how a centralized state and its apparatuses (legal, administrative, security) came to make the fostering of life and the care of population a part of a new regime of power that brought “life and its mechanisms into the realm of explicit calculation” (Foucault, 1978:143, cited in Watts, 2003).

To this purpose, Foucault elaborates how a new form of modern power emerged gradually over the 16th and 17th centuries in Europe. Following a transformation in ideas about rule and questions over the nature of government that saw the waning of the power of the sovereign, whose right was to ‘take life or let live’, Foucault describes the emergence of government as a new form of modern power that replaced, but did not eradicate, sovereignty, as the ‘right to make live and let die’. Government is thus identified as a significantly different field of institutionalized power than its predecessors of pastoral and disciplinary power. Not concerned with, or secured by, one dogmatic goal, such as the securing of territory, or the granting or taking of life, government takes both the purpose and means of power to be the optimization of life, including non-human life (see Darier, 1998). The purpose of government is therefore to secure a whole host of ‘finalities’ that are identified as necessary for achieving the optimization of all of life; seeking to ‘optimize the conditions of all of life’, government is defined as “any more or less calculated or rational activity, undertaken by a multiplicity of authorities and agencies, employing a variety of techniques and forms of knowledge that seeks to shape our conduct” (Dean, 1999:209).

As the means of securing the validity of government and achieving its purposes was arranging the ‘correct disposition between men and things’, or population and territory (Foucault, 1991), Foucault
traces the emergence of new ways of thinking systematically about the relations between population and territory as an arena of intervention. This ‘mentality’ of government, how to conduct the ‘conduct of conduct’ was termed ‘governmentality’. Somewhat confusingly, the term is used by Foucault to describe the specific historical emergence of this ‘mentality’ in Western Europe, but is more widely employed as a more general description of the ways of thinking about how to conduct the ‘conduct of conduct’ of life, in a wide variety of geographical and historical contexts (Dean, 1999).

Foucault went on to explain how the new purpose of rule as government in turn required new modalities of power. The organization of all of life relies on the operation of more diffuse mechanisms of power, so that the ‘conduct of conduct’ could be achieved for an entire, dispersed population. Distinct from disciplinary power, which reformed individuals through detailed supervision in confined quarters (Foucault, 1977), the concern of government is the well-being of populations at large. Shifting from the level of the individual (disciplinary power/surveillance) to manage the population required distinctive means, as it is not possible to coerce every individual and regulate their actions in minute detail. Rather, government relied on a new field of power which enabled the regulation of the conduct of inhabitants of a territory through a distance, and through diffuse mechanisms (Brown, 2000; Joyce, 2003; Rose, 1999). As Foucault (1991) and other scholars have illustrated, this both relied on and led to the production of new forms of knowledge and calculation (in particular statistics), which brought new domains of population, economy, and territory into the realm of calculation (Braun, 2000; Hacking, 1990; Miller and Rose, 1990; Rose-Redwood, 2006).

This new field of power operated through the exercise of tactics and the construction of knowledge, rather than the imposition of law (Foucault, 1991). Thus, power is exercised through the construction of certain truths and their circulation via normalizing and disciplining techniques, methods, discourses and practices that extend beyond the state and stretch across the social body. Operating to “educate desires, configure habits, aspirations and beliefs”, setting the conditions, “artificially so arranging things so that people, following only their own self-interest, will do as they ought” (Scott, 1995:202, cited in Li, 2007:5), power mobilized within government thus acts diffusely to shape the conditions in which lives are lived. Exercised through complex assemblages of discourse and practice, government is therefore both material and discursive – with a “complex array of apparatuses of knowledge production” leading to physical and discursive technologies of directing conduct (Rose-Redwood, 2006:272).

This understanding of the relational, diffuse, and productive natures of power highlights how government enables as it constrains or coerces, working through material practices and discourses that are for the most part, mundane and routine (Li, 2005). In this way, we can understand how the techniques of government do not act or appear as an external imposition; as the natural expression of the everyday interactions of individuals and groups, “they blend seamlessly into common sense as power works to educate desires and configure habits, aspirations and beliefs” (Li, 2007:5). Of course,
the ways in which power operates to structure choices and educate these desires is not homogenous or uniform in application: it operates unevenly across differently situated subjects (Butler, 1996; Nightingale, 2006; Stoler, 1995), and operates unevenly across different spaces (Legg, 2006; Raco, 2003), and I argue, with different results upon different socio-natures (Bakker, 2006; Bakker and Bridge, 2006; Braun, 2000). I discuss the uneven application and effects of relations of power in more detail in the following section.

Following Foucault’s articulation of governmentality, scholars in the West began to trace the history of changing forms of government authority and practice, focusing in particular on the emergence of neo-liberal rationalities (Barry et al., 1996; Dean, 1999; Dillon, 1995; Gordon, 1991; Lemke, 2001; Rose and Miller, 1992; Rose, 1996). Other scholars, while still focused on the operation of modern power in the West, have traced: how new forms of knowledge contributed to the rationality and tactics of government - specifically in production of insurance and risk (Ewald, 1991; Hacking, 1990), and systems of taxonomy and classification (Halfacree, 2001); the various ways in which government as a field of power operates through self-help programs (Cruickshank, 1996); the biopolitical projects of census-taking and statistics (Brown and Boyle, 2000; Elden, 2001, 2003; Hannah 2000, 2001; Legg, 2005; Philo, 2001; Philo and Parr, 2000).

The early inter-disciplinary studies of governmentality focused analyses on the operation of state power within the West (see Burchell et al., 1991; Dean, 1999). For postcolonial scholars, this provoked the question of whether or not the concept of governmentality was of any analytical utility outside of the West. Highlighting the relationality between colonial metropoles and territories, some postcolonial scholars even questioned the utility of governmentality as applied to the West (Cooper and Stoler, 1989; Stoler 1995). Since these questions were posed, scholars situated in places with much different histories of rule have taken up the framework of governmentality to examine the articulation and relations of institutionalized power outside of western liberal democratic states (Chakrabarty, 2002; Chatterjee, 2004; Goldman, 2005; Kalpagam, 2000; Li, 2007; Ong, 1999; Prakash, 1999; Valverde, 1996; Watts, 2003).

Resuscitating Foucault’s original writings on the co-existence of sovereign and disciplinary power within government, postcolonial scholars in particular have cautioned against earlier misinterpretations of government. As stated by Foucault, “we need to see things not in terms of the replacement of a society of sovereignty by a disciplinary society and the subsequent replacement of a disciplinary society by a society of government…In reality, one has a triangle, sovereignty-discipline-government” (Foucault, 1991:102). Postcolonial scholars have helped to emphasize this fact that disciplinary mechanisms or sovereign power did not cease to play an important role in government, and rather than eradicating disciplinary power, scholars point to how government articulates new relations between modes of power for new modalities of rule (Li, 2007; Ong, 1999, 2006). Therefore, as illustrated by Li (2007) in the military regime of New Order Indonesia, the diffusion of power
introduced through government is not to be taken to mean that sovereign and disciplinary power were eradicated, as some have erroneously interpreted (Harris, 2004). Rather, government introduced a new triad of modalities of power. Sovereignty, discipline and government operated with a new concern for “the population and its optimization – wealth, health, happiness, prosperity, efficiency – and the forms of knowledge and technical means appropriate to it” (Dean, 1999:20). Disciplinary and sovereign power were not therefore eradicated, but different modes of power were applied to differently situated populations, as ‘the forms of knowledge and technical means’ were considered ‘appropriate’ to it. Power does still discipline and control, as exemplified both within colonial regimes (Li, 2007; Mbembe, 2001, 2003; Arnold, 1994; Hussain, 2003; Mehta, 1999), and modern liberal democratic states who reserve this modality of rule for populations judged deficient (Cruickshank, 1999; Dean, 2001; Hindess, 2001; Mehta, 1997; Procacci, 1991; Valverde, 1996).

Cautioning against a reading of governmentality that can be interpreted to present an “ethnocentric replay of modernization theory” (Li, 2007:12), scholars working outside of the West, and below and beyond the boundaries of the nation-state, have instead pointed to ways in which government has articulated different modalities of power within the practice of rule (Li, 2007; Valverde, 1996). Contemporary examples of the ways in which sovereign and bio-power are awkwardly combined – such as the oil regimes in Nigeria described by Watts (2003), and the transnational companies supported by western liberal regimes working with the military in Indonesia (Li, 2007) - further reject the concept of governmentality as the evolution towards a superior form of rule. Rather, postcolonial scholars illustrate that the combination of modalities of rule often observed within pre-colonial and colonial governments is not limited to the ‘pre-modern’ era and pre-liberal regimes.

Following these scholars, I take up governmentality as a framework within which to analyze how power works (material and discursive), and what it does (production of nature, subjectivity, and space). In the next sections of the Chapter I review ways in which scholars in postcolonial studies and analyses of power-nature-society have both critiqued and extended the analysis of relations of power as understood within the framework of governmentality.

2.3 Government of Nature, Space, Subjects in the Postcolonial

Within this section of the chapter I conduct an iterative dialogue between governmentality, postcolonial studies, and analyses of power-nature-society. I begin with reviewing the ways in which the latter have critiqued and contributed to the analytic of governmentality. Postcolonial scholars examining the practice of government have shown power mobilized within government to be composed of different modalities (disciplinary, self-regulatory); to be uneven in its application across
differently situated populations and spaces; to provoke resistance in ways that are productive of new
relations of rule; and to contain inherent contradictions in the pursuit of diverse finalities. Following
this, I discuss how scholars of the relationship between nature and society have taken up the substrate
left unexamined by Foucault to emphasize how rationalities and technologies of government are both
articulated in relation to, and worked through, material environments. In the third section of the
chapter, I bring together the insights from both of these bodies of work to foreground the materiality of
governmentality, suggesting how it contributes to rematerializing the postcolonial and urban
geographies to understand ways in which layers of relations of rule inscribed in ecological processes
and physical spaces still affect conditions with in contemporary cities of the Global South.

2.3.1. Postcolonial Governmentality

In the earliest dialogue between governmentality and postcolonial studies, scholars criticized
conceptions of governmentality as a geographically limited genealogical project (only within the
West), which used a totalizing conception of power (Legg, 2005; O’Malley, 1996; O’Malley et al.,
1997). Postcolonial scholars sought to correct these notions by paying attention to difference in places,
spaces, and subjects, and this section of the chapter outlines three particular contributions which this
attention to difference has made to the understanding of governmentality. Specifically, postcolonial
scholars have highlighted ways in which relations of rule are resisted or negotiated; the uneven
application and effects of government; and the inherently contradictory and incomplete nature of
government.

First, postcolonial scholars have set limits to government by highlighting ways in which
relations of rule are resisted or negotiated (Li, 1999; O’Malley, 1996; Thomas, 1994). Scholars have
shown how, in practice, government rationalities were contested by active subject (and subjecting)
populations, who always ‘retained the capacity to act otherwise’ (Li, 2007). Repositioning the ‘prickly
subjects’ (Li, 2007) and uncooperative natures from passive recipients to active agents within relations
of rule, scholars illustrate how the actions and/or responses of both human subjects and non-human
objects of government alternately provoke, facilitate, frustrate, and/or rework relations of power in
unpredictable ways (Braun, 2000; Li, 1999, 2007; Mitchell, 2002; Thomas, 1994; Watts, 2003). This
has in turn highlighted the conceptual difficulty of divorcing the emergence of new problematics of
government and the articulation of rationalities of rule from the contestation and contradictions which
emerge through the practice of rule (Howell, 2004; Li, 1999, 2007; O’Malley, 1996).

Attending to the continual and responsive process of constructing knowledges through which
subjects are governed, and which they actively resist and reshape, scholars of the postcolonial
emphasize the relationship between resistance and rationalities of rule – or, between power and agency
– within the framework of governmentality. Although some argue that as government technologies respond to, and are informed by resistance to technologies of rule they subsume their failures and in fact reinforce and extend the power of ‘experts’ (Ferguson, 1990; Mitchell, 2002; Rose, 1999), other scholars criticize what they identify as an exaggerated closure of resistance within relations of rule (Li, 2007; O’Malley, 1996; O’Malley et al., 1997; Stoler, 1991; Thomas, 1994). However, although those like Li (2007) and Rose (1999) reserve the practice of politics and resistance to rule as a limit to the analytic of governmentality, their work has acknowledged that “new thinking about how to govern arises not only from inspired ideas, but from the pragmatic observation of how things work out in practice.” (Li, 2007:19). Therefore, although differing in their agreement over whether or not the analytic of governmentality can adequately explain the ways in which populations are mobilized to resist and respond to relations of power, postcolonial scholars illustrate the ways in which the contestation, negotiation, and compromise of government as it is practiced to be integral to formation of its rationalities and technologies1.

Second, scholars illustrating ways in which modalities of power work unevenly across different populations, spaces, and natures, have brought to the fore the uneven practice of government. Contra Foucault – power does not bleed homogenously across the social body. Paying more attention to differences in the effects and responses to relations of power, postcolonial scholars emphasize that power works differently across the social body. This highlights both the fact that rule is never complete, and is never evenly applied across all populations and spaces (Hindess, 2001; Howell, 2004; O’Malley et al., 1997). By paying more attention to the complicated realities of social location in which rule is practiced – how it was informed by responses of populations and natures - postcolonial scholars have highlighted how relations of power were applied unevenly across different populations, and how in the practice of rule not all bodies and spaces are incorporated into systems of rule in the same ways, to the same effects (Agrawal, 2005; Howell, 2004; Mehta, 1997; Thomas, 1994).

From these insights into the partiality and unpredictable effects of the relations of power within government, scholars have shown how the performance of rule and its construction is always the result of a contested engagement (Howell, 2004), often resulting in compromises in order to secure the sense of order (Li, 1999). The reality of resistance to rule by colonial populations usefully highlights what is true for all forms of government - seeking utopia, government can never be complete. Rather, given its contradictory aims, or what Foucault (1991) terms ‘diverse finalities’ scholars have emphasized government as a continual project being reworked upon and in relation to past relations of rule, at once both necessarily incomplete and inherently contradictory (Li, 2001; Moore, 2001; Thomas, 1994). Government is therefore seen as a perpetual, ongoing project that changes technologies according to

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1 Work on relations of contestation and struggle in government have also been explored outside of postcolonial studies, for example in the work of Blomley and Sommers (1999) and Crampton (2003) who look specifically at cartographic technologies of government, and their appropriation by non-state actors such as community groups to suit their own ends.
shifts in the ways of thinking about the purpose of government (to discipline/control; to uplift and
develop; to self-actualize), and importantly, responses to government by both differently situated
subjects, and non-human natures.

In addition, as government, as emphasized by Foucault (1991), seeks a ‘whole host of
finalities’, postcolonial scholars explore these diverse finalities to illustrate how government is
composed of multiple modalities. Tania Li (2007) illustrates how there was no unitary purpose to rule
in the Netherlands East Indies, as the diverse concerns of government - to secure orderly rule,
entrepreneurial profit, revenues to support the state apparatus, and native improvement – were often
contradictory. Therefore, although not minimizing the fact that colonial rule was based on conquest
(Mbembe, 2001), this was not the whole story. As other scholars also document, the liberal arts of
government were not absent from the colonies but rather emerged in rough parallel to Europe (Cooper
and Stoler, 1989; Stoler, 1995). Emphasizing this complexity of government –which combined
different rationalities in awkward amalgamations – postcolonial frameworks of governmentality reject
the chronologies of colonial government suggested by Harris’ (2004) teleological progression. Instead,
analyses of postcolonial governmentality attend to the combination of modalities of rule (sovereign,
discipline, government) that came to bear in different times and places.

Through acknowledging that colonial government consisted of multiple modalities, and
highlighting the multiple projects of government necessary in the aim to ‘optimize all of life’,
postcolonial analyses point to how government does, and must, embrace contradictions and make
compromises. Some ‘finalities’ of government are in tension with each other, and often productive of
perverse results. As illustrated later on in Chapter Six, an example of these ‘perverse results’ of
colonial government was the provision of water supply to native areas of the city; initiated as part of
the general purpose of government to ‘raise up’ the native population, the program of ‘kampong water
supply’ proceeded to set tariffs for water at twice the per unit cost paid for by European residents.
Examples like this abound in the colonial context, and resist perceptions of rule as a coherent, complete
project, which are presented in some studies of governmentality (see Ferguson, 1990; Scott, 1998).

Instead, as illustrated by Cote (2003) and Goldman (2001), there is often competition or
disagreement over the means and technologies of government – both between state departments and
agencies, and between national and international institutions. Watts (2003) provides a clear example in
contemporary Nigeria of how government is not always a coherent state project, and Legg (2005)
illustrates how in colonial India resistance was not necessarily only generated in response to state
power, but arose from tensions between different institutions of authority over the different rationalities
of government. I discuss more in the following section how geographers and other scholars of power-
nature-society also argue that government must be conceived of as going beyond the state to include
non-state actors and institutions (see Rose-Redwood, 2006), and note that the framework of
governmentality should be adjusted to able to account for the tensions arising from diverse finalities negotiated between multiple state and non-state institutions of authority.

In summary, work done by scholars within postcolonial spaces has thus set necessary limits to the analytic of power as it is sometimes understood within governmentality. Power is not totalizing or unrolled without resistance, power is not only located within state agencies but operates outside the nation-state boundaries, the state is not necessarily coherent, and government is always a complex process as it works towards ‘diverse finalities’ and thus must embrace contradictions within relations of rule.

In addition to correcting the misinterpretations of the operation of power within government by their focus on the material effects of relations of rule (including resistance), postcolonial scholars have also addressed a consistent critique made against colonial studies and its over-emphasis on discursive relations of power. Charged with favouring cultural analysis of discursive categories and the politics of knowledge production over the lived material geographies of inequity, and accused of failing to connect critiques of discourse and representation to the lived experiences of postcoloniality, postcolonial analyses are seen by some as unable to address the material problems of the present day, much less that of the future (see Dirlik, 1994; Harris, 2004; Jacobs, 1996; McEwan, 2003). The discursive analysis of many postcolonial scholars is seen as simply unable to connect to the specific, concrete and local conditions of everyday life, leading to the ‘fantastic optimism’ overlooking the persistent material inequities (Jacobs, 1996; McClintock, 1992).

Responding to this criticism, I argue the analysis provided within the framework of governmentality can redress this imbalance between discourse and practice. For, within governmentality, thought itself is conceived of as a material practice, linked to a complex array of apparatuses of knowledge production. Documenting how new ways of seeing and organizing population and territory led to the formation of particular subjects and spaces (Dean, 1999; Gibson, 2001; Hannah, 2000; Mitchell, 2002), scholars illustrate the imbrication of discursive and material relations of power. In addition, while attention to the practice of rule has highlighted the realities of resistance and uneven effects of power, scholars have also noted the ways in which colonial discourses (racialized, pathologized colonial populations) were materialized, and relied on physical practices. As such, scholars have demonstrated how discursive categorization of differences between European and colonial subjects was productive of physical spaces, material environments, and corporeal bodies (Howell, 2004; Legg, 2006), and led to the spatial ordering of imperial and colonial spaces (Kusno, 2000; Rabinow, 1989; Wright, 1991; Yeoh, 1996), and the production of colonial natures (Braun, 1997, 2002; Scott, 1998; Sivaramakrishnan, 1999).

Related to this, recent work on cities in the south has also emphasized the interrelationship between urban identities and the spatiality of colonial and postcolonial power and discourse (Bunnell 2002, Kothari, 2006; Legg, 2006; Myers, 2006), highlighting the co-constitution of space and
subjectivity (Legg, 2006). This work demonstrates the ways in which material things and spatial arrangements make a difference in the constitution of social relations, either reinforcing or contesting discursive categories of subjectivity. Discussion on the iterative relationship between material and discursive relations of power is continued below in the conversation between governmentality and analyses of power-nature-society.

2.3.2 Power-nature-society & Governmentality

As postcolonial scholars refined the concept of governmentality to include populations and non-western spaces notably absent from Foucault’s writing, so another body of work has reworked governmentality in reference to the environment. Noting that government is defined as the establishment of ‘right relations’ between population and territory, studies of the relations between power-nature-society have shown that territory is not ‘mere substrate’ upon which relations of power unfold, but is itself a field of power both through which government operates, and is itself constituted (Darier, 1999; Braun, 2000; Luke, 1998; Rose-Redwood, 2006). In this section of the chapter, I review the contributions of studies of power-nature-society to studies of governmentality. Following this I suggest how they can be combined with the insights from postcolonial studies to emphasize materiality of governmentality, and then identify the ways in which this materiality re-conceptualizes the conditions of postcoloniality and urbanization in the Global South.

First, one intersection between analyses of power-nature-society and governmentality is found within theories of the production of social nature. Attention to the various ways in which relations of power work both upon but also through material natures has emphasized the social production of nature as a socio-natural product of government (Braun, 2002; Rutherford, 2007). While this corrects the notion of a static, un-mutable nature existing outside of social relations as seems implied within Foucault’s conception of territory (Braun, 2000), it also offers analysis of how relations of power work through the physical environment to link the constitution of nature, space, and subjectivity, providing a conceptual tool for deconstructing the binaries of nature/society or material/discourse.

Second, by identifying nature itself as an object of government (and thus enrolled within social relations and processes of socio-natural production), scholars have drawn attention to how the production of particular natures was integral to rule (Braun, 2002; Scott, 1998). As particular kind of natures were remade into something useful for the political and economic aims of emerging states (Bakker, 2000, 2002; Gandy, 2002, 2006; Kaika, 2006; Swyngedouw, 1999), certain natures were also necessary for the constitution of particular global, national or local subjects (global eco-citizens, indigenous natives, geological citizens etc), who would act or be in certain ways in relation to the

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2 Legg (2006:711) refers to “Foucault’s almost total silence on issues of colonialism”, which he discusses further in Legg (2007).
physical environment, the state, institutions of authority, others, and themselves (Braun, 2000, 2002; Kaika, 2004; Scott, 1998). Tracing how nature was made amenable to rule, and the processes by which nature was constructed as a particular domain with specific uses and resultant relations between nature/society, scholars have also shown how ‘nature’ was both inserted with social processes (social nature), and then – importantly – productive of particular spatial relations and social processes.

The relationship between the government of territory and population - environment/citizen or nature/subject – and the technologies by which they are both made amenable to rule is an area of study covered by a sub-set of scholars exploring the politics of environmentalism (Darier, 1998; Luke, 1998, 1999; Mitchell, 2003; Rutherford, 2007). Connecting the government of nature (and its socio-natural production through discursive and material practices), to the governance of populations, scholars identify environmentalism as a field of power through which populations are increasingly governed by neo-liberal states, in a ‘green governmentality’ (Luke 1998, 1999; Rutherford, 2007). Originating within western studies of environmental politics, this analysis articulates the ways in which environmentalism has become a new, non-state centered site for the exercise of both disciplinary and self-regulatory power upon both the individual body and global population – enticing certain actions, practices, and attitudes while enforcing against others (logging, hunting) in ways that are often shown to be both race and class specific (Luke, 2003). Describing how new forms of knowledge about the global environment (satellite, statistics) produce particular representations and discourses around natures in need of intervention and management, and contribute to the production of particular environmental discourses (scarcity, biodiversity), scholars document the implications of these ‘truths’ for how they entice or enforce certain knowledges, practices, subject positions, and kinds of morality (the ecological citizen) (Luke, 1997; Mitchell, 2003).

Although a significant proportion of work on environmentalism as a field of power stems from analysis of the operations of power within the western neo-liberal state, other scholars working in the nexus of relations between environment and development have demonstrated ways in which environmentalism also operates outside of neo-liberal regimes to manage populations, reconfigure space, and constitute certain subject positions. Circulated through the sustainable development paradigms of multi-lateral development banks and international agencies, certain environmental truths (deforestation, conservation, biodiversity) have been adopted by international organizations and state agencies as a way to manage population in areas of the Global South (Goldman, 2005; Li, 2007). The ways in which these environmental discourses have then enforced particular spatial practices and subject positions reiterates the myriad of ways in which power is worked through the environment. Scholars of environment and development in Southeast Asia have in particular demonstrated how non-western states use international environmental discourses as way to rationalize state control over natural resources, and control recalcitrant populations (hill-tribes, ethnic minorities) by using the environment as a ground for normalizing certain behaviours, and state/society relations (Li, 2007;
Goldman, 2005; Vandergeest, 2003). In Indonesia, Tania Li documents how the establishment of community based natural resource management, emerging from discourses of biodiversity and sustainability, has tied ‘rights’ to particular kinds of environmental identities, social organization, spatial practices, and resource management (Li, 2002). This draws attention to how, outside of western states, state/society relations and identity are also being reconfigured – and resisted - through environmental policy.

The analysis of relations between power-nature-society within these studies of the politics of the environment in both western environmentalism and environment and development in the Global South has highlighted the ways in which power operates through the environment. Specifically, it illustrates how power operates at multiple sites and scales of governance that involves, but also moves outside, of the nation state. A major contribution of this work is the way in which it de-centers state power, responding to earlier criticisms of governmentality for its singular focus on institutions of the state (Agrawal, 2005; Li, 2001). Acknowledging that “power bleeds across the social body in such a way that governing occurs in multiple sites and through a myriad of techniques” (Rutherford, 2007:294), scholars have extended analysis of government both below and above the nation-state (Blomley and Sommers, 1999). I argue that this can be used to correct earlier analyses of the government of nature (particularly in Global South), which looked primarily at the expansion of state domination and control (see Ferguson, 1990; Scott, 1998), pointing instead to the myriad relations and scales of power which also operate upon and within state institutions. In addition, by conceptualizing government as more than merely state power, it becomes possible to acknowledge states as composed of diverse institutions, not unitary bodies similarly enrolled within rationalities of rule, but rather each negotiating different global/local relations (Agrawal, 2005; Tsing, 2005).

Attention to the role of non-state actors in the development of governmental rationalities and technologies is also evident through the work of geographers, who also argue for an expanded analysis of government beyond the state. Rose-Redwood (2006) emphasizes the role of international organizations like the International Red Cross in the work of biopolitics of populations, while also pointing to the work of non-state agencies in what he calls the ‘geo-coding’ of urban spaces in the U.S. during the 18-19th century. Likewise, Blomley and Sommers (1999) and Crampton (2000) both illustrate the use of government technologies (mapping), and the construction of governmental rationalities by non-state actors as cartographic technologies are used as forms of resistance. As cited in Rose-Redwood (2006), Foucault himself insisted that “relations of power, and hence the analyses that must be made of them, necessarily extend beyond the limits of the State” (1980:122). The challenge put to the analytical framework of governmentality is therefore how to account for, and include, ‘governmentality from below’ and from above, and to consider the interplay between state and non-state practices of government (Rose-Redwood, 2006).
While providing some key insights into the operation of relations of power mobilized through government, a criticism similar to postcolonial studies has also been made of some analysis of power-nature-society and governmentality, specifically, that attention to discursive relations of power are prioritized over material practices of dispossession and violence (Harris, 2004; Mills, 2003). As attention to the discursive construction of nature, and subsequent formation of rationalities of government and environmental policies looks at how certain places have been reconfigured and reimagined as sites in need of intervention and management (Luke, 1998), the emphasis indeed seems to be on discursive constructions – representations on maps, satellite imagery, statistics – rather than actual material practices. Critics of this emphasis on discourse argue that the dramatic reconfiguration of landscapes effecting eminently material relations of inequity (forestry, nature conservancies, national parks) can not only be explained through the construction of discursive categories, but needs to attend to enforcement of practices, and material relations of power involved in acts of conquest, dispossession, and exclusion (Harris, 2004).

In response to this criticism, I repeat the argument of the previous section: the analytical framework of governmentality, particularly as applied by scholars of power-nature-society in postcolonial settings, enables movement beyond the discourse/materiality binary. First, as postcolonial scholars seek to decolonize western knowledge, and attend to the violence enacted by exclusions enforced by binaries, they have highlighted the production of boundaries between nature and society as a political technology (Braun, 2002). In turn, this provokes rethinking of the relationship between discursive and material relations of power. Second, attention to the practice of government has helped to trace the material processes and practices through which nature is rendered amenable to technical interventions and inserted within political rationalities. Again, this has suggested an iterative relationship between discourse and practice, as power/knowledge was both productive of but also produced through particular practices (mapping). This is illustrated by scholars like Timothy Mitchell, who while acknowledging the state as a discursive category does not take the presence of the ‘state’ for granted but illustrates the practices through which it is physically constituted, practices “through which uncertain yet powerful distinction between state and society is produced” (Mitchell, 1991:78). Similarly, Ferguson and Gupta (2002) illustrate how the discourses productive of state plans are then constituted through the practices of data collection and planning to produce the apparent autonomy and authority of ‘the state’ (Ferguson and Gupta, 2002; Moore, 1998).

In addition, complementing the attention of postcolonial scholars to the materiality of governmentality, and the iterative relationship between discursive categories and material practices, other scholars have focused on the relationship between material environments and subjectivity. Illustrating how subjectivity is not only a discursive construct, but is also constituted in relation to material environments, Agrawal (2005) uses the term ‘environmentality’ to describe this imbrication of environment with subjectivity. Originally coined as a term to describe the operation of governmental
power through trans-national environmental organizations who exercise disciplinary power through environmental policy (see Darier, 1999; Luke, 1995, 1997), it is used by Agrawal to denote shifts in subjectivities which accompany new forms of regulation of the environment. As Agrawal explains in the context of the Kumaon region of India, environmental regulations were productive of both new ‘natures’ (socio-natures: the scientific forest), and new subjects (unruly, illegal vs. responsible, environmental, conservationist) who were formed not only through these discursive categories, but through their own material practices. Although not without its criticisms, Agrawal’s demonstration of the mutual constitutiveness of (colonial) governmentality, the identities of colonial subjects, and the physical environment, illustrates the government of populations not only through the construction of discursive categories, but through the formation of particular physical spaces and natures. Unfortunately, left unexplored by Agrawal are the ways in which gender, race, and socio-economic class are worked differently through environmental interactions. In addition, as his definition of ‘environmental subjects’ remains limited to those who consciously articulate and self-regulate behaviour according to standardized notions of environmentalism (protecting biodiversity, conservation practices), this neglects that fact that we are all, consciously or unconsciously ‘environmentalized’. This binary use of the concept of ‘nature’ and environment obviates the socio-natural production of the ‘environment’, and of course excludes examination of urban natures.

The imbrication of environment with identity that Agrawal does elucidate contributes to other analyses that have explored the formation of subjectivity within the analytic of governmentality (Chakrabarty, 2000; Mitchell, 1989; Prakash, 1999; Scott, 1999). In particular, Agrawal’s contribution is an engagement with the ways in which material practices and environments are part of the constitution of identity. This also provides balance to the emphasis on discursive constructions of subject positions, criticized for failing to seriously engage with the past and present material geographies of inequity. Instead, illustrating how material relations of power work to close off possibilities for the articulation of certain subject positions - what Butler (1993) would term as ‘making more or less easy to articulate’- this analysis can acknowledge the role of spaces and exclusions which are physically enforced. For example, using this analysis in the colony of the Netherlands East Indies, it becomes possible to articulate how the spatial arrangement of access to urban water supply, and subsequent material relations with particular kinds of water that it either enabled or disabled, informed the discursive constitution of colonial subjects.

Finally, to conclude this section of the chapter, I return to its opening paragraph, and the second half of the criticism of Foucault’s conception of a static environment existing outside of social processes. Specifically, as nature is an object of, and produced by government, nature is also productive of government. Moving beyond the material effects and actions of government, this emphasizes the iterative relationship between governmentality and materiality. For, understanding the environment as a field of power means that it must be recognized also as being constitutive of the
relations of rule. Hence, while government is productive of certain socio-natures (and attendant spaces and subjectivities), it is itself produced by these material conditions, natures, and practices (Braun, 2000; Ferguson and Gupta, 2002; Mitchell, 1991). Attention to material practices through which government constitutes nature also points to ways in which political rationalities themselves were informed through these material practices. Braun (1997) shows how the process of making nature legible and amenable to government also informed the technologies of government - constituting the state itself as a separate sphere, and the construction of society and national subjectivities (geological citizens).

Understanding how material environments are not only a field of power for government, but are in fact productive and constitutive of these relations of power and political rationalities acknowledges natures as actants, “dynamic forces that constantly surprise those who would harness and control them” (Latour, 1993, cited in Li, 2007:18). This in turn suggests that the biophysical properties of nature matter - determining how they are enrolled within government, and acknowledging how they either frustrate, facilitate, or provoke unexpected relations of rule, while they either enable or disable the articulation of different subject positions. Illustrating the former point, Bakker (2006) documents how bio-physical and kinetic properties of water matter in how it is able to be enrolled in neo-liberal projects of privatization.

In conclusion, I argue that like postcolonial scholarship, analyses of power-nature-society have also refined the utility and scope govern mentality. First, attention to the various ways in which relations of power work both upon but also through material natures has emphasized the social production of nature as a socio-natural or material/discursive product of government. While this corrects the notion of a static, un-mutable nature existing outside of social relations as seems implied within Foucault’s conception of territory, it also offers analysis of how relations of power work through the physical environment to link the constitution of nature, space, subjectivity, providing a conceptual tool for deconstructing the binaries of nature/society or material/discourse. Second, attention to the environment as a field of power through which government operates has highlighted the operation of government at scales beyond the nation state, correcting the state centered analysis of some postcolonial and environment and development scholars which seem to assimilate governmentality with ‘government’ of nation-state, or fail to recognize the production of state/society binary as product of government technologies, or ignore the production of scale through relations of power as a component of governmentality. Third, attending to the materiality of government as it constitutes physical environments considered necessary for rule, has highlighted the ways in which subjectivity is also constituted through material practices. Finally, moving beyond the mere material practices and effects of government, scholars have emphasized an iterative relationship between governmentality and materiality. Understanding the environment as a field of power means that it must be recognized as
constitutive of the relations of rule mobilized by government, hence while government is productive of certain socio-natures, it is itself also constituted by material conditions, natures, and practices.

2.3.3. Materiality of government: Layers of relations of rule

Seeing government as being both simultaneously discursive and material allows for the analysis of ways in which relations of power mobilized, appropriated, and resisted within government are worked through physical technologies (like urban water supply infrastructure), material practices, and actual, tangible, and visceral matter. Acknowledging this material dimension of government thus attends to the ways in which relations of power are inscribed within ecological processes and physical spaces, as well as in socio-cultural and socio-economic relations. Applying this observation within postcolonial urban spaces, to identify how past relations of rule remain layered upon and embedded within both discursive categories, socio-economic processes and the physical environment highlights the relevance of the colonial past for the present, and speaks to the need to rematerialize urban studies within the South (McEwan, 2003; Yeoh, 2001). Using the concept of ‘layers of relations of rule’ from Tania Li (2001) to attend to the physical sediments of previous government rationalities, and noting how they continue to interact with the present as they are “layered over, and articulated with prior formations” (Moore, 2001 cited in Goldman, 2001:513) assists with the project of re-conceptualizing and rematerializing urban studies within the Global South.

First, recognizing how relations of power are worked through physical natures, corporeal bodies, and concrete urban spaces, and attending to ways in which political rationalities themselves are articulated in relation to these material environments, there is a new visibility to ways in which new rationalities of rule emerge from and engage with the past. Even if, as highlighted by postcolonial scholars, the effects induced by governmentality are rarely those that are intended, since government is never complete or uncontested, they still “induce a whole series of effects in the real” (Li, 2007:28) which do not disappear when one mentality of government is replaced by another, as for example the shift from colonial rule to independence. Thus, as previous relations of power remain layered both within the discourses and material environments of contemporary places to interact in unpredictable ways to produce new relations of rule, this can add new material dimensions to the analysis of conditions of (post)coloniality. Without being prescriptive or derivative for contemporary conditions, the physical sediments of previous relations of rule do still matter.

Attending to the materiality of governmentality within the concept of ‘layers of relations of rule’ is particularly appropriate for analysis of urban water supply in the Global South. As water supply infrastructure is long-lived (often well over one hundred years, as is the case for Jakarta), 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. As colonial relations of power were concretized within urban infrastructure and embedded within physical geography of the colonial city, the successive eras of government have had to negotiate around and within these colonial relations. Building physically on top of the colonial infrastructure systems, the subsequent layers of Jakarta’s water supply infrastructure were also discursively situated within existing sets of socio-economic, cultural, and political relationships. Therefore, Jakarta’s colonial pipe’s continue to be engaged within new relations of power, and as I explore in subsequent chapters, it is the materiality of governmentality - the ways in which relations of power were inscribed within physical space and ecological processes as well as socio-economic relations - that explains why colonial relations of power continue to inform access and sustain fragmentation.

Second, beyond illuminating the continuingly productive relationship between the colonial past and present in the contemporary city, understanding the materiality of governmentality can also aid scholars in understanding processes of urbanization within the Global South. Specifically, the materializing and thus historicizing of relations of power can help to decolonize urban studies, and produce more diverse urban geographies as called for by scholars working in the cities of the Global South (McEwan, 2003; Robinson 2002, 2006). As argued by Robinson (2003), the assumed universalism of theoretical claims that are developed without reference to the range of different cases to which they are assumed to apply, such as cities in the South, need to be challenged. Indeed, recent scholarship on specific cities in the South highlights the importance of Robinson’s critique of Euro-American centered forms of theorizing (see Boland, 2007; Gandy, 2005, 2006; Legg 2006; Loftus 2007; Nijman, 2006; Swyngedouw, 2004). Rejecting the extrapolation of theoretical frameworks developed through research on cities in the North to those in the South, these urban scholars are calling for the creation of alternative, more flexible theories of urbanisation to generate more appropriate explanatory frameworks (Robinson, 2002, 2006). A conceptual framework informed by the materiality of governmentality can, I argue, contribute to this project of generating more ‘cosmopolitan’ analysis of processes of urbanization in general, and the fragmentation of urban water supply networks (and, indeed, many public services and amenities) in particular.

An example of the conceptual contribution of the dialogue between governmentality and materiality is illustrated when examining the thesis of ‘splintering urbanism’ (Marvin and Graham, 2000), which, as a theoretical framework developed to explain the ‘collapse of the integrated ideal’ following the fragmentation of access, control, and pricing of network infrastructure in both the North and the South, is still rooted in a Northern context. Although Graham and Marvin acknowledge the differentiation of service provision which characterizes colonial cities (which they characterize as ‘spatial apartheid’), 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.
Therefore, while Graham and Marvin (2001) position Jakarta, with its toll roads and gated communities, alongside other Southern cities as characteristic of a splintered urbanism arising from processes of liberalization, privatization, structural adjustment, and financial speculation, this is an incomplete analysis. Specifically, Jakarta has never ‘achieved’ the modern infrastructural ideal, and the splintering of its urban water supply infrastructure is neither recent, nor is differentiation always oppressive. As Chapter Six later illustrates, resistance to rule has been part of the process of Jakarta’s fragmentation, and splintering can also occur from below. As also noted by other scholars (Coutard, 2002), the ‘collapse’ of an integrated ideal may be attendant upon many particularly situated relations of power, and need not always be negative. I argue that the insight into the both the historical origins, and the variety of relations of power (including resistance), implicated within processes of splintering are visible within the more flexible framework of governmentality. Indeed, as documented in Chapter Three, by tracing the ways in which the colonial rationalities guiding the construction of the original infrastructure have been incorporated into postcolonial government rationalities, the processes of ‘splintering urbanism’ are shown to be much more than an example of the recent, neo-liberal phenomenon.

2.4 Conclusion: Productive Contradictions – Jakarta’s urban water supply

When governmentality is reworked through the analyses of postcolonialism and power-nature-society to reveal the mutually constitutive relationship between materiality and governmentality, it provides the conceptual tools necessary for understanding the production of patterns of water supply in Jakarta. Identifying and explaining the current contradictions within patterns of urban water supply by making visible the relationships between urban governance and urban infrastructure, the analysis foregrounds the physical environment (and concrete infrastructures) as a field of power through which socio-natures are produced, but also productive of, rationalities of rule.

First, attending to the ways in which relations of power are inscribed within physical space and ecological processes as well as discursive categories and socio-economic processes gives literal interpretation to the ‘layers of relations of rule’, and suggests how the imbrication of urban infrastructure and identity continues to inform patterns of provision and preferences in the contemporary city. Applying this analytical framework to Jakarta in particular yields an understanding for both the sustained nature of splintering of the city’s water supply network, and attendant persistent patterns of provision. For, unlike the developmentalist analysis of failed modernization, or the thesis of splintering urbanism - analyses which demand deliberate blindness, or merely footnote Jakarta’s realities as anomalies within theory – the sustained splintering of Jakarta’s water supply network and the problematic non-thirsty poor are not only able to be acknowledged, but are explained as the
material, discursive, and spatial effects of successive, contested, and contradictory projects of (post)colonial government. As government rationalities have thought and acted in particular ways to articulate the ‘right relations’ between urban waters, spaces, and residents, successive governmentalities have inscribed both physical and discursive relations of rule, which continue to articulate with the present in unpredictable ways. Ironically, by taking what is defined as Jakarta’s deviance from western based urban trajectories – its failure to achieve universal provision of water through centralized distribution system - as a productive point of entry, governmentality provides a framework for exploring the ways in which this fragmentation and subsequent patterns of access are historical products of material and discursive relations of power.

Secondly, by identifying how relations of power mobilized within government are materialized within urban water supply infrastructures, the framework of governmentality highlights the often hidden relationship between urban infrastructure and urban governance (Gandy, 2002). Jakarta’s splintered networks are identified as the product of both government strategies attempting to secure the ‘conduct of conduct’ through urban water supply, and resistance to these strategies by uncooperative subjects and unruly natures. Acknowledging this relationship between urban governance and urban infrastructure is crucial to explaining the splintering of multiple modes of production and distribution throughout the development of a centralized water supply network in Jakarta. For, although the western urban infrastructural ideal - centralized supply – was periodically articulated as a project of successive colonial and postcolonial governments, it was never intended as a universal supply. Rather, the achievement of one standardized universal system of supply was seen as contradictory to government strategies of producing difference, a tactic I argue was necessary to establish and maintain legitimacy of both colonial and postcolonial government. Subsequently, as the following chapters document, patterns of access to the various centralized piped networks were established according to a strategy of urban governance that sought the creation of particular kinds of urban spaces and particular kinds of urban citizens who resided in them (European vs. native; hygienic vs. contaminated; colonial vs. independent; modern vs. traditional; obedient vs. illegal). Providing different qualities and quantities of water supply through different kinds of infrastructure, according to different rationalities of rule over time (modernizing, developing etc), through different modes of power (disciplinary vs. biopower), has been part of the project of producing governable citizens, and reinforcing the authority of various (post)colonial governments. Therefore, rather than failed modernization, or lack of development, Jakarta’s splintered urbanism has been the product of government rationalities, and equally importantly, resistance to these rationalities – by both human subjects and uncooperative natures.

The next chapter follows from the conceptual framework articulated here. Conducting a historical analysis of the socio-spatial fragmentation of access to piped water in Jakarta, Chapter Three provides the first of three methods of analysis (historical, political economic, discursive) used to document the governmentality of water in Jakarta.
Chapter 3

Splintered Networks: Urban water supply in Jakarta, 1870-1990

3.1 Introduction

In this chapter I document how the progressive development of Jakarta’s centralized piped networked water supply has continually worked to fragment access between different urban spaces and urban populations according to relations of rule articulated by successive colonial and postcolonial governmentalities. Documenting the ways in which colonial rationalities guiding the construction of the city’s first water supply infrastructure were incorporated into postcolonial governmentalities, the chronology challenges the thesis of splintering urbanism as developed by Graham and Marvin (2001). Identifying the socio-spatial fragmentation evident within the contemporary city as a product of a pervasive, persistent rationality of rule governing the production of urban water in Jakarta, rather than a recent, neo-liberal phenomena, the chronology traces how the patterns of splintered access inscribed within the city’s first urban water supply infrastructure in the 1870s was subsequently enrolled to support successive governments who also premised legitimacy upon visible axes of difference between subjects and the urban spaces they occupied: European vs. native, modern vs. primitive, developed vs. undeveloped and so on. Through the analytic of governmentality, the splintered networks of Jakarta’s urban water supply are viewed as the particular and historical product of colonial and postcolonial relations of rule which limited access to the piped networked water supply to particular types of urban citizens.

Following from the moment of origin of Jakarta’s water supply in 1873, the chapter also highlights the materiality of governmentality to trace how both the city’s built infrastructure, and the ways in which it articulated legitimacy of access to piped water, continued to inform subsequent physical patterns of access and rationalities of provision. Addressing the criticism of those scholars who argue that analyses of governmentality focus too narrowly on discourse and abstract, intangible subjectivities, without acknowledging and incorporating the material aspects and expressions of power (see Harris, 2004), the chronology in this chapter highlights the material effects of relations of rule. Specifically, identifying the ways in which the water supply infrastructure in the contemporary city has been both physically and discursively layered upon the foundations of the first reticulated networked system built by the colonial government, I highlight how the ‘layers of relations of rule’ described by Li (2001) are grounded not only within socio-economic relations and discursive categories but also within material infrastructure, physical spaces, and ecological processes. Attending to the ways in
which both the physical and discursive sediments of previous relations of rule do still matter, I excavate the relevance of colonial pipes for the contemporary city.

Deconstructing the narrative of progressive, linear development of the city’s urban water supply system as it is usually presented (see Maronier, 1929; PAM Jaya, 1992b), the chronology of Jakarta’s water supply infrastructure development paradoxically illustrates the continuities between the phases of both colonial and postcolonial progress: each main infrastructure development worked to further fragment the distribution of water supply both socially and spatially throughout the city. With each phase of development into the centralized piped water supply effecting a simultaneous fragmentation of access between urban spaces and populations - circulation of different qualities and quantities of water, different technologies of distribution, and economies of consumption - the colonial patterns of provision are still visible within the contemporary city.

The continuity between the past and present in Jakarta’s urban water supply system is typically identified as the result of a lack of progress, and viewed as evidence of Jakarta’s failed modernization (see Robinson, 2002; see examples within Drozdz, 2006; UN-ESCAP, 2007). However, by documenting the original and progressive fragmentation of the piped water supply network, this chapter problematizes both academic analyses of splintered urbanism (Marvin and Graham, 2000) and the developmentalist interpretations of failed modernization. I argue that the failure to provide the western standard of universal provision is not the product of failed modernization as usually interpreted within developmentalist analyses. Rather, fragmentation is the physical and spatial product of colonial and postcolonial governments who never had universal access as a political goal; the production of a centralized urban water supply was only ever a partial project of both colonial and postcolonial government in Jakarta, and always accompanied by attendant development of parallel and partial networks of alternative supplies.

The chronology of Jakarta’s urban water supply infrastructure proceeds to follow four key phases of growth in the city’s urban water supply – (1) the colonial artesian water system (1870-1920), (2) the colonial spring water network (1920-1945), (3) the first two large scale surface water treatment plants Pejompongan I&II built after independence (1950-66), and (4) the long decline of the centralized public water supply infrastructure during the 1960-1990 New Order government. These first four phases of urban water supply development are demarcated by the types of infrastructure and water supply technologies that were introduced, but also importantly, through the subsequent fragmentations of waters, spaces, and populations that they each entailed. The (post)colonial rationalities of rule - and resistance to rule - underlying the patterns of deliberately partial provision are explored more thoroughly in Chapters Five and Six, while Chapter Four discusses the dramatic expansion of the city’s urban water supply infrastructure after 1990 and during the World Bank’s Pam Jaya System Improvement Project and subsequent privatization, and the new rationalities of government introduced within these projects.
### Table 3.1 Urban water supply infrastructure development in Jakarta, 1873-1990

<table>
<thead>
<tr>
<th>Year(s)</th>
<th>Infrastructure built and operational</th>
<th>Total Production Capacity (L/s)</th>
<th>Number of Household Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>1873-1889</td>
<td>9 artesian wells 6 reservoirs (660 m³; T = 660 m³)</td>
<td>n.a.</td>
<td>1</td>
</tr>
<tr>
<td>1890-1922</td>
<td>41 artesian (shallow) wells (T = 50) 6 reservoirs (140 m³; T = 800 m³) 15 pumping stations (121 L/s) 119 Km main pipe network</td>
<td>121</td>
<td>4,090</td>
</tr>
<tr>
<td>1923-1930</td>
<td>Spring water supply from Bogor (315 L/s) 1 reservoir (20,000 m³) 154 Km main pipe network (T = 284 Km)</td>
<td>315</td>
<td>18,769</td>
</tr>
<tr>
<td>1931-1956</td>
<td>Spring water production capacity increased by 85 L/s</td>
<td>400</td>
<td>n.a.</td>
</tr>
<tr>
<td>1957</td>
<td>Pejompongan I WTP (2,000 L/s)</td>
<td>2,400</td>
<td>n.a.</td>
</tr>
<tr>
<td>1966</td>
<td>Pejompongan II WTP (1,000 L/s)</td>
<td>3,400</td>
<td>n.a.</td>
</tr>
<tr>
<td>1967</td>
<td>Pejompongan I capacity increased by 1,000 L/s</td>
<td>4,400</td>
<td>n.a.</td>
</tr>
<tr>
<td>1973</td>
<td>Pejompongan II capacity increased by 1,000 L/s</td>
<td>5,400</td>
<td>n.a.</td>
</tr>
<tr>
<td>1975</td>
<td>Pejompongan II capacity increased by 1,000 L/s 225 Km main pipe network (T = 509 Km)</td>
<td>6,400</td>
<td>n.a.</td>
</tr>
<tr>
<td>1977</td>
<td>Mini-WTP Cilandak 200 L/s</td>
<td>6,600</td>
<td>n.a.</td>
</tr>
<tr>
<td>1982</td>
<td>Pulogadung WTP 1,000 L/s 6 Mini WTP’s 280 L/s (T = 480 L/s)</td>
<td>7,880</td>
<td>n.a.</td>
</tr>
<tr>
<td>1986</td>
<td>Pejompongan II capacity increased by 600 L/s Pulogadung increased by 3,000 L/s 100 Km more main pipe network (T = 609 Km)</td>
<td>11,480</td>
<td>154,900</td>
</tr>
<tr>
<td>1988</td>
<td>-</td>
<td>-</td>
<td>158,620</td>
</tr>
<tr>
<td>1990</td>
<td>3,063 Km more pipe network (T = 3,672 Km)</td>
<td>10,400</td>
<td>227,830</td>
</tr>
</tbody>
</table>

n.a. = not available
T = Total (reported figures).

Sources: Smitt (1922); Maronier (1929); Eggink (1930); PAM Jaya (1992b); World Bank (1990b, 1998); JICA (1997).
3.2 Artesian water supply: 1873-1922

The drilling of individual artesian\(^1\) wells begun as a project of colonial government in the 1870s marks the beginning Jakarta’s centralized piped water supply. Accompanying changes in the purpose of colonial government, which would see an influx of new European migrants following new economic policies promoting investment opportunities, the center of colonial administration began to emerge as a proper colonial capital with attendant infrastructure supporting its transformation from ‘Tempo Dulu’ colonial society (see Milone, 1967) to a racialized and spatially segregated urbanized landscape. Supporting a new population of European residents, and contributing to the new racial rationalization of colonial rule, the series of individual wells, supplemented by reservoirs and later fused together within a piped distribution network, was also the beginning of the splintering of city waters between different urban populations and urban spaces. With the centrally regulated and scientifically monitored artesian water strictly limited to the legally defined ‘European’ population, the city’s first water supply infrastructure facilitated the desired divisions between races (European vs. native), and the urban areas they resided (European suburbs and ‘well planned’ residential areas vs. the kampong). Supporting a colonial governmentality that premised legitimacy of rule upon European racial dominance (see Gouda, 1993), the free standing hydrants and reservoirs comprising the city’s first urban water supply system were located in a north-south strip in the central (European) parts of the city, mirroring the spaces of new European concentration.

The public to whom the series of artesian wells were made accessible consisted of the city’s 7,000 odd legally designated European residents, less than eight percent of city’s population at that time\(^2\). Of course, as noted by scholars of the Netherlands East Indies (Cote, 2003; Stoler, 1992; Taylor, 1983b), the racial category of ‘European’ did not imply homogeneity; as a contested discursive construct, this legal category encompassed an uneasy mix of naturalized Europeans who had been born in the colony, and an increasing number of new middle class arrivals\(^3\). This discursive differentiation between different kinds of European residents themselves, and the ways in which this was negotiated through urban water supply infrastructure, is dealt within in detail in Chapter Five; within this Chapter I document how the colonial government attempted to correct the porous boundaries of racial identity by fixing, and physically embedding, the socially constructed categories of citizenship within corporeal bodies and urban spaces. In the rest of the chapter, the terms ‘European’ and ‘native’ as pertaining to access to urban

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1 Artesian water is groundwater trapped between layers of impermeable rock, so that when tapped is under pressure and comes out of the ground as like a spring. Groundwater is still used as a water supply in present day Jakarta, but is no longer under pressure, with the water drawn from between layers of impermeable rock now being pumped from depths of 100-200 meters below sea-level.

2 In 1885 Van Raay (1915) records 7,634 legally designated European residents, 25,560 Chinese, and 62,616 indigenous and mixed race residents living in and around area of Batavia.

3 In 1885 the total European population of the Netherlands East Indies was approximately 47 000; 35 000 of whom were born in the colonies, the vast majority of whom were of mixed European and ‘Indische’ descent (Cote, 2003).
water supply in the colonial city derive from colonial archival records; they do not differentiate between indigenous ethnicities (Javanese, Sundanese, Balinese, Buginese et cetera), nor between the different cultural competencies and middle class moralities of those who were legally (although perhaps still not culturally) defined as ‘European’.

Map 3.1 Artesian water supply network, 1873-1922

In the 1870s the city’s water supply system consisted of a series of seven artesian wells, with a storage capacity of 660m³, but the system continued to expand in capacity and coverage according to the growth and pattern of development of the European urban population. By 1920, after 50 years of development of the artesian supply system, there were 28 wells, 12 reservoirs with a storage capacity of 750m³, and 118 km of piped network connecting 3,863 individual households to the piped water supply system (Gemeente Batavia, 1917; Smitt, 1922).
Table 3.2 Artesian wells, pump stations, and reservoirs installed in Batavia, 1873-1921

<table>
<thead>
<tr>
<th>Name &amp; Location</th>
<th>Year</th>
<th>Depth (m)</th>
<th>Elevation + sea level (m)</th>
<th>Year of pump station</th>
<th>Pump Capacity (m$^3$/hour)</th>
<th>Year of Reservoir</th>
<th>Reservoir Capacity (m$^3$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Parapattan I</td>
<td>1873</td>
<td>1.66</td>
<td>6.58</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Batoetoelis</td>
<td>1873</td>
<td>1.31</td>
<td>3.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Glodok I</td>
<td>1873</td>
<td>1.40</td>
<td>3.00</td>
<td>1916</td>
<td>1873</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>4. Schouwburg</td>
<td>1874</td>
<td>1.40</td>
<td>4.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Beursplein</td>
<td>1875</td>
<td>1.71</td>
<td>2.00</td>
<td></td>
<td></td>
<td>1875</td>
<td>30</td>
</tr>
<tr>
<td>6. Koningsplein</td>
<td>1976</td>
<td>1.89</td>
<td>3.52</td>
<td></td>
<td></td>
<td>1876</td>
<td>180</td>
</tr>
<tr>
<td>7. Salemba</td>
<td>1876</td>
<td>1.09</td>
<td>8.38</td>
<td></td>
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Source: Data from Smitt (1922)
Accompanying the racial heterogeneity throughout the 17-18th centuries (see Milone, 1967; Taylor, 1983b), and prior to the colonial government’s construction of the artesian wells, the entire heterogeneous population of Batavia – full-blood European, mixed race Indische, Javanese, Madurese, Malay, Chinese, and other foreign easterners\(^4\) - all relied on different combinations of river water and shallow groundwater. As was described by a military doctor of the Netherlands Indies, residents used various procurement and treatment methods depending on their geographical location within the city, personal inclination, and socio-economic status (Moens, 1873). Although intermittent attempts to solve the perennial problem of poor water quality in Batavia had been undertaken infrequently throughout the 17-18th century, the imprint (and improvements) on the urban landscape prior to the 1870s were negligible, leaving residents to ‘secure for themselves’ a safe water supply (Moens, 1873). Selecting their sources of household water on the basis of cost, geographical proximity, and quality, as perceived through the traditional sensory assessments of colour, clarity, and odour, all residents used a variety of different water sources, treatment technologies, and providers – ranging from chemically treated surface water produced by a Water Fabriek (Water Factory), to the surface water sold by ambulatory ‘toekang air’ (water vendors).

\(^4\) Foreign easterners is the classification given by the colonial government to the colony’s Arabs, East Indian populations.
Although providing numerous consumer options and allowing for the varying socio-economic status of residents, the multiple waters of Batavia became problematic in the latter half of the 19th century. New scientific discoveries made connections between drinking water consumption and health, and articulated a standardized, biophysical definition of a hygienic water supply (Hamlin, 2000; Maronier, 1929; Moens, 1873). 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 (Gandy, 2004; Goubert, 1986; Luckin, 2000; Melosi, 2000). Within the Netherlands Indies this discovery accompanied a rationality of rule premising the legitimacy of colonial government upon European cultural superiority (Gouda, 1993), and stimulated the demand for an urban water supply system capable of providing a superior quality to select citizens (see Maronier, 1929; Moens, 1873). Therefore, although financial investments into urban water infrastructure were previously deemed unnecessary, or too costly for serious consideration by the colonial government, the artesian wells and later network were financed completely by the Dutch government and actually delivered water at no cost to users until the advent of individual household connections and a Water Ordonnance in 1910 (Maronier, 1929).

Instrumental to supporting the legitimacy of the colonial government, and determining the technical design of the subsequent artesian water supply system, was the specific racialized public to who water was provided. Unlike in the metropole, in the Dutch colony the public provided with this new standardized water supply was composed of a particular, gradually more homogenous group of European residents, who at the end of the 19th century had begun to concentrate their settlement in newly developed suburbs of the colonial capital city5. Building upon the emerging divisions between urban spaces and urban populations, the artesian water supply system mirrored the newly concentrated clusters of European urban settlements, and the hydrants of the artesian water supply limited the circulation of a chemically treated and scientifically monitored clean water supply amongst a specific set of residents. Facilitating the transformation of the city from a collection of de-concentrated riverside garden villas of the ‘Indische’ or ‘Tempo Dulu’ colonial society (see Milone, 1967) to a more spatially segregated European population, the artesian water supplied a new concentration of Dutch government officials, military personnel and private company employees. This made the centralized provision of a uniform quality of water to a homogenous group of consumers both desirable - supporting the transformation of European settlements by providing a water supply alternative to the surface water previously conveniently located alongside estates - and geographically feasible. Meanwhile, the

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5 Increasingly segregated colonial satellite towns, ringed by native kampongs, began to emerge around the city’s center (Weltevreden, Tanah Abang, Gondangdia, Meester Cornelis); see Kusumawijaya (1990), Milone (1967), Wertheim (1956).
formerly rural areas of native villages swallowed up by the expanding urban area continued to rely upon surface waters for all of their water supply and sanitation needs (Argo, 1999; Wertheim, 1956).

Intended only to provide for the European population, who were increasingly encouraged to ‘take care’ for a scientifically defined quality of drinking water (see Moens, 1873), the artesian hydrants were limited to European areas of the city, and not extended to native populations until the last decade of the artesian water supply (1910-20; Eggink, 1930). Recorded as a matter of fact by a colonial engineer, this is the population for whom the provision of artesian water was always intended.

“The Europeans were mainly settled in a small strip along ‘den Grooten Postweg’ [the large mail-road] running through Buitenzorg, Meester Cornelius, and Batavia, and so within the neighbourhoods of Salemba, Kramat, Passer Senen, Waterlooplein, Noordwijk and Molenvliet... The Government’s water provision using artesian wells also only reached along that strip. What lay outside that strip was not considered.” (Van Raay, 1915:136).

Map 3.2 Urban water supply and land use in Batavia, 1897

Source: Map created by Ernst-Jan Martijn (2007), based on water supply network map in Smitt (1922), and land use map in Tresling (1897).
Building upon the initial segregation inscribed within the artesian water hydrant and reservoir system, later development of the city’s water supply and specifically improvements in distribution technology led to even greater differentiation between the water supplies of the city’s population. From the late 1890s to 1900s an increasing number of European households began to build small piped networks, creating clusters around individual hydrants accompanied by reservoirs. The increasing demand for household connections to pipe water into the home – already the standard in European cities by the 1920s (de la Motte, 2005) – was in large part due to the influx of new types of colonizers from the metropole. From 1890-1920 male migration from Europe to the Netherlands East Indies increased by two hundred percent, and, perhaps more importantly as argued by some scholars, female migration increased by three hundred percent (Gouda, 1993; Stoler, 1995; van Doorne, 1994). With houses located adjacent to the artesian hydrants, European residents built small clusters of pipes, creating ‘spider-web like’ piping systems surrounding the above ground hydrants. Fused together by the Municipality of Batavia after its establishment in 1905, the number of household connections to the artesian network continued to grow, even more rapidly after 1910 when the government formalized its policies on household connections to ensure an adequate quality of service (Maronier, 1929).

Of course this progress towards the metropolitan ideal was only geographically feasible for the households who lived within the clusters of formally planned European residential areas where the hydrants had been located. Reinforcing this initial socio-spatial bias, the subsequent investments into increased production (growth in capacity of wells), and increased distribution (growth in network area and addition of pumping stations) followed the expansion of European residential and commercial areas. During this phase of artesian water network expansion, the native spaces in the city were left untouched, and despite representing the majority of the area’s population, native spaces are noticeably absent from the maps of urban infrastructure. Indeed, throughout most of the operation of the artesian water supply system, native residents were spatially excluded from access. Providing the desired contrast between stages of (racialized) development, the majority of the native population living within the urbanized area continued to rely on the numerous surface water channels for all of their water needs. With the colonial government opining that the ‘physical standards of an urban habitat’ were foreign to the ‘traditional society’ of the native population (Tillemans, 1913:407), the majority of the city’s residents were left to demonstrate their ‘traditional habits’ of washing, bathing, and defecating along the riverbanks (van Breen, 1919; van Leeuwen, 1920; van Raay, 1915; Wertheim, 1956).
The efforts to include the native areas of the city within the growing network of water supply occurred much later, following the secure establishment of water supply to European areas, and were decidedly minimal. Despite the introduction of an Ethical Policy in 1901, supposedly guiding colonial governmentality, the mandate of ‘raising up’ the native population was not immediately evident within the ongoing development of Batavia’s urban water supply infrastructure. Instead, the overall policy of the newly established Municipal Council (1905) towards native affairs - and provision of urban water supply - was “Onthouding was het parool, en geen inmenging!” (Abstinence was the motto, no interference in the affairs) (van der Wetering, 1939:308). Until 1918 native residential areas (kampongs) were still considered a legally, if not geographically, separate entity from the European city, and it had its “own life and independent task” for which the European dominated Municipal council was not responsible for (ibid). Therefore, in contrast to the programs of improvement directing government funds to native education, agriculture, and economic development programs⁶, there was little action taken to ensure that the native population of the capital city had access to safe water supplies (Abeyasekere, 1985). Although

⁶ From 1901-1913 the colonial budget rose from 160 to 300 million guilders; allocations to the education system for natives occurred in parallel, rising from 1.5% of overall government expenditures to 4.5% by 1913. See Moon (2005) for more on agricultural development programs, Lindblad (1989) for education, and Brooshooft (1977) for Ethical Policy programs.
geographically enclosed by an expanding urbanized area, the kampongs were considered an undeveloped and embarrassing aberration to urban life, and not actually part of the modern city (see Abeyasekere, 1985; Cobban, 1988; van der Wetering, 1939). Installing only four public hydrants for the indigenous urban population of over 116,740 residents (Eggingk, 1930; van Raay, 1915), the resultant distances between home and water source meant that households had to expend their own time and labour to collect water, or purchase it from an ambulatory vendor. Vendors sold the artesian water at a cost of three cents per twenty litres, a significant amount for native households in the last decades of 19th century, when the average wage was between twenty to sixty cents per day (Abeyasekere, 1987; Booth, 1988).

**Illustration 3.3** Water vendors in Batavia, 1918

Source: Drost (1918), “Water aftapping uit hydrant Passar Baroe Oost. Het water wordt in open petroleumblikken weggepikold” (Water abstraction from hydrant Passar Baroe Oost. The water is vended in open gasoline tanks).

Left to remain reliant upon the most affordable and convenient water sources for their supply while the colonial government facilitated the transformation of European domestic habits and hygiene practices, the continued use of untreated surface water by native populations for drinking, bathing, and washing created both physical and discursive connections between native bodies and disease.

“The occurrence of typhus and cholera epidemics were known to be related to the use of unsanitary water versus the use of reliable water…this was especially evident with the difference in hygienic circumstances between European and Inlandische [native] population.”(Maronier, 1929: 225).
Perversely, instead of generating a more widespread effort to eliminate the use of unsafe drinking water amongst native populations, the connection between native bodies and disease provided both physical and discursive support for still more segregation between populations. While reinforcing the premise of cultural superiority, the epidemics of cholera and typhus - clearly the product of lack of access to clean water - considered endemic to native quarters (Abeyasekere, 1987) increased the desire for a separation of European and native spaces in the city.

Tellingly, the limited action that was taken by the Municipal Council to provide water supply to the kampongs during these years was spurred by this European fear of epidemics spreading from native to European areas of the city. The few public hydrants that were installed in urban kampongs from 1910-1920 were geographically strategic. Instead of installing hydrants into the lower northern areas of the city, where flood waters brought the greatest risk of disease and brackish groundwater created the greatest demand for a clean water supply, the European council favoured the native residential areas in the city center (Abeyasekere, 1985; Wertheim, 1956). Proximity to European residential and commercial areas seemed to be the criteria for provision of public infrastructure, and as the death rate in native quarters rose to 60,000/year during this same time period, “one's chances in the stakes for life and death…were increasingly determined by one's position in the racial hierarchy created by colonial rulers” (Abeyasekere, 1987:206).

In conclusion, as intended by the colonial government, and acknowledged by colonial engineers, Batavia’s first urban water supply system was built for a specifically European population. When the Ethical Policy was introduced at the turn of the century the artesian water supply system gradually began to include native urban residents within its distribution, but government still continued to ensure the demarcation of different waters between different racial groups, and supported the shifting rationality of rule that legitimized European dominance in the discourse of modernity, not race (see Gouda, 1993). European residents were thus provided with water piped into the home and were expected to rely on this single source of water for all household needs (cleaning/washing/drinking/cooking), whilst native residents – if provided at all with artesian water – relied on the corporeal network of water vendors to deliver a much lesser amount of water, at a higher per unit volume cost. Not surprisingly, native households, if using the artesian water supply at all, used only a small amount for consumption needs. After more than forty years of the operation of the artesian water supply system it was simply accepted that “the Europeans had access to considerable more points of supply” (Heetjans, 1915:305), and hence consumed the majority of the artesian water produced. Providing both the discursive and the physical foundation for the subsequent design of the 1920 spring water network, the pattern of provision embedded

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7 Public hydrants were installed in the following native areas of the city: kampongs to the west of Molenvliet (1909), kampong Jaagpad (1910), kampongs Tanah Tinggi and Petodjo (1912) (Eggink, 1930).
8 In 1912 and 1913 the physicians Ouwehand and Van Gorkom published statistics on mortality in Batavia, calculating an annual death rate for the native urban population of over 60 000 (Ouwehand, 1912; Wertheim, 1958); the high rate of mortality was later attributed to polluted water supplies (Abeyasekere, 1989).
within the city’s first urban water supply infrastructure set in place the channelling of select waters, into select urban areas – reflecting, and perpetuating, the construction of differences deemed necessary to colonial rule.

3.3 Spring Water Network: 1923-1945

The city’s centralized piped water supply system was already in place throughout the last years of the artesian water system, but with the growth in urban population, the quantity of artesian water supply was increasingly uncertain. Moreover, the quality of water provided by the artesian system was less and less desirable to a new kind of middle class European immigrant used to conveniences of the Continent (Maronier, 1929). Investigations into rehabilitating and/or replacing the artesian water supply system began in 1906, following the Decentralization Law of 1903 that established Batavia as a municipality with its own local government (Nas, 1990). However, it was only after two full decades of debate over the relative merits and expenses that the city’s spring water supply system was completed. Lauded by engineers and urban planners as a vast improvement over the artesian infrastructure era, the spring water system increased water production capacity to over 350 litres per second, the size of the reservoir 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 aeration or cooling, as was the case for artesian water (Gemeente Batavia, 1937). Delivering pure mountain spring water into the city through fifty three kilometres of iron pipe, the 1920s spring water supply system was designed with a capacity of 350 litres per second to supply ninety percent of all European households with 140 L/capita/day. When the production capacity was later increased to 600 litres per second (Maronier, 1929), the supply was deemed sufficient for a slowly growing capital city that had not yet anticipated the events of coming years, notably World War Two and the transition to independence that followed.

The city’s new spring water supply system was represented by colonial engineers as the conclusion of what had been a process of perpetual growth begun in the 1870s (see Maronier, 1929; Smitt, 1922; Van Raay, 1915a; Van Raay, 1915b). Physically, it was laid within the existing small city network of the artesian water supply system, replacing or rehabilitating piped materials in places where necessary but maintaining the spatial pattern. Discursively, the spring water supply system continued to support shifting colonial government rationality – marking the developmental superiority of the European population, whose mastery was no longer premised upon race, but modernity (Gouda, 1993; Mrazek, 2002). Subsequently, build upon the foundations of the artesian water supply infrastructure, the spring

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9 See decline in volume of the artesian wells recorded Drost (1918), van Raay (1915a), and Smitt (1922), and debated in Koster (1917) and van Leeuwen (1917).
water supply system continued to splinter the city into axes of differential development. Specifically, much different technologies of distribution were used to deliver different volumes of water to different spaces in the city, and the different per unit cost prices associated with each encouraged different patterns of use amongst different types of urban populations (Europeans, Chinese, Arabs, and Natives). Replicating the patterns of provision initiated within the artesian system, the spring water network only exacerbated the divisions between urban spaces and populations: European residents provided with household connections paid half the price for water than did native residents using public hydrants, and subsequently came to use the bulk of the spring water supply. Native households continued to rely on multiple lesser cost sources as an economic strategy and convenience. Although the spring water supply system was the first urban water supply infrastructure intended for eventual universal use, this was seemingly as theoretical as the eventual independence of the colony, as the system continued to differentiate between the developed (European) versus the undeveloped (native) spaces of the city.

Map 3.3 Spring water supply network of Batavia, 1922-1945

Source: Created by Ernst-Jan Martijn (2007), drawn from maps in Smitt (1922) and Maronier (1929).
Illustrating the contradictions inherent within colonial government - and the conflicting rationalities of different levels of national versus municipal authorities - while in principle the spring water system was intended to provide, after thirty years, for the entire urban population, in practice it was designed and constructed in order to serve European residents and commercial interests. Design criteria explicitly stated a production capacity that could serve ninety percent of European households with 140 L/capita/day, sixty five percent of Chinese and Foreign Easterner households at 100 L/capita/day, and thirty three percent of native households at 65 L/capita/day (Maronier, 1929). Colonial engineers, urban planners, and economists who designed the spring water network and set forth these principles of its operation built into the water supply infrastructure the premise that ‘natives had less need’ for networked water supply because they continued to use a combination of different water sources, a practice notably enforced by the pattern of water supply infrastructure development throughout the growth of the artesian systems, and subsequent limited provision of piped water to native areas. Speaking about provision of piped water to native residential areas, a colonial engineer stated that,

“in principle the water for human consumption (i.e. drinking or cooking) shall be obtained from the pipes, whilst bathing and washing water will be taken from the rivers or existing wells…So, we don’t at all need to count on all inhabitants immediately being water users; in any case by far not all will obtain all required water from the water delivery system.” (Brandenburg, 1924: p.154)

Accordingly, native households were expected to use, and thereby supplied with, a much smaller volume per capita. Drawing on data from the operation of piped water supply networks in neighbouring cities of Surabaya and Semarang, colonial engineers argued that the target of providing thirty three percent of native households with piped water was even too ambitious. Instead, advocates suggested that eventually only twenty percent of the native population of Batavia would be connected to the spring water network, in comparison with sixty percent of Chinese, and one hundred percent of Europeans10 (van Leeuwen, 1917), and “when one asks about the different categories why widely varied usage figures are assumed, then the reason is partially to be seen in the fact that per lifestyle (mode of living), some have less water needs than others” (Gomperts 1916:12). The fact that for the native population, “a large part of the water used for internal purposes (human consumption) is taken from the water supply network, while bath and wash water is taken from the existing bad wells” meant that although “we know that an average of 50 L per day is not enough for the native, this is used as a starting point for the design of the water system…the assumption is based on the fact that not all the water that they use is taken from the water system” (Gomperts, 1916:13).

10 In Semarang 50% of the Chinese population, and 6% of the native population were connected to the centralized piped water system; in Surabaya, 14% of the Chinese and 25% of the native population were connected (van Leeuwen, 1917).
Conveniently, the Council’s initial decision to accept (and encourage) the use of lower quality river or groundwater by native households for all non-potable uses lowered the total costs of the city’s distribution system. As the municipal distribution network was paid for by the city, and not the Central Government, this was important for the fiscally conservative Municipal Council who financed only two of the total nine million guilders needed to build the spring water network\textsuperscript{11}. Distributing spring water through communal hydrants rather than house connections, and thereby lowering predicted consumption to only sixty five litres per capita per day, the extension of the water network into the native areas of the city could therefore be much less extensive, saving the city money. Speaking of plans for the spring water network prior to its construction, a colonial engineer and member of the Municipal Council stated that, “for the kampongs only a few house pipes shall have to be laid down. The usage network shall thus be more simple, and can more or less limit itself to for supply to public washing and bathing places” (Van Breen 1916:9).

The Council’s decision to provide access to the public water supply amongst native population through public hydrants, rather than through household connections, was supposedly justified through the lower per capita usage of piped water amongst natives and the expectation that native households would be unable to afford the initial connection fee of twenty five guilders, and subsequent monthly costs of water and meter rental\textsuperscript{12}. Perversely, both issues – ability to pay and lower consumption – were then reinforced by the pricing policies of the municipal water supply company. Native households that did have access to the spring water supply through public hydrants actually paid more per litre than did the connected European households. Although initially the spring water was distributed at no cost from the public hydrants (like in the artesian system), after the first few years of operation the Municipal water supply company became worried about its economic efficiency and the rising costs of this ‘free’ water supply to native households, and instituted new system of payment (Eggink, 1930; Maronier, 1929). With the system of ‘paid kampong water delivery’ the Municipality formally appointed the already operating native water vendors to distribute the water from the hydrants to native households. However, by charging these vendors the same volumetric costs for water that connected households paid (30 cents/m3), and allowing the vendors to re-sell it at a determined profit margin to take into account their transport labour, native households ended up paying 60 cents/m3! Native households thus paid two times the price paid by those with household connections.

The director of the water supply system in the neighbouring city of Bandung recognized the perverse incentives built into this system of ‘paid kampong water supply’ and argued for a more equitable

\textsuperscript{11} The total cost of the spring water network system was nine million guilders, however the Municipality only had to finance the costs of the city distribution network (two million guilders); the Central Government financed the fifty three kilometres of pipes which brought the spring water from Buitenzorg (Bogor) into the high reservoir at the edge of the city, almost seven million guilders (Maronier, 1929).

\textsuperscript{12} Meter rental was between 0.5-1.50 guilders/month, depending on size of the meter (Gemeente Batavia, 1917).
tariff scheme, whereby those receiving the ‘special luxuries’ of having water piped directly in the home, could, and should pay more for their water than the poor, who should only be charged the cost price (calculated at 7.5-10 cent/m³) (Heetjans 1915, 1922, 1923). Describing the supply of water through public hydrants as ‘very unsatisfactory’, Heetjans pointed out that, “in the cities, where the largest part of the population has to have the water be carried (i.e. use water vendors), it is expensive, even more expensive than water from a house connection.” (1915:248).

Undoubtedly, although the system of ‘paid water kampong’ water supply secured the financial profits of the municipal water supply company, it reinforced existing patterns of inequitable provision of water between the different populations, and discouraged the use of piped water within kampongs. With surface and groundwater supplies available at more convenient locations, and at much lower cost, the pattern of water use within native households - using a combination of water sources/qualities for different uses – remained as it always had. Colonial hygiene officers often referred to these practices as the result of ‘ingrained habit’; a well known hygiene propagandist stated, “even if properly designed houses with proper water supply and sewerage were available, unhealthy conditions would ultimately continue to be the result of the occupants’ living habits” (Tillema, 1913:79, cited in Cote, 2003). However, as seen below, the reversion to traditional habits was based on simple conditions of affordability and availability as constructed and enforced by the colonial government itself.

Supporting this analysis, initially the placement of more public hydrants within the kampongs resulted in increased use of piped water network supplies by the native households. The increasing costs to the Municipality for its ‘free water’ supply budget as a result of increased use by native households was documented from 1920-1924; in 1920 the Municipality spent only 54,000 guilders on ‘free water’, but by 1924, it paid out 120,850 guilders (Eggink, 1930). However, after the regulation of 1926 charged a cost price of 60 cents/m³, native residents returned to their traditional habits, resulting in a corresponding decrease in demand for network water supply in native areas (Maronier, 1929). As recorded by colonial engineers, there was a dramatic reduction in the demand for networked water in the kampongs after the implementation of the ‘paid water delivery system’; by 1927 the budget for ‘free of charge’ water had dropped from 120,850 guilders to only 6,000; by 1930, “concerning the free of charge water provision, so little is being expended that the amount of it is not expressed in the company’s budget anymore.” (Eggink 1930:63).

When, perhaps in response to its critics like Ingeniur Heetjans, the Municipal Council addressed the issue of equitable distribution, this also had perverse consequences – further facilitating spatial fragmentation. Initiating a scheme to subsidize house connections in some native neighbourhoods, the

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13 Engineer Heetjans explains how by paying 1 cent/petro can (approximately 18L), native households were effectively paying 60 cents/m³: “water vendors pay 30 guilder cents/m³, then charges on average another 30 guilder cents for carrying/delivery of the water, so that the average costs are at least 30 cents/m³ (transport costs will be 30 cents/m³), which means that the water for the buyer has to cost at least 60 cents/m³. This is considerably more than what is paid for water than by well-off European renters.” (Heetjans, 1923:91).
residents who could not afford the cost of either increased land values or higher rents that accompanied the provision of piped water services were effectively displaced (Abeyasekere, 1989; van der Wetering, 1939). The poorer segment of the native population subsequently moved out from the modernized kampongs in the urban center to the outskirts of the city, while those areas with piped water became populated by the new administrative middle class of salaried Indonesians, and Eurasians (Abeyasekere, 1989; van der Kroef, 1954). As the “silent battle for living space” (van der Wetering, 1939:315) continued to displace native communities for the building of new European residential districts and associated services (railways, tramways) (Wertheim, 1956), the spatial separation of two distinct urban societies was also project in part facilitated by the spring water network.

Meanwhile, contradictory to the Ethical Policy of the colonial government, the expansion of the piped water network in European areas of the city was in stark contrast to the government’s ambivalent project of kampong water supply. With the extension of the spring water network throughout the European residential neighbourhoods planned for in the initial engineering design, and enforced by a regulation making connection to the network mandatory for households with a rent above twenty five guilders/month\(^{14}\), direct household connections supplied one hundred percent of European households by 1930 (Eggink, 1930)\(^{15}\). Meanwhile, only an estimated five percent of the Eurasian and native population were connected\(^{16}\).

In addition, while replicating the pattern of provision set in place by the artesian infrastructure built within European developed areas, the spatial development of the spring water network also continued to follow the pattern of European residential expansion. Looking at the map of the spring water network, the European neighbourhoods in Batavia are clearly indicated through the overlaid grid of water supply pipelines, in contrast to the almost complete invisibility of the kampongs. Thus, the pattern of urban water supply enabled by existing infrastructure of the artesian network, and further encouraged by the design and operation of the spring water network complemented the 20th century production of western enclaves. By the 1930s, after almost a decade of operation of the spring water network, the (racialized) developmental transformation of the colony was considered complete, as “the Indies became an area where Dutchmen, in a Dutch manner, in Dutch environments, led their own lives” (Van Doorne 1983:10).

In conclusion, the development of the spring water network only further reinforced the patterns of use and provision visible already in the previous era of artesian water supply. Splintering the centralized water supply system into different technologies of distribution for differently modernized populations,

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\(^{14}\) The Housing and Building Ordinance of 1 July 1923 (Bouw en Vonings Ordeening) made it mandatory for all houses of monthly rent over 25 guilders/month to connect to the piped water network (Eggink, 1930).

\(^{15}\) There were 10,392 household connections in European quarters (Eggink, 1930); the total European population of Batavia in 1930 was 37,067 (van der Wetering, 1939), with an average of 3.6 members per household (see Maronier, 1929).

\(^{16}\) There were 6,926 connections outside of the European areas; with an average of five persons per household (Maronier, 1929), the total non-European population served was 25,000, approximately five percent of the total.
only served to reinforce the different volumes of water provided to different kinds of residents. As noted by an engineer commenting on the technical design of the city’s spring water system,

“In neighbourhoods with a lot of villas (i.e. higher class), a lot more main pipes are necessary than in the more densely populated small housing areas. Moreover, the water in the larger houses is supplied to more taps, and so, with more luxury, so that the maximum use of the water network in well off neighbourhoods at the peak hours of water consumption rise more (peak is more pronounced, since these houses use more water).” (Heetjans, 1922:248).

Provided with a convenient supply of water piped directly into the home, and delivered at a higher pressure than through hydrants, European households naturally (i.e. as expected and designed) came to use the majority of this water supply. In 1929, the European population comprised only seven percent of the population, but yet consumed seventy eight percent of the residential urban supply, and this was after four years of a program specifically targeting the extension of supply to native households (1926-1929) (Eggink, 1930). With the worldwide depression in the 1930s, and the drop in colonial economy because of falling sugar prices, the campaigns of kampong improvement ended, along with the Ethical nature of colonial government policies (Cobban, 1974, 1988; Cote, 2003)\textsuperscript{17}. By the time the colony’s economy had recovered, and programs of kampong improvement resuscitated in 1938-39, World War Two had begun. Suffice it to say, up until the end of Dutch colonial occupation, access to the city’s public services remained limited to Europeans and a very small section of the native population whose living standards had improved (Booth, 1988)\textsuperscript{18}.

\textsuperscript{17} From 1927-1931, 1.25 million guilders was spent on improving kampongs in cities throughout Java, with the central government paying 50\% of the costs; after 1931 government funding stopped, only to be revived again in 1938 when 500,000 guilders/year was again allocated to be distributed amongst all urban areas in the colony (Cobban, 1974, 1988).

\textsuperscript{18} Booth (1988) states that although income disparities amongst the native population grew during the last years of the colonial economy, there is no doubt that it was disparities between rather than within ethnic groups that continued to be the most obvious as income gaps even increased during the 1930s. In 1939 a European made 61 times the average Native wage, while a Chinese worker earned 8 times the average Native wage.
3.4 Surface Water Treatment Plants: Pejompongan I & II, 1950-1966

Following the tumultuous and protracted transition to an independent Indonesian government (1945-1950) – the events including Japanese invasion, the return of Dutch colonial government, and the subsequent war for independence – the city’s spring water supply system was all but destroyed (Fischer, 1959; van der Kroef, 1954). With a rapid increase in urban population\(^{19}\), and the capital city of Jakarta emerging as the center piece of the new nation of Indonesia, the postcolonial development of Jakarta’s urban water supply system was quick to follow formal independence. Using money from the French government and engineering plans from the French water supply company Degremont, the construction of a large scale surface water treatment plant (Pejompongan I) began in 1952 and was completed by 1957 (Hanna, 1959; PAM Jaya, 1992a). With a second large scale water treatment plant (Pejompongan II) completed by 1966, the volume of water circulating through the city was increased by almost ten-fold, from the colonial era (from 315 L/s to 3,400 L/s), creating the potential for more equitable distribution in the postcolonial city.

Illustration 3.3 Water Treatment Plant Pejompongan I


\(^{19}\) Population increased in Jakarta, from 823,000 residents in 1948, to 1.8 million in 1952 (Abeyasekere, 1989).
Map 3.4 Piped water supply network in Jakarta, 1950-1976

Source: Created by Ernst-Jan Martijn (2007).

WTP Pejompongan I was built on the edge of the urbanized area, drawing its raw water supplies from the Ciliwung river, whose waters were routed through the city by the Banjir Canal (Flood canal, built by the Dutch in 1923). Adding 2000 L/s of treated surface water to the city’s distribution network, Pejompongan I raised the potential urban water supply capacity to 2315 L/s. Although the city’s population continued to increase throughout the 1950-60s, the construction of a second large scale water treatment plant in 1966 (Pejompongan II) added another 1000 L/s.
The city’s new water treatment plants were radical in that they changed the bulk of the source of water supply, from the colonial ideal of mountain spring water to treated surface water taken from the city’s flood canal. However, with the circulation of water throughout the city still determined by the colonial infrastructure artefacts (city network), the patterns of provision embedded in the urban landscape continued to guide postcolonial access, and in fact became inscribed within the postcolonial government rationality, which under the Architect President Sukarno entailed building up selective areas of the city to world class standards (see Jakarta, 1962). Becoming a component of President Sukarno’s monumentalist construction of Jakarta (see Kusno, 1997; LeClerc, 1993), the postcolonial development of Jakarta’s urban water infrastructure continued to facilitate fragmentation. The selective provision of networked water supply within particular spaces in the city continued to work both physically and discursively to reinforce desired differences. After independence, the difference rationalized as necessary to rule entailed distinguishing between the ‘modern ideal’ of what all Indonesians should aspire to, and the surrounding realities of the ‘sea of kampongs’ (Kusno, 2000). Investment into new water supply infrastructure for the postcolonial city thus continued the colonial pursuit of the centralized ideal to serve the selective strip of modernized spaces in the city, while simultaneously displacing any un-modern elements (bodies, buildings) outside areas of network access.

Subsequent investment into Jakarta’s urban water supply went to support the construction of these differences. Building a new vision for the city and the nation within the existing foundations of colonial infrastructure, the city’s increased volume of piped water remained limited primarily to the formerly European areas of the city now being incorporated into the spatial geographies of power of the postcolonial government (Kusno, 2000; Leclerc, 1993; MacDonald, 1995). Therefore, while a minority of the elite residents occupied the residential spaces with privileged access to piped water, and consumed the majority of the public urban water supply, the “the bulk of the population remains without piped water supply and is dependent upon kampong wells; thousands must still resort for laundry, bath, or toilet, or all simultaneously, to the sluggish canals” (Hanna 1961:5). In 1959, fifteen percent of Jakarta’s residents consumed 2000 L/s of Jakarta’s new water supply, approximately between 220-330 L/capita/day, while the majority of the masses continued to rely on untreated river and ground water supplies for all of their needs (Fischer, 1959).

While partly the product of a nascent and fragile postcolonial government lacking the technical and financial capacity to finance large scale improvements, the continuation of the colonial patterns of provision – and splintering of the city through infrastructure access – must also be recognized as a product of purposeful postcolonial planning. Throughout the 1950-1960s, piped water remained limited to the central areas of the city covered by the colonial era network because investments that were made into the distribution system remained limited to rehabilitating the existing pipes within the new Indonesian elite residential areas. Concurrently, there was no money invested to improve access for the rest of the population through even basic infrastructure like public hydrants (Abeyasekere, 1989). With the former
colonial neighbourhoods occupied by upper class elites seeking housing closer to the center of the city (Abeyesekere, 1989; Argo, 1999), the pipelines built to increase the water supply from Pejompongan I to the reclaimed modern areas of city did not increase the number of residents who had access to the piped water, but merely increased the volume of water that a minority of residents could access – looking suspiciously like the city’s pattern of urban water supply in the spring water era.

However, while similar to the colonial pattern in that the postcolonial urban elites consumed the bulk of the residential urban water supply, unlike the colonial era, these residents paid virtually nothing for it. This in fact assured that the government, already in financial crisis by 1957 (see Robison, 1986), would not have the necessary funds to finance network extension or ‘basic needs’ infrastructure for lower-income areas. Water use by the elite households was not even metered until two decades later (1970s), by which time it was stated that the elites living in selectively served spaces of the city were provided with water ‘almost for free’ (PAM Jaya, 1992b). Paying a flat rate of 100 Rp/month households were consuming on average between 220-330 L/capita/day, this was between three to six times the expected consumption of 60-90 L/capita/day according to which they were being charged (PAM Jaya, 1992b). The progress cited as illustrated by the construction of an ‘adequate water supply’, which provided the ‘urban conveniences embodying the concretization of the revolution’ (van der Kroef, 1954) was therefore only ever experienced by a few. The reality for the majority of the population (80% estimated to live in both the old central city and new peripheral kampons), remained reflected in the “dirty brown canals and river arms used for any and all needs ranging from washing to excretion.” (van der Kroef, 1954:158).

In these early years of independence, the continuation of colonial patterns of water provision in postcolonial Jakarta is usually attributed primarily to the lack of technical and financial capacity of the newly independent nation (Chifos and Suselo, 2000; World Bank, 1974). However, while it is tempting to allocate cause to the legacy of colonial government and its spatial apartheid, the splintering of the city’s urban water supply infrastructure was also a product of purposeful postcolonial planning. Notably, the only investment made by the Indonesian government during this period to extend network access targeted elite areas, rather than the un-serviced informally settled low-income areas. Unlike during the colonial period, cost-recovery was not even the leading rational, as these upper class consumers did not even have their use metered. Tellingly, rather than installing public hydrants to address the non-existent services of dense informal settlements growing on the outskirts of the developed areas of the city (Hanna, 1961), in the 1950s the government built new pipelines to deliver water into elite residential areas on the outskirts of the city.

Located on the southern edge of the city, the new upper-class suburb of Kebayoran Baru was originally planned by the Dutch post-war government as a satellite town with 100 000 luxury homes for occupation by Europeans and Indonesian elite (Asian Review, 1955; Dorleans, 2000; Roosmalen, 2000). After independence, President Sukarno reclaimed the archipelago of modern urban dwellings as a
‘western showpiece’ intended to help modernize the image of Indonesia (Boddy, 1983). Changing the original plans drawn up by the Dutch colonial government to provide piped water within Kebayoran Baru through water from artesian wells (Kusumawijaya, 1990), upon the completion of Pejompongan I in 1957, pipelines were installed to attach the suburb to the city’s network, selectively channelling water outside of its central city network into the modern urban dwellings (documented in World Bank, 1974). Representing the only area of the city where investment into networked water supply was actually used to increase the percentage of the population with access, the rationality behind those entitled to access the public water supply services could not be made more clear, and the postcolonial pattern of water provision continued to mimic its colonial origins. In a powerful contrast to the “luxury housing built to satisfy the demands of the newly rich or newly powerful” (Hanna 1961:5) were the surrounding kampongs, denied access to the network water supply even through the low-cost provision of public hydrants (Abeyasekere, 1985).

The exclusion of the majority of the population from access to the piped water supply was not only that of passive neglect. To be sure, as President Sukarno’s system of Guided Democracy spiralled into economic instability there was a lack of public finances preventing circulation of piped water through urban kampongs (Chifos, 2000), but this was also accompanied by an active displacement of the un-modern elements from the central, networked spaces in the city to the un-serviced periphery. With the decidedly un-modern kampongs and their characteristic poverty considered an embarrassment in their juxtaposition with the ‘world class city’, campaigns to remove the population, and rid the modern city of their traditional, unsophisticated lifestyles thought to ‘lower the status of the nation’ continued throughout the 1950s and 1960s (Abeyasekere, 1989). The construction of the Asian Games complex and the adjacent inner-city thoroughfare Jalan Thamrin and Jalan Sudirman connecting the suburb of Kebayoran Baru to the city center involved the removal of an estimated 47,000 kampong residents (Abeyasekere, 1989). Following this emptying out of undeveloped land inhabited by the impermanent dwellings of thousands of recent urban migrants, general campaigns to remove the homeless from the city boundaries continued a more targeted approach (Nas and Mallo 2000), and served to depopulate the international spaces of the city that were also, not coincidentally, the areas served by the centralized water supply network.

Relegating much of Jakarta’s undesirable population to the peripheral land far outside of the already limited coverage of the network also served to reduce the perceived demand for piped water supply. By the end of the 1950s, many of the low-income residents of Jakarta had been moved out of the actual serviced area, and there were strong incentives for newly arriving migrants to also settle in these less regulated urban peripheries. Subsequently, this left only twelve percent of the population of the city with access to the piped water supply (Fischer 1959), and it is therefore little surprise the volume of water supply available for urban residents after Pejompongan I was considered more than adequate to meet demand (PAM Jaya, 1992b).
Meanwhile, the kampons that remained within the interstices of the international spaces in the city’s center remained excluded from the provision of public services. While already in the colonial period the water supply through the provision of public hydrants had lagged behind population growth, there was now to be a thirty year period in which population densities would continue to rise while programs of kampong improvement and public hydrants lay dormant (1939-1969). With the absence of piped water supplies in the kampons remaining the norm until the late 1970s and early 1980s (Argo, 1999), the migrants streaming into Jakarta during the 1950-60s created “vast block interiors that became the sites of the un-serviced urban kampong” (Cowherd, 2002: 173).

The consistent exclusion of low-income, informally planned areas from network access left residents with little choice than to continue their historical reliance upon a combination of water supplies (see Argo, 1999). Digging shallow wells (open pits, no covers) and using the surface waters for washing and bathing, low-income residents only purchased drinking water from vendors in areas where groundwater and surface water quality was no longer adequate (Krausse, 1978). Perversely, the visual display resulting from the lack of public water supply and sanitation services in the kampons, described as a “public strip tease” (Hanna 1961:2) by the international visitors to Jakarta, also served to highlight the kampons’ undesirable and primitive status, and was used by government authorities to justify exclusion from the modern areas of the city meant to attract, impress, and reflect international ambitions.

Subsequently, during the first decades of independence, access to the city’s public water supply infrastructure remained a material and symbolic emblem of a certain class of citizen, not a public right. With the majority of the city’s residents living in spaces without access to the water supply network, the dramatic increase in the volume of water circulating through the pipes only reinforced the discrepancy between the serviced urban spaces and residents, and those who were not. Ironically, although President Sukarno guided the development of the capital city in order to create a “new space intended to be different from both colonial Batavia as well as the surrounding sea of poor urban neighbourhoods” (Kusno, 2000:52), a similar hierarchy of urban citizenship was inscribed into the postcolonial urban landscape.

Rather than a radical break with the past, the water treatment plants built within independent Indonesia were constructed upon the physical and discursive infrastructures of the colonial government. This continued the splintered pattern of both access to water supply and subsequent divisions between populations and urban spaces. Although the failure to provide an adequate urban water supply in Jakarta has always been blamed upon the fact that the new water supply infrastructure continued to be circulated through the already then leaky colonial era city network (Fischer, 1959), and the economic crises of the Guided Democracy era are given as a reason for the lack of expansion of the networked area (Berry and Sierra, 1978; Chifos 2000; World Bank, 1974), the significant financial investment made into the city’s
first two large scale water treatment plants\textsuperscript{20}, and the extension of the network into certain newly modern areas of the city belies this myth and supports the argument that the distribution of networked water to ‘the masses’ was never part of the political project of first postcolonial government.

3.5 Large scale and ‘mini’ Water Treatment Plants: 1966-1990

When the economic and political instability of Guided Democracy was thrown over in a violent transition (1965), the New Order era government inaugurated a new vision for the nation, and fundamentally different relations between the state and society (see Bourchier and Hadiz, 2003; Pemberton, 1994). However, like its predecessor, this government maintained the same selective pattern of urban water supply within Jakarta, and worked to further splinter access to piped water, albeit along new axes of difference. Brought to power based on their promises of a ‘new order’ for the country, and their promises of development for the nation, the ‘old order of things’ still embedded within the foundations of the city was used to continue the pre-existing pattern of provision – channelling water into politically – and now economically - productive urban spaces, while bypassing the majority of urban residents. From 1965 to the late 1980s, the rehabilitation of existing infrastructure, the construction of two additional large scale water treatment plants, and new investment into mini-treatment plants went to benefit selectively targeted productive and modern areas of the city: industrial and commercial centers, and middle class beneficiaries of the New Order’s program of economic development. Therefore, although water supply production capacity increased three fold in over three decades of New Order rule (1960s-1980s), the provision of piped water supply was extended to less than one-quarter of the city’s population, and covered less than half of the urban area\textsuperscript{21} (Nihon Suido, 1988; Porter, 1996; World Bank, 1990b). By the late 1980s, the pattern of provision of piped water supply in Jakarta remained consistent with that of previous governmentalities and their physical works.

The shift in government rationality to the New Order ethos directed the production and distribution of Jakarta’s water supply from the 1960s-1980s. Under the New Order, the key to the development of the nation for the benefit of all Indonesians was the mobilization of free market capital (Cowherd, 2002), and the flow of urban water supply was subsequently guided to support the re-spatialization of Jakarta according to the needs of private sector investment. Following the strategic fragmentation of urban space and other urban services under the New Order’s mandate to facilitate economic growth and private sector development (see Cowherd 2002; Effendy, 2004), the city’s third large scale water treatment plant was built to service a growing industrial area in the Northeast. With

\textsuperscript{20} WTP Pejompongan I is recorded to have cost Rp. 80 million (PAM Jaya, 1993b); given the fluctuating exchange rate throughout the 1950s this represents anywhere between U.S. $2-7 million dollars. The cost of WTP Pejompongan II is not recorded in Rupiah, but given as U.S. $7 million (PAM Jaya, 1992b).

\textsuperscript{21} In 1988 the piped network covered 213km\textsuperscript{2} of DKI Jakarta total area, 649 km\textsuperscript{2} (Nihon Suido, 1988).
Jakarta’s percentage of un-served population on the rise due to continued migration the city instituted a ‘closed city’ policy to curb demand on urban services\textsuperscript{22}, and built Pulogadung WTP to service the Pulogadung Industrial Estate in East Jakarta, an area of the city that Suharto had targeted for the initiation of the New Order strategy of industry led economic growth (Cybriwsky and Ford, 2001; Castles, 1989). For the seventy six factories already located in the P.I.E. (Castles, 1989), 1000 L/s of treated water was already being provided to the area through the construction of a booster pump and large diameter pipeline, channelling 770 L/s of the increased capacity of Pejompongan II (PAM Jaya, 1992b; World Bank, 1974). This was followed in 1982 with the completion of Pulogadung WTP, providing another 1000 L/s to the industrial area (PAM Jaya, 1992e). When in 1987, the capacity of Pulogadung WTP was further increased to 4000 L/s this supply was actually under-utilized, due to the low demand from industry and the lack of distribution networks to channel water to those surrounding residential areas that did need it. With the industries located in P.I.E. largely favouring cheaper sources of water supply there was excess capacity, due to the fact that the planned installation of 550 kilometres of distribution pipes in surrounding neighbourhoods was never completed (JICA, 1997). Reports on the coverage of the water supply network in the 1990s continued to document that networked water supply in eastern Jakarta was still limited to industrial areas (Argo, 1999).

\textsuperscript{22} From 1966-1976 the population of Jakarta increased from 3.6 to 5.7 million; to curb population growth in the capital in 1970 Jakarta was declared a ‘closed city’ for migrants (Abeyasekere, 1989; Critchfield, 1971).
Parallel to the New Order’s program of industrial economic growth, the extension of network water supply into upper class residential areas continued in a similar pattern as the ‘older order’, and its colonial antecedents. Providing a socio-political complement to the program of industrial water supply, residential access to the piped water network was largely limited to the economically mobile and politically obedient citizens of the New Order. Expanding the production capacity of the pre-existing WTPs (Pejompongan I&II), the additional volume of water went to provide the urban elite, who in the 1970s and 1980s were still living in the centrally located elite residential areas, and already integrated
within the city’s network since the colonial era (Menteng, Kuningan, Kebayoran Baru)\textsuperscript{23}. Throughout the 1960-70s, the investments into increased production capacity and distribution went to benefit the upper class neighbourhoods, and the modern strip of highrises, luxury hotels, and developments along the city’s center thorough-fare supported by this demographic. Following the rehabilitation of the existing WTPs, there was sufficient volume of water to provide for between forty to sixty one percent of the population, but this public service was still limited to less than fifteen percent of Jakarta’s residents (Abeyasekere, 1985; KIP, 1976), and ninety percent of the kampong population was recorded as being without access to piped water (KIP, 1976; Taylor, 1983a).

When from the late 1970s-onwards money went into extending the centralized network to actually include other residential areas, the new areas included within access to water were those that followed the from the New Order urban development trajectory. This New Order trajectory, as noted by other scholars, was one of marked socio-spatial fragmentation (Cowherd, 2002; Kusumawijaya, 2004). With the emergence of an urban property market in Jakarta, its growth due in part as an investment strategy for the New Order’s beneficiaries of the industrial development (Cowherd 2002), the identification of select new spaces worthy of network expansion led to strategic development of water supply services in limited areas of the city to create isolated archipelagos of service. First, in late 1970s, the residential area of Pondok Indah (Beautiful Neighbourhood) was the recipient of the first new distribution network built for residential areas\textsuperscript{24}. With the installation of a primary, large diameter, pipeline channelling water from Pejompongan I to the recently built gates of Pondok Indah, the first gated community in Jakarta became part of the selectively serviced areas of the city. Advertised as a ‘residential enclave’, Pondok Indah was defined as purposefully isolated from its surrounding neighbourhood; while its spatial exclusion was ensured by the construction of a golf course and the rerouting of a river (see Cowherd, 2002), it also appears on city maps as an island of services amidst non-networked surrounding of Southern Jakarta.

The development of a new wave of high income residential areas in the early 1980s, supported by New Order planning policies and economic growth, effected an even greater physical fragmentation of the city’s networked water supply. Housing estates built in the north western and north eastern areas of the city were accompanied by the construction of mini-water treatment plants that were physically completely isolated from the centralized supply system. Financed through the partnership of PAM Jaya with the provincial government, industry, and real-estate developers, the production facilities and distribution networks produced small volumes of clean water, and were built only to provide for isolated residential areas and industrial areas. A total of eight mini-water treatment plants built from

\textsuperscript{23} In 1967 Pejompongan I was upgraded, increasing its capacity from 2000 to 3000 L/s; in 1973 the capacity of Pejompongan II was increased from 1000 to 2000 L/s (JICA, 1997).

\textsuperscript{24} Pondok Indah was developed by the New Order urban developer Ciputra, a Chinese-Indonesian who was financed by Sukarno crony Salim (Cowherd, 2002). Pondok Indah was one of Ciputra’s first projects, pioneering the ‘gated community’, and while still an upper class elite residential district today in South Jakarta, in the early 1970s it was transformed from 720 ha of rubber plantation (Cybriwsky and Ford, 2001).
1977-1982 provided such places as Sunter Paradise, Taman Kota (Garden city), and Citra Gardens with piped water supply. The beneficiaries of the mini-treatment plants and the islands of services they produced area are beautifully illustrated in PAM Jaya’s 1992 publication, where advertisements for real estate properties receiving water from the mini-treatment plants proclaim their ‘24 hour piped water services’ as an attractive amenity to prospective buyers and investors (PAM Jaya, 1992).

**Table 3.3** Mini-water treatment plants, 1977-1982

<table>
<thead>
<tr>
<th>Year</th>
<th>Name/Location</th>
<th>Production Capacity (L/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1977</td>
<td>Cilandak</td>
<td>200</td>
</tr>
<tr>
<td>1980</td>
<td>Pesing</td>
<td>5</td>
</tr>
<tr>
<td>1982</td>
<td>Taman Kota</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Muara Karang</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Pejaten</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Sunter</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Cakung</td>
<td>25</td>
</tr>
</tbody>
</table>

Source: Data from PAM Jaya (1992a), JICA (1997).

**Illustration 3.4** Advertisement for Sunter Paradise housing estate, 1992


Advertised with the words, ‘Semakin Lengkap, Semakin Elit’ (Increasingly Complete, Increasingly Elite), Sunter Paradise housing estate profiles the services offered to potential residents: strategic toll road location, electricity, telecommunications, piped water, and other amenities.
The splintering of the city’s urban water supply system through the production of physically disconnected production and distribution infrastructure continued into the late 1980s. The construction of the city’s fourth large scale water treatment plant, Cisadane, was actually built physically outside of the DKI urban boundaries, as its production capacity of 3000 L/s was planned in order to provide for the adjacent ‘new town’ areas of Bumai Serpong Damai (BSD). Like Pondok Indah, BSD was built by the prolific New Order urban developer Ciputra and his Suharto-crony financier Salim, and it was again a pioneering project, the first ‘new town’ built from the concept which soon came to dominate urban residential development surrounding Jakarta (Firman, 2004; Goldblum and Wong, 2000; Leisch, 2000, 2002). Bumai Serpong Damai, which was located twenty kilometres southwest of Jakarta in the neighbouring province of Tangerang covers 6000 hectares, and was planned for an eventual population of 600,000 residents (Cybriwsky and Ford, 2001; Struyk et al., 1990; Winarso and Kombaitan, 1997). Also, like Pondok Indah, the elite residential enclave (and its golf course, designed by Jack Nicklaus) was to be provided with piped water from publicly financed water supply infrastructure. The initial economic feasibility study for Cisadane focused on the provision of BSD residents with piped water from the new treatment plant (pers.comm. PT. Ekamitra Engineering SHD.BHD, 10 January 2007); financed by the central government through a loan from the French government, and built through a Build-Operate-Transfer contract with the French water supply company Degremont (World Bank, 1990), the provision of water to higher income residents repeated the pattern of New Order development. However, with the three projected phases of growth of BSD not occurring according to initial targets because of the 1997 economic crisis, only 200 L/s of the capacity is currently used for BSD, and the vast volume of excess water produced by Cisadane WTP is now sold to the private sector water supply partners for distribution to the western half of Jakarta (pers.comm. PT Tirta Cisadane, 15 August 2007). Notably, as will be explained in more detail in Chapter Five, this re-integration could only occur after the World Bank financed the construction of a pipeline connecting Cisadane back into Jakarta’s central distribution network.

In stark contrast to the areas of the city designated as productive and modern emblems of the New Order, the kampongs remained areas outside of the New Order’s promise of development. The first program of postcolonial kampong improvement begun by Jakarta governor Ali Sadikin ran from the late 1960s to the mid-1970s, paralleling the period in which water supply infrastructure investments were made to continue to provision to upper class neighbourhoods, and provide new supplies for industrial growth.\(^\text{25}\) However, although marking the first postcolonial program for water supply to low-income neighbourhoods, the kampong improvement programs produced only marginal improvement in the access to piped water (Argo, 1999; Taylor, 1983a). This is because, like in the colonial era

\(^{25}\) KIP began as a local government initiative, with 50% of settlement improvement costs paid for by the Jakarta government, and 50% by the residents. In 1974 KIP was taken up by the World Bank, where upon it was extended as a national development program in Indonesia, and managed by the Central Government up until early 1980s (World Bank, 1995a).
programs, only a very small percentage of the budget went towards the provision of piped water supply; from 1969-1974 only five percent of the KIP budget was spent on drinking water facilities (Erni and Bianpoen, 1980). Despite the pressing needs of the kampong residents for basic sanitation and clean water, the projects money was spent on roads and footpaths (Abeyasekere, 1985). The low priority placed on the provision of piped water in the first decade of kampong improvement meant that public hydrants were still a rare occurrence in kamponds in the late 1970s, and drinking water became an increasingly expensive commodity for the poor (see Abeyasekere, 1987; Argo, 1999; Krausse, 1978; DKI Jakarta, 1976). During this time, the poorest families of one low-income neighbourhood in central Jakarta are documented as paying up to five percent of their daily income for a daily allotment of eight litres of water (Jellinek, 1985). Other surveys record low-income households as paying between 10-25% of daily wage on water supply (Papanek, 1975)\(^{26}\). After a decade of kampong improvement (1966-77), still only fifteen percent of Jakarta population had access to networked water (Abeyasekere, 1987).

Although after the World Bank took up KIP in 1974 more emphasis was put on the provision of piped water into kampongs, this plan was frustrated by the government’s priorities of economic versus social development. The emphasis on economic development during the New Order was reflected in the mandate of the provincial water supply company, which became a publicly owned company in 1973 (PAM Jaya, 1992a). Mandated “to take part in carrying out the national and regional economic development” (PAM Jaya, 1992b:65), the city was reluctant to extend pipes into low-income areas and as a result the public hydrants that were installed were sometimes not provided with water (World Bank, 1995a). Alternately, if and when public hydrants were actually installed and connected, often the ‘benefits’ deriving from this public infrastructure were appropriated by local government officials who were condoned under the New Order regime to extract their own profits from the public system (Dian Desa, 1990; Server, 1996). Therefore, although the World Bank had envisioned the implementation of an initial ‘minimal cost, basic needs’ water supply infrastructure, and a gradual transition into more complete network coverage through household connections (World Bank, 1974; DKI Jakarta, 1976), the evaluation of the World Bank’s KIP records failure:

“Although changes in drinking water source are in the predicted direction [towards more residents are using piped water rather than shallow groundwater], they are surprisingly modest in the aggregate. While it was the intention of KIP to provide public water standpipes throughout the improved areas this component has not been implemented consistently. The primary reason has been the reluctance of the public water supply company to extend its

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\(^{26}\) Papanek (1975) records households paying between Rp.20-50 for 20 litres of water, while daily wage is recorded as Rp.200. With the exchange rate of Rp.415 equivalent to $1 U.S., this means households earned approximately $0.50 U.S./day, and paid either $0.05 or $0.12 a day for a water supply of 20 litres.
distribution network into so many low-income kampungs because of presumed difficulty in cost recovery in such areas.” (Taylor, 1983a:101).

With the city’s water supply company following the mandate of the New Order, by the end of the World Bank’s program of kampung improvement in Jakarta, the numbers of public hydrants available to low income residents actually declined. In 1987 there were barely 1000 public hydrants spread throughout the city (Porter, 1996). In comparison, the city of Surabaya, which had one quarter of the population of Jakarta, had two times as many public hydrants (Porter, 1996). Understandably, under the New Order ethos, PAM Jaya was ‘reluctant’ to encourage public hydrants because they were simply less profitable (IWACO and WASECO, 1990). PAM Jaya’s (legal) profits came from household connections, and having to meet financial performance objectives, “they continually stymied the construction of public hydrants which made little profit for the company and required significantly more maintenance” (World Bank, 1990b:115).

By the end of the 1980s Jakarta’s water supply capacity had increased by more than three times, but still less than one fourth of the city’s residents had access to the piped water supply (Porter 1996). In addition to limited coverage, distribution was decidedly inequitable. Surveys conducted in the early 1990s reported that in low-income neighbourhoods more than fifty percent of the population relied on public hydrants for drinking water supply, and paid up to five times more for their water than residents with household connections; only ten percent of the residents of these low-income areas accessed water through individual connections (Adzan, 2001). Like the patterns of provision from previous eras, the urban water supply infrastructure investments made from 1960s-1980s favoured the select few residents who qualified as citizens. Building upon foundation of the city’s splintered urbanism, the New Order’s transformation of Jakarta’s urban space came to reflect “a deepening social dualism that provides a higher quality environment and more sophisticated infrastructure for the consumer class without having to provide it for all citizens.” (Cowherd, 2002: 271).

In conclusion, while the explanation usually given for the lack of service coverage in Jakarta by the Western development agencies is that of a lack of local financing, inappropriate tariff structures and insufficient economic efficiency coupled with a rapid rate of population growth that continually outpaced the investment into public services and urban infrastructure (Chifos and Suselo, 2000; World Bank, 1991, 1993b), the areas of the city into which the New Order did selectively invest in betray the inadequacy of this reasoning. Instead, examining the development of urban water supply infrastructure according to government rationality, the investments of these years can be seen as the embodiment of the New Order governmentality. The rehabilitation and expansion of the city’s network was directed into areas supporting strategy of industrial led economic growth, and the provision of public water supply was limited to the economically mobile and politically obedient citizens of the New Order. Like in previous eras, the city’s urban water supply was purposefully fragmented between different types of
urban spaces and populations, purposefully contradicting western norms rather than failing to meet them.

3.6 Conclusion: Colonial & Contemporary Waters

This chapter has documented the progressive splintering of Jakarta’s piped water supply network. Enrolled within relations of power mobilized by colonial and postcolonial governmentalities, the centralized network in Jakarta has worked since its inception to channel the city’s piped water supply through different kinds of infrastructure, to serve different types of urban populations, living in different urban spaces. It was in 1873 that partial provision to a specific set of residents was embedded within the original infrastructure of the emerging city, and since then, shifts in governmentality – and the infrastructure development rationalized – have maintained the distinctions made between categories of citizens, and the quantity and quality of water they consume.

In tracing the development of Jakarta’s urban water supply infrastructure from its origins, the growth of each phase of the centralized water supply system built upon and within the original colonial foundation is made visible. Conceptually, this underscores the fact that ‘layers of relations of rule’ are embedded not only within socio-economic relations, but are also inscribed within physical space and therefore remain – as do discursive categories – to influence conditions of the present. Thus attending to the ‘layering over and articulating with prior formations of rule’, as emphasized by Moore (2001), involves both physical and discursive elements.

Acknowledging the ways in which these circuits and networks in particular places simultaneously embody successive ‘relations of rule’, through the patterns of water supply infrastructure and water use practices they both enable and disable is therefore important for analyses of current conditions of access. As highlighted by other scholars, urban water supply infrastructure is particularly long lived, lasting well over 100 years in the case of Jakarta and other cities. Arguably, this makes understanding of how current choices are constrained or enabled by historical actions particularly important. Indeed, it is only through tracing the ways in which the colonial rationalities guiding the construction of the original infrastructure have been incorporated into postcolonial government rationalities that the ‘splintering urbanism’ identified by Graham and Marvin (2001) can be seen not as a recent, neo-liberal phenomenon, but rather as a pervasive, persistent rationality of rule governing the production of urban water in Jakarta.

In conclusion, although the origin of the ongoing fragmentation of access to urban water supply in Jakarta is located within the city’s first reticulated water network, and the ways it was predicated upon and subsequently reinforced by a racialized system of rule, the chronology of Jakarta’s urban water supply infrastructure development has traced how the subsequent splintering of the city’s
water supply worked according to the ways in which these axes of difference (race then class-based) were negotiated and articulated within successive colonial and postcolonial projects.

Building upon the historical analysis of Jakarta’s urban water supply system presented here, Chapter Four next traces the continued fragmented growth of the piped network through development interventions led by both public and private sector management; the Chapter extends the genealogy up until present day while bringing a specifically political economic focus on the last two decades of infrastructure development. Chapter Five then completes the triad of historical, discursive, and political economic analysis. Through a discursive analysis of the ways in which infrastructure was used to configure – and contest - particular natures, spaces, and subjects, Chapter Five explores in more detail the socially constructed categories of identity (‘European’, native, Indische) introduced in this Chapter
Chapter 4

Invisible Networks:
The ‘failed development’ of Jakarta’s water supply, 1990-2007

4.1 Introduction: 50 years of Failure?

Completing the genealogy of the city’s splintered networks begun in Chapter Three, this chapter documents the continued fragmentation of access to piped water supply in Jakarta through projects of international development that, unlike Guided Democracy or New Order rationalities, had as their key objective the revitalization of the city’s centralized water supply. By using the analytical framework of governmentality I both make visible, and offer explanation for, the failures of over two decades of both public and private sector led development interventions. Specifically, I uncover the ways in which the layers of previous relations of rule, embedded within both discursive and physical foundations of the city, continued to intersect with new neo-liberal governmentalities seeking a different ‘education of desires, and configuration of habits’ around water as a way to optimize the conditions of life in the city.

Building on the historical analysis contained in Chapter Three, this Chapter examines the ways in which the past two decades of international development in Jakarta’s water supply system sought to correct the ‘failure to provide’ of previous governments. As documented in Chapter Three, the programs of previous governmentalities (the New Order in particular) seeking to ‘optimize the conditions for all of life’ operated according to rationalities of rule which in fact demanded, and legitimized, a reduced quality of life for a large percentage of the city’s population. Under the New Order, benefits of development were to ‘trickle down’ to those who were politically obedient and economically established; the rest of the masses were to be ‘rational’ in their demands on the government (Heryanto, 1988; Morfit, 1981). Therefore, after forty years of postcolonial planning, including two decades of the New Order’s age of ‘development and progress’ where economic growth averaged at nearly eight percent annually (Robison, 1990), the country’s capital city still only had a centralized piped system covering less than half of its urban area, and although producing 10,400 L/s of water, it was losing more than fifty percent of this in its distribution system, and providing for less than thirty percent of its urban residents (World Bank, 1990).

With both the piped and non-piped water quality in the city continuing to decline while urban population increased, the lack of capacity of the city’s piped water supply system was, not incorrectly,
increasingly highlighted as a serious problem for human and environmental health, national economic development, and poverty alleviation (ADB, 1990; Berry, 1982; Cestti, 1993; World Bank, 1984, 1986, 1990b, 1991). This led to the largest international development intervention into Jakarta’s water supply infrastructure ($124 million USD); from 1990-1998, the World Bank led project ‘facilitated’ the subsequent privatization of Jakarta’s water supply network operations (1997-present).

However, although setting out to improve the conditions of life in the city, the shift to neo-liberal governmentality led by the World Bank, has also ‘failed to provide’, and has in fact only exacerbated the previously existing inequities. This perverse result is revealed through an analysis of both discursive and political economic relations of power mobilized through government, which, as I illustrate, intersected with the physical and discursive sediments of previous relations of rule to maintain inequitable patterns of provision. While Chapters Five and Six provide more detail on the successive (post)colonial governm entalities fostering particular relations of rule, and provoking resistance, I highlight in this chapter how they worked to frustrate the projects of international development 1990-2007. For, while seeking to revise rationalities guiding patterns of access and development according to neo-liberal principles, these development interventions did not erase previous relations, or their physical sediments (see Moore, 2001).

The chapter begins with an analysis of the discourses of international development projects, as I denaturalize the emergence of the World Bank project and subsequent privatization as logical solutions through which to correct previous decades of postcolonial urban development perceived as failed, or stagnant. Examining the discursive technologies used by international development agencies, I identify how development projects identified the failures to provide universal access to piped water in Jakarta as an example of failed modernization. Most significantly, this discursive technology of ‘rendering technical’ obviated the political and made Jakarta’s problems amenable to technical solutions. Therefore, the development agencies driving the financing and construction of Jakarta’s water supply infrastructure were unable to recognize its ‘lack’ of a centralized supply system as the product of (contested and contradictory) government policy, which, as I document, led to conflicted results in their own programs to improve access.

Within the discussion of ‘rendering technical’, I also reveal the neocolonial devices embedded within international development discourses, and highlight how this has compromised its own governmental programs to improve access. Specifically, as I document, the assessment and the enumeration of the population as techniques of knowledge and calculation through which to deliver services to optimize the conditions of life were incomplete. I analyze this incomplete application of the technologies of government as a result of reliance of donors upon neocolonial understandings of cities and urban development trajectories, producing knowledge that is (much like the critique of Marvin and Graham’s splintered urbanism) heavily influenced by the implicit assumptions and standards of the (post)colonial West. As I document, the adoption of neo-colonial discourse equating modernity and
development with the western urban infrastructural ideal led to a chronic under reporting of the city’s progressive growth of decentralized and informal networks of water supply. And, although these splintered networks (and their implications for imprinting the western standard), remained invisible to donors, the relations of power contributing to their growth would continue to compromise the success of development projects.

Following the analysis of the developmental discourses articulating the rationality of the solutions offered (namely, the World Bank’s project and preparation for privatization of Jakarta’s water supply), I look at the product of these relations of power. Completing the chronology of Jakarta’s urban water supply infrastructure development begun in Chapter Three, the final years of the development of Jakarta’s water supply infrastructure are traced through the World Bank’s PAM Jaya System Improvement Project (PJSIP), and the private sector partnerships (PSP). Looking in particular at the ways in which these interventions further facilitated splintering of access, I analyze both the effects of political economic relationships, but also the ways in which new rationalities of water supply management introduced through these projects intersected with the past layers of relations of rule.

4.2 Invisible Networks I: Hydraulic modernity and development discourse

Central to the failures of the last two decades of development interventions in Jakarta were the ways in which the city’s failure to provide was ‘rendered technical’ through development discourse and coded as an example of failed modernization. Through this discursive technology, development planners excised political relations, and therefore were inherently unable to diagnose the ways in which Jakarta’s splintered networks were the product of relations of rule. Contributing to the occlusion of the invisible networks of relations of power informing the fragmentation of Jakarta’s urban water supply, was the reliance of international development upon western theories of urbanization and modernization which led to the particular (insufficient) technical, apolitical, ‘solutions’, for the lack of coverage of Jakarta’s network system. For, guided by the (western) developmental standard of universal provision through centralized networked infrastructure, the identification of Jakarta as an example of failed modernization to be solved within technical programs of development, was also fundamentally the product of western based analysis of urbanization and modernization that fail to recognize trajectories of urban growth differing from the western context and deviating from western urban norms (Robinson, 2003).

Specifically, as many scholars working outside of the West have highlighted, focusing solely on the access to a centralized piped water supply network disregards the quality, convenience, and preferences that lay behind informal water networks that may be piped – but not centralized (Kjellen and McGranahan, 2006). However, because of a reliance on western urban norms, and an inherent
inability to acknowledge the realities casting doubt on the completeness of their diagnoses or the feasibility of their solutions (Ferguson, 1990; Li, 2007), development discourses have consistently interpreted the existence of other models of urban water supply (decentralized, informal) as evidence of its failed modernization.

Other research within urban geography has helped to highlight this implicit western bias in urban studies, drawing attention to how most of the urban theories explaining the relationship between society, cities, and infrastructure are rooted in a Northern context (McGee, 2007; Power et al. 2006; Robinson, 2002). Therefore, while maintaining the West as the reference for models and theories of urban development, difference from this urban standard is either routinely overlooked, or misinterpreted as deviant from the norm. For urban water supply, the urban standard is the western model of universalized, homogenous provision of networked service. As reflected in the World Bank and UN-Habitat’s City Development Indicators¹, access to a centralized system stands in as proxy for developmental status (UN-Habitat, 1998).

Subsequently, by characterizing the absence of these integrated, universalized networks in cities of the South as a ‘lack’, the result of incomplete modernization and urbanization (Robinson, 2002; 2006), Jakarta’s multiple waters become deviant, or ‘in need of development’. Therefore, despite the historical provision of water in Jakarta through multiple modes and networks, access to a centralized, piped networked water supply remains the sole indicator for development achievements within urban water supply (UN-Habitat, 1998). Not surprisingly, the developmental ranking of cities in the City Development Index identifies Jakarta as lagging in its progress of urban development and modernization: with a centralized water supply system delivering to less than half of the city’s residents, Jakarta’s progress towards the western urban infrastructural ideal is portrayed as stagnant – scoring only 57.3% for urban infrastructure development, in contrast to its rating for education, 95.7% (UN-Habitat, 1998). As seen below, this state of development was most recently reflected in the documentation of the World Bank, and World Bank funded Indonesia working group on water supply and sanitation (Pokja, AMPL).

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¹ UN-Habitat’s Global Urban Indicators Database began in 1996 as a tool for measuring progress towards Target 11 of the Millennium Development Goals. As part of the development of this Global Urban Observatory, UN-Habitat has developed a City Development Index, similar to the Human Development Index used of the UNDP and reported in annual Human Development Reports, (http://ww2.unhabitat.org/programmes/guo/). The City Development Index reports that “the levels of household connection to networked infrastructure are major indicators of the level of city development” (UN-Habitat, 1998:13)
When classified according to the achievement of the western infrastructural ideal – centralization and standardization - Jakarta’s splintered network and multiple waters identify the city as ‘lagging’ behind in the regional race towards modernization and urbanization, far behind neighbouring Malaysia, Thailand, and Singapore. “How have so many of Indonesia's developing neighbors managed to expand and support sufficient water supply networks while little progress is made here?” asks a World Bank urban infrastructure advisor (Drozdz, 2006).

Postcolonial urban geographers point out that the continued reliance upon the West as the theoretical and normative reference has its origins within the colonial past (Myers, 2006; Power et al. 2006). The developmentalist discourse of Jakarta’s failed modernization can also be identified as the continuation of discursive connections made between urban water supply technologies, infrastructure systems, and modernity that were enrolled within government of the colonial city of Batavia. This is discussed in detail in Chapter Five. Here, I note how the intersections between colonial governmentality (and the relationship between hydraulic modernity and identity that it demanded) and current rationalities of government in Jakarta remain hidden, another of the city’s ‘invisible networks’.

For, while development reports lamenting the lack of progress in Jakarta’s water supply often cite the continued physical reliance upon colonial era infrastructure – making visible the material connections between past and present to support their argument as to the stagnant nature of infrastructure development throughout the postcolonial period – the discursive continuity between the colonial past and present remains hidden within the assumptions of progress defined by western norms for urban water supply infrastructure (see World Bank, 1974, 1984, 1990b, 1998). Looking more closely at the ways in which contemporary interpretations of Jakarta’s urban waters (and water users) as either developed or undeveloped are based upon the discursive and material foundations of the colonial city, these intersections between different layers of relations of rule become more visible.

Physically, the discourse of westernization and modernization was cemented within the construction of the colonial city’s spring water supply network in 1920, which continued, as documented in Chapter Three, to inform the physical growth of the city’s water supply system. However, in a simultaneously discursive construction, the city’s spring water supply network was highlighted as the pinnacle of colonial technical mastery (see Mrazek, 2002), and coded different kinds
of water supply within the colonial hierarchy of development. Composing a history of the city’s water supply, colonial engineers traced the ‘evolution’ in technologies of production and distribution to posit a process of linear development. Moving from the ‘pre-modern’ sources of surface waters and simple mechanical forms of filtration (1700-1870s), to a centrally distributed artesian water supply (1870-1920), to the pressurized, standardized, piped spring water network (1920-on) engineers documented a narrative of development and modernization that posited discursive connections between waters and levels of modernity (see Eggink, 1930; Gemeente Batavia, 1927; Maronier, 1929; Smitt, 1922).

This discourse remained embedded within the sediments of the city, and influenced the government technologies of assessment and enumeration as practiced by development donors. Specifically, as the continued reliance of residents upon multiple sources of water and decentralized forms of provision disrupted the colonial chronology of urban development and contradicted its trajectory of modernization, the persistence of surface and groundwater use throughout the colonial city’s evolutionary stages was simply excised from the historical narratives (see Eggink, 1930; Maronier, 1929). For the colonial government, the continued use of non-piped water sources, and primitive distribution technologies (ambulatory vendors) were classified as merely ‘temporary solutions’ for the urban population who were not yet fully modern (Brandenburg, 1924; Maronier, 1929; Tillema, 1913; van der Wetering, 1939). Tellingly, the gradual progress of this deficient population towards a westernized, modern urban identity was to be indicated by an increase in per capita consumption of piped water.

### Table 4.1 Native development and predicted per capita piped water supply consumption, 1920-1950s

<table>
<thead>
<tr>
<th>Year</th>
<th>Liters/capita/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1920</td>
<td>23.6</td>
</tr>
<tr>
<td>1930</td>
<td>40.5</td>
</tr>
<tr>
<td>1950</td>
<td>70</td>
</tr>
</tbody>
</table>

Source: Data from Brandenburg (1924)

Within the colonial present, the informal, decentralized water supply networks are still –after almost 100 years of existence - largely seen as temporary solutions for a population of ‘not yet modern’ residents. Like in the colonial era, the use of multiple water sources, the practice of combining different qualities of water according to cost and purpose, and reliance upon water vendors are interpreted as the product of a developmental gap. For example, as stated by a World Bank staff member, it is the ‘needy poor’ who are ‘left’ to ambulatory water vendors, and decentralized sources of supply (Drozdz, 2006). Viewed as such, development solutions have simply assumed that these traditional, non-western forms of supply would disappear in parallel to the growth of the centralized system, and have not promoted the incorporation or regulation of traditional service providers within Jakarta’s formal water supply network (Susantono, 2001). As a result, documented more extensively in
the following section, development agencies failed to recognize how the progressive fragmentation of Jakarta’s water supply, as the presence of decentralized and alternative providers did not decrease along with increased investment into the centralized network – but rather, increased.

It was not until three decades after the entrance of international development in Jakarta’s water sector in the 1970s, and following the failure of the largest donor driven investment into the centralized network in the 1990s, that the persistence of these transitional technologies and providers was recognized, documented, and acknowledged in water sector strategies reviewed by donors (World Bank, 2004a; World Bank, 2003c; ADB, 2003; Waspola, 2007). Now interested in the extent to which households have made investments into these alternative water sources, and having encouraged the growth of what is now termed a ‘multi-provider market’ for urban water supply, donors are tacitly admitting their failure to recognize the persistence of the informal market and decentralized providers.

In the World Bank’s 2003 background sector report on urban water supply infrastructure in Indonesia, there was finally an admission of the fact that “two significant areas of activity have developed in parallel to the investments in centralized network water supply – communal or private self-provision and informal sector services around network and groundwater supplies” (World Bank, 2003a:2).

**Figure 4.1** Use of public and private water service providers in Indonesia, by income quintile

![Source of Drinking Water per Income Group](source-of-drinking-water.png)

Source: Data from World Bank (2006e) ‘Making the New Indonesia Work for the Poor’

“Within Indonesia, the current level of private investment made by households for their alternative, decentralized water supply systems can only be estimated as *hundreds of millions of dollars* every year” (World Bank, 2003a:12).
This western bias and subsequent blindness to the progressive fragmentation of Jakarta’s waters were, as I document in the next section, the product of intersections between layers of relations of rule occurring within development programs who ‘rendered technical’ the failure to provide. Together with the occlusion of political relations, the continuation of the colonial discursive connection between levels of development and ‘ways of being’ in relation to water led to fundamental oversights in the enumeration, assessment, and delivery of water supply services.

4.3 Invisible Networks II: Discounting diversity & miscounting the disconnected

With a singular focus on the western hydraulic system as the developmental norm, the urban infrastructural ideal of integrated networked system guided the first three decades of international development within Jakarta’s water supply system. Assuming the centralization and standardization of urban water supply as a trajectory of modernization, the continued reliance of urban residents on non-piped water supply was, as in the colonial past, attributed to a lack of development. Interpreted according to the original colonial binaries, the oft-cited statistics of connected vs. unconnected residents are no longer used to indicate European vs. native, but these statistics are still interpreted within – and used to support - the binary of developed vs. undeveloped, modern vs. traditional. As such, the percentage of urban residents not connected to the centralized piped network stands in as an indicators for levels of (delayed) development (see UN-Habitat, 1998; UN-ESCAP, 2007, Drozdz, 2006), and was used to justify development programs from the 1970s-1990s.

Table 4.2 International development involvement with Jakarta’s centralized water supply infrastructure, 1950-1990s

<table>
<thead>
<tr>
<th>Year</th>
<th>Infrastructure</th>
<th>Donor and type of finance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950s</td>
<td>1st large scale WTP - Pejompongan I</td>
<td>French government, bilateral aid</td>
</tr>
<tr>
<td>1960s</td>
<td>2nd large scale WTP- Pejompongan II</td>
<td>Degremont, private sector loan</td>
</tr>
<tr>
<td>1980s</td>
<td>2nd Master Plan (1985) 4th large scale WTP – Cisadane</td>
<td>Japanese bilateral aid (OECF)</td>
</tr>
<tr>
<td>1990s</td>
<td>5th large scale WTP – Buaran I 6th large scale WTP - Buaran II</td>
<td>World Bank loan (PJSIP) &amp; Japanese bilateral aid (OECF)</td>
</tr>
</tbody>
</table>

Source: Data from JICA (1997), PAM Jaya (1992a), and World Bank (1990b).
In the 1970s, the first decade of multi-lateral aid involvement into Jakarta’s water supply system was preceded by this documentation of the need for development. Prior to the World Bank’s first Urban Sector Development Loan for Jakarta, a joint World Bank-WHO study recorded that although forty percent of households had access to piped water this was mostly through water vendors, not household connections. Moreover, sixty percent of households had no access to piped water, and fifty percent of households relied primarily on groundwater supplies (Berry and Sierra, 1978). In 2006, the latest multi-lateral development intervention into Jakarta’s water supply, again led by the World Bank, is also justified by using these indicators: “Nearly half of all people currently living in Jakarta, the fourth most populous city in the world, lack a piped water connection” (Drozdz, 2006).

While not overtly stated, the implicit assumptions of this development discourse are that (1) progress towards development will be indicated by the changes in the ratio of connected/unconnected; (2) the physical growth of the centralized network system is the pathway to progress; and (3) – crucially - this development can be achieved through technical, not political, interventions. Guided by these assumptions, the first three decades of international development within Jakarta’s urban water supply adopted a myopic emphasis on the centralized supply system. In the first decade of major donor involvement (1970s), the first Master Plan for Jakarta’s urban water supply concentrated solely on the expansion of a centralized network water supply delivery, laying out the long term plans for gradual progress towards the western urban norm. Like the next Master Plan in 1984, planning for the protection of surface and groundwater water quality and sustainability of other water supply systems (surface water, shallow and deep groundwater) was considered outside of its purview (see Argo, 1999; Porter, 1996; World Bank, 1984). Following the recommendations of the city’s first Master Plan, donors financed a four fold increase in the production capacity of the centralized system.

However, echoing the colonial government rationality towards ‘native’ development (explained in Chapter Five), the achievement of this western ideal would only be manageable through a program of gradual progress. The World Bank determined that given a moderate pace of developmental growth, all residents of Jakarta would – by the year 2000 – have achieved the western standard of potable piped water (World Bank, 1974). Like the previous predictions of the colonial state for the development of its native urban residents, donors foresaw the requirement of more than three decades of developmental assistance, which in turn, like before, justified the use of transitional technologies. Rationalizing a gradual progression towards development through a series of transitional phases, public hydrants and water vendors were framed as ‘stop-gap measures’, reflected in the basic needs programs throughout the 1970s and 1980s. Of course, the city, and its population, was intended to ‘grow out of’ this reliance on decentralized providers as they reached financial, political, and cultural maturity (see World Bank, 1974). Not surprisingly, the developmental trajectory predicted by the World Bank
paralleled the colonial models: progress towards modernization would be indicated by the gradual increase in consumption of piped water.

**Table 4.3** (Post)colonial development and per capita piped water supply consumption

<table>
<thead>
<tr>
<th>Postcolonial Developmental Hierarchy*</th>
<th>Liters/capita/day</th>
<th>Colonial Developmental Hierarchy**</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970s: public hydrants</td>
<td>20-30 L/capita/day</td>
<td>Natives</td>
</tr>
<tr>
<td>1980s: mix between public hydrant and yard taps</td>
<td>60 L/capita/day</td>
<td>Foreign Easterners (Arab and Indian)</td>
</tr>
<tr>
<td>1990s: mix between yard taps and private connections</td>
<td>100 L/capita/day</td>
<td>Chinese</td>
</tr>
<tr>
<td>2000: 100% private connections</td>
<td>150 L/capita/day</td>
<td>Europeans</td>
</tr>
</tbody>
</table>

*Data taken from the World Bank’s ‘Standards for Incremental Kampong Improvement’ (World Bank, 1974) and from Berry and Sierra (1978) ‘Public Works Investment Strategy for Urban Water supply in Indonesia’.

**Colonial data taken from Brandenburg (1924) and Smitt (1922).

What this postcolonial developmental trajectory and its implicit assumptions missed – or ignored – was the continuity of reliance upon these ‘stop gap’ sources and providers. Obviating the ways in which relations of rule made access to the city’s piped water supply more or less possible, and the ways in which ways in which rationalities of rule supported, facilitated, perpetuated these options, the assumption implicit in the basic services model for urban water supply development was that given physical access to the city’s centralized water supply network, residents would prefer this source. Subsequently, the fact that consumer preferences for decentralized providers and multiple sources were not transitional but continued to persist throughout – and because of – the growth of the centralized networked water supply system went unrecognized. The specific ways in which different eras of governmentality encouraged, facilitated, or provoked the preference for decentralized water supply is discussed in detail in Chapters Five and Six. In the paragraphs below I highlight how this trend was missed, and/or misinterpreted, by development agencies.

Preferences of residents for decentralized providers and sources did not however go wholly undocumented. A review of Jakarta’s Kampong Improvement Programs financed by the World Bank in the 1970s noted that despite investments in extending the centralized network system,

“the largest single source of drinking water in 1981 continued to be wells, the proportions having declined only slightly since 1976, the percentages of households purchasing water from vendors also only declined slightly during the 1976-81 period” (Taylor, 1983a:91).

However, instead of generating investigation into why residents who had the possibility of physical access to piped water continued to prefer decentralized providers, this observation was simply presumed to be justification for continued investment into the centralized system, and throughout the 1980s and 1990s donors continued to concentrate investment into the achievement of the western
infrastructural ideal. When some beneficiaries of development displayed their continued preference for ‘local waters’, and non-network access, these facts were under-emphasized, ignored, or blamed on the continued ignorance of low-income residents (see World Bank, 1995a).

In addition to blaming preferences for decentralized water supply on the need for ‘behaviour change’ and a more scientific approach to water quality (see, World Bank, 1995a, 2006c), development programs also misunderstood the fact that decentralized sources of water supply were also – increasingly - preferred by those households who were presumed to have already achieved development. Assuming that connection to the piped network indicated higher developmental status, development programs have had to overlook and/or under report the realities that complicated this narrative, missing both the trend (see World Bank, 2004a), and its implications for the operation of the centralized piped network, which is discussed below in following sections on PJSIP and PSP. In the 1970s, the World Bank-WHO recorded that increased use of piped water correlated with increases in household income, but they also recorded that increased reliance upon and investment into non-networked decentralized private water supply sources correlated with increases in household income (Berry and Sierra, 1978). Following this initial observation, in the 1980s, after a four fold increase in production capacity of the centralized system, the review of World Bank KIP investments again observed that within the ‘improved’ kampongs, there were no strong correlations between the use of water vendors and shallow groundwater wells and household income (Taylor, 1983a).

Subsequently, as the discourse of development correlated access to the centralized piped network with levels of modernity, donors overlooked the percentage of Jakarta’s ‘un-served’ population who were already developed but not connected to the network. Developmental discourse had conditioned water supply professionals to categorize all of the unconnected households as undeveloped and thirsty for access to the centralized system, but many of the unconnected were upper income residents who had opted out of the public provision of urban services, encouraged in particular through New Order governmentality and its promotion of fragmented patterns for urban development (see Cowherd, 2002; Effendy, 2004). As is presented in more detail in Chapter Five, the New Order’s under financing of public service provision (Chifos and Suselo, 2000; World Bank, 1984; World Bank, 1991; World Bank 1993c), and promotion of commercial land development in the fringes of the city (Dowall and Leaf, 1991; Han and Basuki, 2001; Leaf, 1996), had, by the 1980s, led to increasing numbers of middle and upper class residents into residential enclaves provided for by superior privatized network services (Firman, 2004; Leisch, 2000, 2002).

It was not until the mid-1990s, when the donors financed the first record of municipal water supply customers by tariff group that the documented evidence contradicting their discourse was too obvious to ignore. Two decades after the initial observations, development agencies finally recognized that a large majority of the upper class, and presumably ‘developed’, residents of Jakarta were opting out of the centralized public service. Given the gradually declining water quality and service levels of
the centralized piped system throughout the 1970-80s, yet another material effect of governmentality, piped network water was no longer the modern standard of the city for many of the middle and upper class residents who actually had the option to connect. With many residents making significant private investments into alternative water supply sources (deep groundwater but mainly shallow groundwater wells with filters, pumps, and piped networks), and contributing to the rapid growth of the bottled drinking water market in Jakarta (Argo, 1999), the preference of many residents was not the centralized piped water supply, and it was not only the ‘needy poor’ who preferred alternative sources for their quality, convenience, and continuity of service.

Table 4.4 Network water consumption and connections per house type in Jakarta, 1994-1995

<table>
<thead>
<tr>
<th>House Category (Tariff group)</th>
<th>Percentage of Customer Base</th>
<th>Percentage of Water Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luxurious</td>
<td>10.0%</td>
<td>15.0%</td>
</tr>
<tr>
<td>Middle class</td>
<td>24.9%</td>
<td>30.5%</td>
</tr>
<tr>
<td>Simple</td>
<td>56.2%</td>
<td>26.2%</td>
</tr>
<tr>
<td>Very simple</td>
<td>8.9%</td>
<td>8.3%</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Source: Data from JICA (1997)

Figure 4.2 Deep Wells and Registered water consumption from deep wells in Jakarta, 1977-1986

Source: Data taken from BPS (1972-2005) and Dinas Tata Kota Jakarta (1987).

**NOTE:** This figure reflects the reported use of deep groundwater, as documented through licenses issued through the Ministry of Mines. However, as documented in Braadbaart and Braadbaart (1997), control over extraction of deep groundwater has historically been difficult, and it is estimated that every two out of three deep wells being used are not licensed. Therefore, while the above figure does indicate the trajectory of increased use of deep groundwater sources, it does not reflect total volume abstracted.
Prior to the documentation of network customers and consumption per tariff groups, the trajectory of urban water supply development in Jakarta was obscured by the myopic focus of the western hydraulic discourse, and the inherent inability of development projects to gather and/or use information that undermined the linear narrative of their plan for Jakarta. This failure to first recognize, and then investigate the reasons behind the parallel growth of decentralized water supplies was encouraged by the discursive technology of ‘rendering technical’ as experts were unable to acknowledge realities which cast doubt upon the completeness of their diagnoses or the feasibility of their solutions (see Li, 2007). Subsequently, by disconnecting the state of Jakarta’s water supply infrastructure from urban governance, and occluding the role of the politics embedded within Jakarta’s splintered network donors, more technical solutions were legitimized. Donors continued to believe that Jakarta’s urban water supply system was still a case of failed modernization, its lack of progress towards the western infrastructural ideal to be solved by the technical and ideological solutions provided by western/northern donors.

A product of this discourse, from 1990-1998 the two most involved development actors in Jakarta’s urban water supply (the Japanese government and the World Bank) led the largest one-time investment into the resuscitation of the city’s centralized network system. In the following section I document the failure of this intervention, and its implications for the ongoing fragmentation of access to water supply in Jakarta, as in turn it led to the existing private sector concessions.


By the late 1980s the failure of imposing the western technological ideal for Jakarta’s urban water supply was evident to all. It was acutely obvious to donors that investment to date had not established the centralized water supply network as the dominant source of water for the majority of urban residents. Despite continual increases in production capacity, the network covered less than half of the city’s geographical area, reaching a mere thirty percent of Jakarta’s population\(^2\). In addition, while the city’s centralized supply produced a total of 328 million m\(^3\) of water per year, only forty percent of this volume was actually sold, more than fifty percent of water was lost during distribution due to either physical and/or administrative leakage (World Bank, 1990b). Hence, with only 228,000 registered connections in a city with a total population of 8.4 million, approximately seventy percent of the urban population – almost six million residents – still relied on groundwater and/or alternative decentralized sources and bottled supply (World Bank, 1990b). Tellingly, while the amount of piped water consumed by residents was 128 million m\(^3\)/year, the un-served and under-served residents of

\(^2\) In 1988 the service coverage was 44%; the network service area covered 213 km\(^2\), DKI Jakarta total area was 649 km\(^2\) (World Bank, 1990) (NSC 1988)
Jakarta abstracted almost twice this amount, between 200-250 million m³/year of groundwater (World Bank, 1990b).

Rendering technical the perceived failure in modernizing Jakarta’s urban water supply, the problem was to be solved through the largest ever development intervention into the city’s urban water supply infrastructure. Providing technical solutions for the lack of network coverage and unaccounted for water, loans from the World Bank and the Japanese government (OECF) were combined within the PAM Jaya System Improvement Project (PJSIP), established under the umbrella of the World Bank’s Second Jabotabek Urban Development Project (JUDP II). Beginning in 1990, the JUDP (Loan 3219-IND) allocated a total of $190 million USD to the Government of Indonesia to support improvements in Jakarta’s water supply; $124 million USD of this total was allocated for the PJSIP³. The objectives of the project were ambitious: increasing the city’s fixed infrastructure assets by fourfold, extending the distribution network to cover seventy percent of Jakarta’s urban area, doubling the number of house connections, and decreasing the unaccounted for water (UFW) from over fifty percent to thirty percent (World Bank, 1990b). By the end of the project in 1998, the goal was to have fifty percent of Jakarta served by the centralized supply system (World Bank, 1990b).

Table 4.5 Centralized water supply infrastructure development project JUDP-II, 1990-1998

<table>
<thead>
<tr>
<th></th>
<th>Baseline in 1990</th>
<th>Targets for 1997</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PJSIP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production capacity (m³/s)</td>
<td>10.4</td>
<td>17.0</td>
</tr>
<tr>
<td>Distribution network (km)</td>
<td>3,672</td>
<td>5,937</td>
</tr>
<tr>
<td>Connections</td>
<td>228,000</td>
<td>462,000</td>
</tr>
<tr>
<td>Connection density (units/km)</td>
<td>62</td>
<td>75</td>
</tr>
<tr>
<td>Service Coverage</td>
<td>44%</td>
<td>70%</td>
</tr>
<tr>
<td>2. Rehabilitation of 3 existing large scale water treatment plants</td>
<td>Optimizing productivity for Pejompongan I&amp;II and Pulogadung; rehabilitation and reconditioning.</td>
<td></td>
</tr>
<tr>
<td>3. Construction of 2 large scale water treatment plants: Buaran I&amp;II</td>
<td>Costs co-financed by Japanese government (OECF) and World Bank Total water production capacity: 5,000 L/s</td>
<td></td>
</tr>
<tr>
<td>4. Cisadane Treated Water Line</td>
<td>24 km pipeline connecting Cisadane WTP, outside the western borders of DKI Jakarta (construction completed in 1992 through French financing) to Jakarta’s centralized distribution network</td>
<td></td>
</tr>
<tr>
<td>5. Pejompongan Raw Water Line</td>
<td>Twin, 11 km closed pipeline delivering raw water from the West Tarum Canal directly to Pejompongan I&amp;II WTP; replacing previous raw water source, the increasingly polluted, uncovered Banjir canal</td>
<td></td>
</tr>
</tbody>
</table>

Source: Data from World Bank (1998)

³ $190 million was divided up into: $19 million to city of Jakarta, $92 million to Pam Jaya, $13 million to Tangerang PDAM. At the close of the project in 1998, $15.3 million of the total remained undisbursed, so the total loan was actually $175 million (World Bank, 1998).
The strategy for modernizing Jakarta’s urban water supply was not however solely focused on the expansion of physical infrastructure. With the results of previous investments into physical expansion sorely lacking in Indonesia and other countries with World Bank lending, by the 1990s the World Bank water sector strategy had shifted from solely physical expansion to focus on institutional reforms (World Bank, 1990b, 1993c, 1995b, 2003c). Worldwide, one-third of all World Bank water supply projects approved in the 1990s had PSP as an objective (World Bank, 2003c), and supported by research, dissemination and technical assistance, “PSP became de rigueur in most regions; the pendulum swung far, and came to favor PSP as a panacea to the perceived performance problems of the Banks water supply and sanitation portfolio” (World Bank, 2003c:21). In Jakarta, “The [PJSIP] Project’s main objectives were to develop and implement a coordinated program of physical investments, technical assistance, and policies for urban water supply” (World Bank 1998:iv).

The product of new institutional ideology within the World Bank, the technical assistance provided and policies introduced within the PJSIP ushered in a new rationality of management, and as other scholars have identified, reflected the global governmentality of the Bank and its supporting neo-liberal institutions (Finger and Allouche, 2002; Goldman, 2005). Instituting a new purpose and role for government (regulator, not provider), and specifying new relations between state/society, which in turn required new relations between water providers and water users, the neo-liberal ideology introduced in PJSIP aimed to decrease the role of the state within service provision by preparing Jakarta’s water sector for private sector participation (World Bank, 1997a, 1997b, 1997c). The project focused on the institutional reforms necessary to improve cost-recovery and economic efficiency for Jakarta, key to enticing the private sector participation believed to deliver the necessary technical and economic efficiencies and incentives to accelerate the (western) development of urban water supply infrastructure.

Stated as an explicit project objective within PJSIP, preparation of Jakarta’s water sector for private sector interest was reflected within project activities. Specifically, the introduction of new management policies to generate increased efficiency within PAM Jaya (reducing staff ratios, improving data management, generating records of customers, increasing tariffs), and improved physical operations (reduce UFW, build leak detection systems and introduction of ‘management zones’ in city) were to expand the customer base and increase revenues along with the revised tariffs for piped water supply. Together, both the institutional and physical programs of development undertaken as part of the PJSIP would improve efficiency, cost-recovery, and commercial viability of Jakarta’s water sector.
Table 4.6 Piped water supply tariff increases throughout the PJSIP

<table>
<thead>
<tr>
<th>Date</th>
<th>Tariff Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>As a condition to the signing of PJSIP loan from World Bank and OECF, tariffs were tripled</td>
</tr>
<tr>
<td>1991</td>
<td>Tariff adjusted by 30%</td>
</tr>
<tr>
<td>1994</td>
<td>Tariffs adjusted by 54%</td>
</tr>
<tr>
<td>1997</td>
<td>Tariff increase of 15% planned, but delayed until 1998 after takeover of private sector concessionaires</td>
</tr>
</tbody>
</table>

Source: Data from World Bank (1998).

However, despite its lofty ambitions, by the end of the project in 1998, the PJSIP had also failed in its development goals. The World Bank’s Project Completion Report rated its outcome as satisfactory, but sustainability was uncertain (World Bank, 1998). Unaccounted for water had actually increased during the project period, and the only designated pro-poor component of the project – construction of 2,800 public hydrants - was abandoned without any clear explanation (Freid, 1998). Plans for network extension and rehabilitation were also not achieved as poor quality construction and corruption in sub-contracting resulted in the failure to reach original targets for pipe rehabilitation work (World Bank, 1998). With contracts for the installation of pipes intended to be divided between sixty four contractors increased to over 200 contractors because of corrupt tendering, the World Bank warned that operation and maintenance costs in coming years would increase, because due the selection of poorly qualified contractors, “construction quality was only barely acceptable” (1998:vi). Subsequently, as the overall quality of piped water distributed in Jakarta did not improve, the project also failed to reach its targets for reducing groundwater abstraction, the World Bank reporting that “most high rise buildings were still using their own water sources because piped water does not guarantee continuity and quality.” (World Bank, 1998:v).

Table 4.7 PJSIP Targets vs. Project Outcomes

<table>
<thead>
<tr>
<th>Project Indicators</th>
<th>Project Target</th>
<th>Project Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>New connections</td>
<td>234,000</td>
<td>234,000</td>
</tr>
<tr>
<td>New public hydrants</td>
<td>2,900</td>
<td>0</td>
</tr>
<tr>
<td>Percentage of UFW</td>
<td>30%</td>
<td>56%</td>
</tr>
</tbody>
</table>

Source: Data from World Bank (1998).

The official explanations for the failures of the PJISP center on the ‘premature’ privatization of Jakarta’s water supply. Discussions between private sector operators and the New Order government began already in the early 1990s, and the 25 year concession contracts with Thames Water International and Suez Lyonnaise des Eaux were signed one year prior to the planned completion date of the PJSIP (PSI, 2007; World Bank, 1999b). As reasoned by the World Bank, “Pam Jaya's commitment to improving its performance through the above action plan declined sharply, when GOI initiated negotiations to transfer the responsibility for operating and
developing the piped water supply service to two private consortia and when it became clear that PAM JAYA was unlikely to continue as the operator because of an obvious conflict of interest” (World Bank, 1998:4).

However, while the premature private sector contracts certainly introduced incentives complicating improved management of the water network by the existing public operators, in and of itself the privatization of Jakarta’s water supply provides an incomplete explanation for the donor that was at that time grooming Jakarta’s (and Indonesia’s) water supply network for more private sector involvement (see Baye, 1997; World Bank, 1997a). Itself initiating the pre-feasibility study for Jakarta’s PSP in 1994 (Braadbaart, 2007), the World Bank was forced to admit that the “privatization was an event that happened parallel to, but was facilitated by the project” (World Bank 1998:vi). What is more important is the fact that blaming premature privatization for the failure of the PJSIP does not explain why the private sector partners are also, after seven years of operation, facing similar challenges (see Jakarta Post 6 December 2007, ‘Water operator seeks contract review’). Echoing the unmet targets of the PJSIP, which were intended to be corrected through privatization (see World Bank, 1998), unaccounted for water still hovers around fifty percent, while delays in network extension and rehabilitation has prevented improvements in water quality (JWSRB, 2004; PSI, 2007).

Given these facts, an alternative explanation for the failure of the PJSIP project is required. I argue that a more suitable explanation for continued failure is provided by the analytical framework of governmentality, as it reconnects urban infrastructure with urban governance. Subsequently, as I document below, the failures of the PJSIP are attributed to the ways in which the development program sought to disconnect this relationship. As politics were excluded from the problematics of Jakarta’s water supply system, public and private sector actors continued to misunderstand, and dramatically discount, the ways in which relations of rule, and in particular New Order governmentality, informed patterns of urban development and water access that encouraged high UFW and low-connection rates, poor quality construction, and abandonment of pro-poor project elements.

Left ignored up until after failures of PJSIP, project planners did not anticipate ways in which the invisible networks between water pipes and political relations would complicate technical interventions. Although, as is further outlined in Chapter Five, the extra-legal relations between decentralized providers and the centralized network, the tacit government approval of corruption and under-reporting of revenues, and the responses of illegal populations to historical lack of service through illegal connections were all products of the inter-relationship between governmentality and materiality, this was occluded by the discursive technologies of development. Therefore, by purposefully excluding the political from the problematic of Jakarta’s waters, the PJSIP project planners failed to anticipate many of the issues later documented within its ‘lessons learned’. Notably, high UFW was more a problem of administrative (corruption) rather than physical leakage and
demanded more than technical solutions like helium injection leak detection technology, and pro-poor growth had to be given explicit targets within the project’s objectives rather than vague goals (World Bank, 1998; World Bank, 2003c).

Making these admissions only after the project had ended and rolled into the entry of private sector operators, the PJSIP actually only exacerbated inequitable access. First, by failing to predict how or why the Jakarta government would be averse to increasing the number of hydrants intended as a pro-poor project component, the 2,800 public hydrants included as a pro-poor project component were not built, and already existing hydrants were taken out, thereby decreasing over life of the project from 2,100 to 1,480 (World Bank, 1998). Unable to address through technical interventions the ways in which government policy of non-provision to the poor was exploited by civil servants and private sector operators within the New Order sanctioned systems of corruption (see Berry, 1982; Dian Desa, 1990; Server, 1996), the project did not anticipate the reluctance to increase the number of public hydrants available for lower income areas, which would break the lucrative monopoly that both hydrant owners and PAM Jaya employees benefited from. Therefore, as the project planners themselves were reluctant to extend pipes where potential for unprofitable illegal connections was high, the policy on piped network extension during the JUDP/PJSIP continued the government’s pattern for favoring extension into wealthier areas of Jakarta (World Bank, 1998).

**Figure 4.3 Decrease in public hydrants throughout PJSIP, 1990-1998**

As the total number of hydrants in the service area actually decreased during the project - from an original 2,100 to 1,480 - this left fewer services for the poor as a result of the project.
Similarly, the project also did not anticipate the growth in UFW throughout the duration of the project, as the proposed technical solutions of leak detection systems did not address the existing financial incentives for PAM Jaya employees and managers to condone the profitable illegal connections and collusion with illegal operators. A common pattern in the water sector in many countries in the Global South (see McIntosh, 2003), PAM Jaya employees allowed the illegal sale of water from utility pipes to decentralized providers who in turn sold the water at prices well above the official tariff rate to the non-networked areas of the city – who, in turn, were maintained as a lucrative market by the government rationalities preventing piped water access in low-income areas. Classifying the water ‘lost’ through illegal sales as non-revenue water, the funds generated by what was under the New Order a condoned illegal activity (Server, 1996), were shared privately between employees and local officials in charge of the sites of the illegal connections (Dian Desa 1990; McIntosh, 2003; World Bank, 2004a). Within this regime of government that had a particular relationship between the public sector and the economy (see Robison, 1990), and encouraged the selective ‘trickling down’ of benefits within the established social order (Morfit, 1981), UFW continued to be high throughout the duration of the project. Tellingly, UFW peaked in 1996 (57%), when the impending privatization spurred a ‘last grab’ attempt a profits from personnel anticipating the soon to be lost revenue.

**Figure 4.4** Unaccounted for Water (as percentage of water produced) in DKI Jakarta, 1990 - 1997

![Graph showing UFW percentages from 1990 to 1997](image)

*Source: Data from World Bank (1998).*
Perversely, these relations of rule enabling the supply (channeling larger volumes of water outside of the official system), and maintaining the demand (lack of pro-poor policies), also contributed to one of the only successes of the project, the achieved target for number of new household connections. Reported in Jensen (2005), and heard in interviews with both the World Bank and current private sector operators, the jump in the number of connections and official revenues recorded by PAM Jaya in the months directly preceding the privatization, were due to the rapid legalization of illegal connections which had been previously tolerated.

Figure 4.5 Increase in connections to centralized network, 1990-1997

In the face of all of the physical implications of ‘rendering technical’ Jakarta’s water supply problems, the project reports of the PJSIP continued to obviate the direct linkages between urban governance and water supply infrastructure. Instead, the project highlighted technical achievement; the sole success of the PJSIP was achieving its target for increased connections. By means of some creative accounting, the achievement of planned 234,000 new connections thereby supported the completeness of their diagnoses and solutions in the face of evidence to the contrary. Hence, while the product of (purposeful) oversights and implicit assumptions, the World Bank reported 47% of Jakarta’s population served by the centralized network as a project achievement, conveniently close to the stated project objective of increasing coverage to fifty percent (World Bank, 1998).

However, upon closer examination of the assumptions of this calculation, this percentage rapidly decreases – giving in reality a possible range of between twenty five to forty one percent coverage of the centralized network. This percentage of coverage was indeed later corrected, revising the calculations for the coverage ratio produced by the World Bank, the 1997 Master Plan reported that the centralized network served only twenty five percent of the total population of the city (JICA, 1997).
Table 4.8 Over-estimations of centralized network coverage by the World Bank in 1995

<table>
<thead>
<tr>
<th>World Bank calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assumptions</td>
</tr>
<tr>
<td>Actual Network Coverage</td>
</tr>
<tr>
<td>47% of population <strong>within the served area</strong> covered by centralized piped network</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>41% of total population of DKI Jakarta covered</td>
</tr>
<tr>
<td>25-34%, calculated by JICA (1997)**</td>
</tr>
</tbody>
</table>

Source: Data from World Bank (1998) and JICA (1997).

*These new figures are supposedly based on a survey conducted by Pam Jaya, details of which were never made public, and these two new calculations added an extra 19% of Jakarta’s population considered to be served by the centralized network (JICA, 1997). Other surveys of low-income households in Jakarta maintain an average household size of 4-5 members (Castalia, 2007).

** Even if the 1997 Master Plan had validated the new calculations of PAM Jaya used to inflate the World Bank’s coverage ratio, raising network coverage to 34%, this is still more than 10% below the World Bank estimate.

From the failure of the public sector to modernize Jakarta’s water supply, a new model for urban water supply infrastructure development emerged under the auspices of both New Order governmentality, and the neo-liberal rationality of the World Bank. Despite its deviations from the World Bank ‘good governance’ regime (particularly transparency), the private sector concession contracts signed through direct ‘negotiation’ with the key players in the Suharto government (Harsono, 2003), were identified as the next vehicle for a program of (western oriented) improvements. Downplaying the dubious relations with a corrupt government⁴, the mandatory partnerships with local private sector companies tied to the Suharto family (PSI, 2007), and the less than transparent contract negotiations, the private sector concessionaires managing Jakarta’s water network until 2023 were framed by the World Bank as helpful partners, poised to achieve the unmet targets of the PJISP (see World Bank, 1998).

However, in predicting the achievement of universal coverage by 2023, and distribution of potable water by 2007, both the World Bank and the private sector partners again failed to recognize

⁴ In addition, the contracts were awarded despite national laws prohibiting foreign investment in drinking water delivery (Law No. 1/1967; Ministry of Home Affairs Decision No. 3/1990) and local regulations (No. 11/1992 and No. 11/1993) precluding private sector involvement in community drinking water supply (Argo and Firman 2001).
the ways in which past relations of rule, and what they implied for the management of Jakarta’s water supply system, continued to articulate with new rationalities. As a result, the intersection between New Order and neoliberal government worked, often in unpredictable ways, to further fragment network access and frustrate the development of universal coverage through the private sector operation.

**Map 4.1 Jakarta’s private sector water supply concessions, 1998-2023**

Source: Created by Ernst-Jan Martijn (2007).
4.5 Failed Modernization II: Private Sector Participation, 1997-2007

As a product of both the physical failures of the PJISP, and the discursive relations of power contributing to the oversights of the World Bank and subsequent occlusion of New Order politics from problematization, the privatization of Jakarta’s water supply system was layered on top of complex intersections of relations of rule. From colonial past to present, and scaling from the global (World Bank and international water supply companies) to the local (water mafia), the private sector concessions operating Jakarta’s water supply system were the unpredictable product of an interesting mixture of interests. Interests - of the World Bank, New Order politico-bureaucratic structures, Jakarta provincial government, and PAM Jaya – which I argue, were the product of a variety of different past and present governmentalities, and attendant notions of the ‘right relationships’ between public/private, state/society and boundaries between legal/illegal. However, although guiding the initial emergence of private sector operations, the relations of power intersecting to produce the private sector concessions remained both physically and discursively embedded within the system of water supply in Jakarta, articulating new networks which frustrated the latest phase of development under the private sector model.

First, there was the global neo-liberal rationality of the World Bank which promoted privatization as the ideological and technocratic solution to the failures of the PJISP, failures which its own discursive technology, and neo-colonial governmentality, had helped to construct. However, in addition to promoting privatization as a vehicle through which to transform the state from public service provider to regulator, and the identity of citizens to consumers (World Bank, 1997a), the World Bank also had direct economic motives as a result of the failures of the PJSIP. Specifically, the PSP contract offered the World Bank an attractive assurance of debt repayment in the face of continued large-scale corruption within the New Order government and less than transparent reporting of revenues by PAM Jaya (Bakker et al., 2006). With the profits of the private sector partners delivered into a joint escrow account, part of which went to repay the Ministry of Finance who had borrowed money from the Bank for the PJSIP, the Bank was assured of timely repayment of the $124 million USD loan. This was important, especially in light of the ongoing extraction of PAM Jaya revenues by the Jakarta government. Despite recommendations from World Bank advisors to retain earnings for financing system extensions until coverage ratio reached 75%, between 1990-1995 $8 million USD of PAM Jaya profits were diverted to the Jakarta government (World Bank, 1998).

Second, there were the political economic interests of the New Order government, whose rationality of rule both legitimized the ‘trickle down’ of financial benefits to those close to the Suharto family (Robison, 1990), and promoted the interests of the private sector as a pathway to national development (Cowherd, 2002). With both of the local partners of Suez and Thames having direct ties to
the network of the Suharto family\textsuperscript{5}, the sale of the city’s water supply operation mirrored the privatization of the city’s toll-roads, and other key infrastructure assets (see Cowherd, 2002). As is outlined in Chapter Five, the private sector contracts in 1997 were merely the final stage in what had been a gradual process of divesting public water supply assets in Jakarta.

Finally, there were the economic interests of the local public and international private sector water operators in Jakarta, both of whose financial interests were structured by the governance regimes from which they emerged, and within which they operated (see Robbins, 2003). The provincial water supply company PAM Jaya, the most ardent in its opposition to the private sector contract (Argo and Firman, 2002), had financial incentives to support the private sector concessions because of the New Order governmentality rationalizing under-investment into public services. Specifically, with the provincial government continuing to extract the revenue PAM Jaya needed to pay off its debt to the Ministry of Finance, the transfer of revenues directly from the private sector operators to the escrow account, to the Ministry of Finance would improve PAM Jaya’s financial position (Jensen, 2005). Last but not least, there were the financial interests of the French and British water supply companies. Following the achievements of PJSIP in terms of network expansion, revised tariff structures, and four-fold increase in infrastructure assets, Jakarta’s water supply network was attractive to a private sector who, at that time, was seeking to expand international operations (Baye, 1997; Braadbaart, 2007; Jensen, 2005).

In hindsight, the ways in which these relations of power helped to construct the current decade of failed development can no longer be interpreted as positive, or seen so benignly. Ten years after the initiation of the original private sector contract the failures of the private sector operators mirror that of the public sector under PJSIP. Although the original ambitious targets for performance were reduced following a renegotiated contract agreement in 2001, the private sector operators are still failing to meet these reduced targets for performance and service levels. Unaccounted for water, currently around fifty percent, failed to meet the initial target of thirty five percent by 2002, and the revised target of thirty eight percent by 2006 (JWSRB, 2006; Lanti, 2004). With delays in profits leading to delays in planned investment, the lack of network rehabilitation has led to revisions for the targets related to water quality; potable water targeted for delivery for 2007 has been delayed until 2010. Finally, while the numbers of connections has – like the PJSIP – been the one indicator of success, the ability of the private sector to ‘serve the poor’ has been extremely limited (Bakker et al., 2006).

\textsuperscript{5} Suez was partnered with the Salim Group, run by Bob Hassan a crony of President Suharto; Thames was partnered with the Sigit Group run by Sigit Harjojudanto, Suharto’s eldest son (Argo and Firman, 2002; Harsono, 2003).
Table 4.9 Private sector operator performance targets: Original and revised, 1998-2002

<table>
<thead>
<tr>
<th></th>
<th>Water Production (L/s)</th>
<th>Volume of water billed, million m3</th>
<th>UFW (%)</th>
<th>Number of connections</th>
<th>Service coverage ratio (%)</th>
<th>Total population served</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline in 1997, before privatization</td>
<td>12 832</td>
<td>188.1</td>
<td>53</td>
<td>408 587</td>
<td>45</td>
<td>4.1</td>
</tr>
<tr>
<td>Original targets to be met by 2002</td>
<td>14 831</td>
<td>342.0</td>
<td>35</td>
<td>757 129</td>
<td>70</td>
<td>6.9</td>
</tr>
<tr>
<td>*Revised targets to be met by 2002</td>
<td>12 409</td>
<td>250.0</td>
<td>45.4</td>
<td>636 461</td>
<td>53.5</td>
<td>5.3</td>
</tr>
<tr>
<td>Realization 2002</td>
<td>12 907</td>
<td>255.2</td>
<td>46.8</td>
<td>649 429</td>
<td>53.2</td>
<td>---</td>
</tr>
</tbody>
</table>

Source: Data from Bakker et al. (2006) and JWSRB (2006).

*New performance targets were set following the renegotiation of the private sector contracts in 2001.

Table 4.10 Private sector operator performance targets, 2002-2006

<table>
<thead>
<tr>
<th></th>
<th>Water Production</th>
<th>Volume of water billed, million m3</th>
<th>UFW (%)</th>
<th>Number of connections</th>
<th>Service coverage ratio (%)</th>
<th>Total population served</th>
</tr>
</thead>
<tbody>
<tr>
<td>Targets to be met by 2006</td>
<td>---</td>
<td>290</td>
<td>39.8</td>
<td>749 145</td>
<td>70.2</td>
<td>---</td>
</tr>
<tr>
<td>Realization 2004</td>
<td>---</td>
<td>---</td>
<td>47.0</td>
<td>705 890</td>
<td>57.0</td>
<td>5.72</td>
</tr>
<tr>
<td>Realization 2005</td>
<td>---</td>
<td>---</td>
<td>50.0</td>
<td>708 919</td>
<td>60.0</td>
<td>5.73</td>
</tr>
<tr>
<td>Realization 2006</td>
<td>Target met</td>
<td>260</td>
<td>51.0</td>
<td>725 420</td>
<td>60.8</td>
<td>---</td>
</tr>
</tbody>
</table>

Source: Data from JWSRB (2006).

An important aspect of this latest decade of failed development, and the ways in which it has exacerbated fragmentation, is first explained through an analysis of the political economic relations of power mobilized through both New Order, and neo-liberal governmentality. However, as I later go on to discuss, this not the only part of the story, and a solely political economic focus leaves other relations of power – and their contribution to Jakarta’s splintering – unexplained. These other relations, the invisible networks, are explained through the analytical framework of governmentality, following the political economic analysis.

First, part of the difficulty in meeting the original and revised targets for the private sector performance has been due to the terms of the contract. Negotiated according to what is termed ‘collusive corruption’ under the New Order government rationality legitimizing the sale of public assets, the contract was constructed to minimize risks of the private sector firms, leaving all cost-
recovery and currency risks to be borne by the government (Bakker et al., 2006; Braadbaart, 2007). Under the terms of Jakarta’s contract, the profits for the private sector and their partners in the Suharto government were not linked directly to the revenues of the municipal water supply system: the companies were to be paid according to the volume of water supplied and billed (water charge), not according to the percentage of cost-recovery – the revenues from the water tariffs collected from consumers. An additional safeguard for private sector profits was built into the payment mechanism: an indexation formula linked to the Rupiah-US dollar exchange rate and the (Indonesian) inflation rate was built into the ‘water charge’ formula used to determine payments made to the private operators; should the Rupiah fall in value, the water charge (expressed in Rupiah), would rise accordingly.

However, while these positively termed ‘creative’ strategies (see Jensen, 2005) were designed to safeguard private sector profits and minimize risk, its limitation were revealed following the political and economic turmoil that unfolded in Indonesia in 1997 and 1998. With the devaluation of the Rupiah\textsuperscript{6} following the Asian financial crisis and Suharto resignation, and the government unwilling to raise tariffs in light of public unrest, the decrease in cost-recovery and revenues from the water supply utility parallel to the increase in the ‘water charge’ meant that the dramatic reduction in revenues collected by PAM Jaya was insufficient to pay the increasing water charges from the private sector companies. From 1997-2004, PAM Jaya became increasingly indebted to the private companies. The cumulative deficit by the end of 2001 was Rp. 469 billion (approximately $46 million USD) and had reached Rp. 990 billion (approximately $97 million USD) by September 2003, excluding late payment interest and retroactive tariff increases (JWSRB, 2005).

\textsuperscript{6} From 2,396 Rupiah/US$ in February 1997 to 9500 Rupiah/ US$ on February 2\textsuperscript{nd} 1998 (Robison and Rosser 1998).
The gap between the water charge paid to the private companies and the average water tariff increased dramatically from 1997-2001. While in 1997 the water charge paid to the private operators was 11% below the average tariff, by early 2001 it has risen to over 60% above the average tariff. The average water tariff did not rise above the water charge until early 2004 (JWSRB, 2004). With the fall in the value of the Rupiah, PAM Jaya’s operating revenues fell approximately four-fold in dollar terms. While PAM Jaya’s revenue can be expected to be on the order of 400 billion rupiah per year (approximately 1/20th of the outstanding ‘debt’), the negotiated tariff increases are likely to be less than 10% per year. Thus, although tariffs were raised and will continue to increase, these increases will not generate sufficient revenue to quickly repay the ‘shortfall’.

With the time period for repayment of the debt owed by PAM Jaya to the private sector operators likely to be protracted, profits have been delayed. In response to both the shortfall, and the financial uncertainty, firms reduced their capital expenditures, leading to smaller improvements in network coverage and quality, reflected in the inability to meet set performance targets (JWSRB, 2006). Perversely, as the private operators have not improved service quality, the Jakarta government responded to public dissatisfaction by again delaying scheduled tariff increases. Although with the automatic tariff adjustment calculation established in 2004 water tariffs were supposed to rise automatically every six months, protected from political and social pressure (JWSRB, 2004), in July 2006 the Governor of Jakarta rejected the scheduled tariff increase on the basis of poor performance of the private sector operators. The latest delay in tariff increases of course delays further PAM Jaya’s ability to reduce its debt to the private firms, and increases the financial uncertainty of the private operators, again giving incentive to delay investment to extend and improve services.
Data recorded by Jensen (2005) from TPJ for the period from 1998-2002 shows net loss for three of the five years; data from Palyja for 1998-2003 shows net loss in two of the five years. While both firms experienced improvement after 2004, and profits are expected to increase dramatically in the later years of the concession, both firms were worried about possible retro-active action by the government, fearing the government may seek to modify the rate of return in the contract, and there might be public backlash (Jensen, 2005). Indeed, renegotiation of the contracts in 2007 have sought to do just that – changing 22% to 13-14% (Jakarta Post 12 January 2007). In response, both Palyja and TPJ radically reduced their capital expenditures, only investing approximately 50% of what was planned for the first operating period (1997-2002). Expecting to invest more than US $100m each in first 5 year operating period, the firms had only invested about half of this by 2004 (Jensen 2005).
While political economic analysis of the failures of the private sector contracts have received worldwide attention (see Bakker et al., 2006; Braadbaart, 2007; Jensen, 2005; PSI, 2007; World Bank, 2004a), and while this element of Jakarta’s failure is undeniably a central component of the story, there are other networks of relations of power which still remain invisible within this analysis of Jakarta’s private sector partnership. Specifically, we miss insight into how the financial difficulties of the private sector operators have also been exacerbated by other oversights and misassumptions. The oversights of the private sector were, I argue, similar to those of the PJISP and Jakarta’s decades of western-led urban development. For, again, by ignoring the ways in which relations of power, mobilized throughout eras of colonial and postcolonial governmentality, have channeled the flows of water, guided the conduct of residents, and created the production of privatized elite enclaves, the private sector operators have also been plagued by their own misguided assumptions as to the ease and profitability of the centralized network system, failing – like those before them – to recognize the implications of the very government rationality which supported their entrance into Jakarta.

Originally, both of the private sector partners were keenly interested in entering the water services market in Indonesia. Within a large middle income country with an expanding middle class with relatively low penetration of networked water supply services, the contracts for Jakarta were expected to be lucrative for both local and international partners (Bakker et al. 2006; Braadbaart, 2007; Jensen, 2005). This is reflected in the average rate of return guaranteed within the contract; set at 22% the investment into Jakarta was favourably compared to the average rate of returns for water utilities in the U.S. and the UK, which are in the order of 6% (Bakker et al., 2006; Sirtaine et al., 2005). Therefore, understanding the millions of un-connected residents in the city as potential customers, and viewing the city’s un-served as a fixed market, the private sector partners saw potential for easy profits in a city where over fifty percent of the city’s eight million residents were not yet customers.

In reality, as was discovered by the private sector operators, not all residents were thirsty for piped water. Moreover, contra development discourse, these disinterested non-served residents included large portions of the middle and upper class who, as is explained in more detail in Chapter Five, were encouraged through New Order urban planning policies to opt for both formal and informally operated privatized water services. As a result, similar to what was initially documented in 1995 during the PJISP, the lower middle class remained the largest consumer group using the centralized network water supply. In 2003, data on the customers per tariff band showed that the low income households (tariff IIb) made up 46.5% of all customers (Bakker et al., 2006). To date, as the private sector operators have not noticeably improved service or water quality, the middle and upper class residents have not returned to the centralized network system (Waspola, 2007).
Table 4.11 Water supply network customers per tariff band, 2003 and 2006

<table>
<thead>
<tr>
<th>Tariff Band</th>
<th>Description</th>
<th>% of Customers per Tariff Band, 2003*</th>
<th>% Customers per Tariff Band, 2006**</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Social institutions (e.g. mosques) and public hydrants</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>IIa</td>
<td>Public Hospitals and very poor Households</td>
<td>11.7</td>
<td>13</td>
</tr>
<tr>
<td>IIb</td>
<td>Low income households</td>
<td>46.5</td>
<td>47.5</td>
</tr>
<tr>
<td>IIIa</td>
<td>Middle income households and small businesses</td>
<td>19.9</td>
<td>19.6</td>
</tr>
<tr>
<td>IIIb</td>
<td>Upper middle income households and government offices</td>
<td>14.7</td>
<td>12.9</td>
</tr>
<tr>
<td>IVa</td>
<td>Large hotels, highrise buildings, banks and factories</td>
<td>5.1</td>
<td>5.0</td>
</tr>
<tr>
<td>IVb</td>
<td>Harbour/Port</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: * Data from Bakker et al. (2006); **Data from Palyja (2006), TPJ (2006), JWSRB (2006), as of March 2006.

In addition to those upper income households who simply do not want to connect to the centralized system, there are also a high number of zero consumption customers, residents who are connected, but do not use the piped water. In 2006, there were 110,000 of these zero consumption households – approximately fifteen percent of the total number of current network customers. Split evenly between TPJ and Palyja operating areas, the vast majority of these non-consuming customers are those who have opted out of the centralized network supply. Data from Palyja shows that in their operating area (western half of Jakarta), fourteen percent of these zero consumption customers were due to lack of available pressure to deliver piped water supply, but eighty six percent simply chose to rely on other water sources (Palyja, 2006; TPJ, 2006; Waspola, 2007).

The effect of this miscalculation of the market potential within Jakarta has been a continuing fragmentation of access across different spaces of the city and between different socio-economic groups. With limited numbers of upper income household connecting to the network, the ability to cross-subsidize lower income households is limited. For, if the tariff groups are not balanced, this lowers the average tariff and exacerbates the problem of the balance between water charge and average water tariff. Since the private sector companies are paid for the volume of water they deliver and not the bills collected, theoretically they should have no interest in whether consumers are low or high income. However, because of the debt owed to them by PAM Jaya, and their interest in repayment, it has had implications for profits and created a disincentive for the companies to expand their customer base within lower income areas of the city. When combined with the financial shortfall brought about by the terms of the contract, and general lag in investment needed to extend and rehabilitate the

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7 Defined as households who consume less than 10m3/month for three consecutive months
8 At the end of 2005 there were a reported 708,919 connections to the centralized network (JWSRB, 2006), but this includes bulk water supply consumers such as port industries, hospitals, hotels, and religious institutions, so it is likely that more than 15% of household consumers are registering zero consumption.
network within poorer areas of the city, the additional indirect disincentives for the private sector operators to serve the poor has simply perpetuated, but not originated, the splintered networks of historical Jakarta.

Table 4.12 Number of low-income households connected by TPJ, 1998-2004

<table>
<thead>
<tr>
<th>Tariff Group</th>
<th>Number of New Connections</th>
<th>Increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Social Institutions and Public Hydrants</td>
<td>1,101</td>
<td>1</td>
</tr>
<tr>
<td>II Public Hospitals, Poor, and Very Poor Households</td>
<td>21,898</td>
<td>24</td>
</tr>
<tr>
<td>IIIa Middle-Income Households and Small-Scale Businesses</td>
<td>51,847</td>
<td>58</td>
</tr>
<tr>
<td>IIIb Upper Middle Income Households and Government Offices</td>
<td>11,150</td>
<td>12</td>
</tr>
<tr>
<td>IVa Large Hotels, Highrise Buildings, Banks and Factories</td>
<td>2,323</td>
<td>3</td>
</tr>
<tr>
<td>IVb Harbour/Port</td>
<td>1,849</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>90,167</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Data from Bakker et al. (2006).

From 1998-2004, only 25% of new connections were targeted in the two lowest tariff bands (public hydrants, intended to serve those without household connections; and ‘poor’ and ‘very poor’ households). In other words, three quarters of new connections were for middle-income and upper-income households, government enterprises and commercial enterprises.

Not surprisingly then, while there have been limited pro-poor initiatives undertaken by both private sector partners, they have remained extremely small in scope and have not been replicated elsewhere in the city. Documented in the 2006 Human Development Report background paper on Jakarta (Bakker et al., 2006), the initiatives of both private sector companies have been miniscule in a city of eight million. In 2002, TPJ used a grant of 60,000 GBP (approximately $100,000 USD) from its British parent company to subsidize the provision of in-house connections in area of Northeast Jakarta; over the five years of the contract, a mere 1,600 low-income households were connected. In the western half of the city Palyja introduced a policy allowing poorer households (on the lowest tariff bands) to pay the connection fee in twelve monthly installments included in the monthly water bill. As is described in Chapter Six, this policy had already been instituted in the early 1990s, with research documenting its limited effectiveness as a pro-poor mechanism (Crane, 1994).

In response to the limited initiatives of the private sector partners, who were originally touted to have “the necessary flexibility, creativity, and incentives to respond to service needs of poorer residents” (ADB, 2002:55), they are now the recipients of a grant administered by the World Bank. The
funding mechanism, Output Based Aid (OBA), is discussed in detail in Chapter Six, but I note here that its targets too have remained limited in scope – identifying less than 5,000 out of an original 20,000 low-income households for subsidized connections (Castalia, 2007). Moreover, while meeting less than one-quarter of its target for connections for the poor, the reluctance of the private sector partners to accept risk has resulted in extremely high per household connection subsidy costs. Currently calculated to spend between $300-$400 USD per household, the Jakarta OBA project being implemented by the private sector is ironically far less cost-efficient than a similar project being implemented by the public sector in Surabaya, where the Output Based Aid mechanism will spend only $20 USD per capita (pers.comm; World Bank and USAID-ESP, 6 June 2007).

As a consequence of the limited interest and ability of the private operators to serve the poor, the pattern of UFW has also – like during public sector management – remained high. The lack of extension of services to the low income population historically excluded from network access under colonial and postcolonial governementalities has left them reliant upon the same providers as before the PSP (and before the PJSIP). Often, these providers are middle-men who negotiate with water company employees to provide extra-legal connections, or act alone to capture ‘rents’ from captive residents (Dian Desa, 1989; McIntosh, 2003; Server, 1996). With this practice condoned throughout the postcolonial period driving the supply, and demand supported by rationalities of rule denying access to certain types of population, these relations were not eliminated by changes in management, as indicated by reports by the Jakarta Water Supply Regulatory Board, and the media (see ‘Sweeping Operation Against Illegal Connections’ JWSRB 22 October 2007; ‘Water is going down the drain’ Jakarta Post 6 September 2002; ‘New investors, old problems in water industry’ Jakarta Post 19 January 2007; ‘Clean water luxury for North Jakarta slum dwellers’ Jakarta Post 27 January 2007).

Problems of what is termed ‘administrative leakage’ (i.e. corruption and illegal sales) were first noted in the 1970s following the New Order program of meterasasi (PAM Jaya, 1992b; World Bank, 1974), and then again in the 1980s (Pandjaitan, 2004). In 2007, a Palyja investigation into a low-income neighbourhood in Jembatan Tiga, North Jakarta reported the following,

“A Palyja official said the illegal pipes had been installed by officials from state offices….He said the stolen water had also been sold by the unnamed figures to several districts in North Jakarta where residents had no access to clean water.” (‘Water firm cuts pipes in slum’, Jakarta Post 6 October 2007).

Therefore, although it was predicted that the private sector operators would be able to correct this problem through changing incentive structures (World Bank, 1998), the problem of UFW is still predominantly administrative rather than technical (i.e. leaky pipes). In 2006 Palyja estimated that the western half of the city alone was prey to 40,000 illegal connections, and that eighty percent of its UFW was the result of illegal connections (pers.comm, Forkami 10 January 2007; Jakarta Post 19
January 2007). While some illegal network areas have been located through the use of district meters, other areas of illegality have been much more difficult to detect because they maintain all the semblances of legality, outfitted with the standardized diameter of pipe materials, and even equipped with water meters recording consumption. As a result, the six month campaign in 2006, although assisted by the municipal police, was only able to shut down one percent of the predicted total number of illegal connections in the western half of the city - 441 of an estimated 40 000 (pers.comm., Forkami 10 January 2007).

The continued failure of the private sector operators to reduce high rates of UFW and halt illegal connections within the historically under-served low-income areas of the city illustrate the failure of neo-liberal management models to grapple with the complexities of water provision in Jakarta. In response, private sector partners are borrowing technologies of government from the MDBs they are now receiving aid from. Learning from the World Bank’s operationalization of what Tania Li describes as the model of ‘government through community’ (Li, 2002, 2007), the private sector operators are seeking ‘creative partnerships’ with Jakarta based NGOs to change the moralities of low-income residents, and institute self-regulation and community surveillance. As described in the memo below, the private operators are eager to engage local partners in efforts to reduce illegal connections.

“We believe that NGOs such as yours could be valuable partners in such a venture [reducing illegal connections]…capitalizing on your social engineering skills and your field experience with low-income communities…Indeed, we assess today that most of our illegal connections/network relate to low income neighbourhoods…” (Palyja memo, July 2006)
Illustration 4.2 Moralizing water theft: “Stop Curi Air”

Illustration 4.3 Moralizing water theft II

The continued failure of the private sector operators to reduce these high rates of UFW, and particularly in the low-income, historically under-served areas, has had further implications for fragmenting supply and exacerbating inequitable access. While hesitant to enter lower income areas where the network pipes are considered too vulnerable to theft (Forkami, 2006; Jakarta Post 27 January 2007; Jakarta Post 14 September 2007), the private sector operators have taken direct measures to reclaim the middle and upper class consumers, who under New Order government rationality were encouraged to ‘opt out’ of public services (Cowherd, 2002). Specifically, in trying to meet the demands of middle and upper income residents for better water quality and higher pressure, the private sector operators proposed to the Jakarta Water Supply Regulatory Board a plan for the distribution of potable piped water to elite residential areas; this includes the housing estate of Citra Gardens in East Jakarta, the housing estate Kelapa Gading in West Jakarta, and five other undisclosed areas in West Jakarta (pers.comm. JWSRB, 1 August 2007; ‘Drinking water deadline ignored’ Jakarta Post 15 December 2007). While the plan has yet to be approved by the Regulatory Board, this effective splintering of the centralized network system simply continues the pattern of Jakarta’s urban water supply development documented in Chapter Three. Channeling investment into improved distribution for isolated parts of the city, and lack luster pro-poor initiatives have simply reinforced original divisions between urban spaces and their populations.

4.6 Conclusion: Exacerbating inequity

Both the World Bank led development project, and the subsequent private sector concessions have not only failed to delivery on promises of ‘efficient, sustainable services for all’ (World Bank, 2003c), but have exacerbated existing inequities. While the private sector operators have certainly not initiated the splintered urbanism of Jakarta’s water supply network, they have perpetuated this pattern of Jakarta’s (post)colonial urban development. The continuing fragmentation and exacerbation of inequity has been explained in this chapter through both a discursive and policy analysis of international development projects, and a political economic analysis of the private sector contracts, positioned within the analytical framework of governmentality.

Central to the last two decades of continued fragmentation is the discursive technology of ‘rendering technical’, which obviated the political and made Jakarta’s problems amenable to technical solutions. Crucially, development agencies driving the financing and construction of Jakarta’s water supply infrastructure were unable to recognize its ‘lack’ of a centralized supply system as the product of (contested and contradictory) government policy, and rationalized technocratic programs of improvements in order to correct the historic failure to provide.
Compounding this first oversight as to the relationship between urban governance and urban infrastructure, development agencies adopted a neo-colonial discourse correlating modernization and development to the growth of individual household connections to the centralized network. Subsequently, unable to acknowledge realities which cast doubt upon the completeness of their diagnoses or the feasibility of their solutions (Li, 2007), development experts failed to gather and/or use crucial information, continuing to chronically under report the growth of decentralized and informal networks of water supply.

As I have documented, this incomplete application of government technologies of assessment and enumeration have had important physical implications, severely compromising the achievements of the PJISP and the PSP. For, while seeking to revise rationalities guiding patterns of access, these development interventions did not erase previous relations of rule, or their physical sediments. Instead, the splintered networks – and the relations of rule supporting their growth – have had persistent implications for the inter-related issues of reducing UFW, improving service quality, enticing upper income households back into the network, cross-subsidizing lower-income consumers, investment into network extension, and, ultimately increasing the equity of access.

Unfortunately, unable to anticipate the ways in which these relations would continue to operate, albeit articulated in new ways, within the new pieces of physical infrastructure and managerial policies, the World Bank did not anticipate any of its ‘lessons learned’. This inability to acknowledge the incompleteness of its development diagnosis is to the detriment of all of the citizens of Indonesia, as the Ministry of Finance continues to pay off the $124 USD loan and shortfall of payments to the private sector operators. It is also to the very physical detriment of low-income residents of Jakarta, as private sector operators continue to delay network investment and extension until profits are assured.
Chapter 5

The Materiality of Governmentality: Producing water, constituting citizens, and uncooperative natures

5.1 Introduction: Rendering Technical and rematerializing government

The term ‘rendering technical’ provides an evocative description of the way in which political problems of poverty and equity are discursively translated into technocratic development programmes. As illustrated by Ferguson (1990), Li (2007), and Mitchell (2002), this discursive process makes the broader problematics of government amenable to technical, and apolitical, programs of improvement. In this chapter the discussion of ‘rendering technical’ also takes the term quite literally, highlighting the physical processes and material expressions of power enrolled in government. Reading the chronology of Jakarta’s water supply infrastructure development alongside the shifts in colonial and postcolonial governmentalities, the chapter documents how political rationalities were, literally, rendered technical within physical technologies of water supply production, treatment, and distribution. Within this chronology, I also illustrate the ways in which these physical infrastructure systems subsequently worked through both discursive and material relations of power to co-constitute bodies, natures, and spaces. Finally, the chapter also reveals the iterative relationship between governmentality and materiality, documenting the ways in which physical natures (concrete infrastructures, ductile pipes, corporeal bodies, biophysical and kinetic properties of water) were constituted by, but also constitutive of, governmentality as they either facilitated, or frustrated, relations of rule.

In this chapter, discussion of the relations between governmentality and materiality are situated within a chronology of Jakarta’s urban water supply infrastructure development. This chronology documents how rationalities of rule were productive of particular physical technologies of urban water supply. While the chronology parallels the timeline in Chapter Three, this chapter demarcates the discussion of each era of infrastructure according to government rationalities, rather than the date of construction for each system. Tracing how shifts in rationalities of rule precipitated the changes in water supply technology, I document how the definition of new problematics of government occurred parallel to transitions in the city’s urban water supply system: the colonial Liberal Era (1870-1901), the colonial Ethical Era (1901-1942), Sukarno’s ‘Guided Democracy (1950s-1965) and the New Order’s decades of ‘Development & Progress’ (1965-1990s) each introduced particular technologies of production, treatment, and distribution that responded to particular problematics of government.
Akin to Foucault’s genealogy of the liberal state (1991), this chapter conducts a genealogy of Jakarta’s urban water supply. In so doing, the chapter highlights the contingency of the present. Locating the emergence of technologies of urban water supply within particular government rationalities disrupts (post)colonial accounts which depict urban water supply infrastructure as having progressed solely according to scientific discoveries and engineering skills (Gemeente Batavia, 1937; Maronier, 1929; PAM Jaya, 1992a). Rather, this chapter highlights the inter-relationship between science, technology, water, and government, and documents the emergence of Jakarta’s water supply infrastructure systems as sometimes decidedly irrational, based not only in reason and science but heated political debates on ‘how best to govern’. As written in the last years of colonialism by two Dutch colonial administrators:

“in the modern world, science and government can not be kept entirely separate…the relations between the two were perhaps closer in the Netherlands Indies than in many other parts of the world" taken from the Editors' Foreword, of Science & Scientists in the Netherlands Indies (Honing and Verdoorn, 1945: xi).

<table>
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<th>Government Rationality &amp; Systems of Rule</th>
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| President Suharto’s Era of Development & Progress | 1965-1990 | WTP Puleogadung  
|                                             |             | WTP Cisadane  
|                                             |             | 8 mini-WTPs                                 |

Within the chronology of urban infrastructure development and governmmentality this chapter introduces three other aspects of the materiality of governmmentality. First, attention is paid to how the relations of power mobilized through government were productive of far more than just pipes, insofar as they also produced particular kinds of urban subjectivities via the different material relations enabled between residents and urban water supply systems. This influence of government upon the material environment is used to demonstrate how subjectivity is constituted in relation to the physical environment in a much more inclusive sense than articulated by Agrawal (2005), who limits
environmental subjects to those who articulate practices within particular, some might argue un-constructed, conceptions of environmentalism. Building upon, but expending Agrawal’s thesis, the chapter highlights ways in which mundane, routine interactions with metabolized, urban natures like water also constitute a realm of the environment through which identity is both constructed and contested. As is visible within both the colonial and postcolonial city, one’s identity as a modern, productive, governable, urban citizen has been related to particular practices and preferences around water, and therefore one’s access to piped water has either opened up, or closed off, possible articulations of identity (see Butler, 1996; Nightingale, 2006). This chapter focuses its analysis within the colonial era, looking at how the practices and preferences of differently situated urban residents were either enabled or disabled by the types of water supply infrastructure made accessible, and thus highlights the ways in which material relations of power are involved in construction of subjectivities as government has made it more or less ‘easy to be’ in certain relations to urban water supply for differently situated populations.

Second, in foregrounding the material aspects and expressions of power within government, the chapter documents both why, and how, Jakarta’s urban water supply infrastructure has been productive of particular urban spaces; successively hygienic, modern, monumental, economically productive, and neo-liberal. Following from the socio-spatial fragmentation of urban water supply, urban populations, and urban spaces documented in Chapter Three, this chapter explains both why this fragmentation was necessary for government (centralizing and isolating European populations in the colonial; marginalizing and excluding urban poor in the postcolonial), and how it was either facilitated, or frustrated, by physical natures. As is documented through the debates over the selection of different kinds of water supply infrastructure, the splintering of urban space was not only the result of the spatial arrangement of piped networks, but was also dependent upon (and sometimes made vulnerable through) the operation of particular physical technologies and material objects (centralized vs. decentralized systems of distribution; pipe materials and diameters, booster pumps), and influenced by the biophysical properties of water.

Finally, in relation to the above point, the observation of Bakker and Bridge (2006) - ‘things other than humans’ make a difference in the ways in which social relations unfold’ - suggests another dimension to the materiality of governmentality, pointing to ways in which the material is not only produced by, but can also be productive of, relations of power. Specifically, as emphasized by Braun (2000), governmentality not only works through, but is also affected by, and is itself constituted in relation to the physical environment. This chapter illustrates how colonial and postcolonial government rationalities have therefore not only been productive of material natures, physical spaces, and corporeal bodies, but have also themselves been constituted in relation to this materiality. Scrutinizing particular time periods of the history of the city’s urban water supply development illustrates the key role played by material objects and natures in constituting and contesting government, both shaping and
constraining the form and effectiveness of government. The chapter begins by examining the moment of origin of the city’s piped water supply network to illustrate how the problematic of European subjectivity and racial superiority was provoked by ‘new’ biophysical properties of water and its relation to health, which redefined the ‘right relations’ of rule, both between nature/society (Europeans and water), and colonizers/colonized (Europeans and natives). The persistent challenges in the postcolonial period of maintaining control over both the flow of water, and subsequent ‘right relations’ between state/society, citizen/non-citizen, government/economy, and nature/society are discussed in detail in Chapter Six, where the relationship between governmentality, materiality, and resistance to rule is explored.

5.2 The rise of the ‘Sanitary City’, 1801-1901

The circulation of a new discourse concerned with the hygienic ‘nature’ of water in the late 19th century Batavia was described by colonial engineers, public health officials, and government staff as the application of new scientific techniques and the development of new engineering capacity (Maronier, 1929; Moens, 1873; van Dijk, 1873, 1875, 1878). As elsewhere in the world, new scientific theories of disease transmission via bacteria had begun supplanting formerly widespread notions of ‘miasmic’ contamination, leading to unprecedented investments into public health and water supply infrastructure (Gandy, 2006; Goubert, 1986; Melosi, 2000). In the Netherlands Indies, where the high rates of mortality in Batavia throughout the 1700s had led to the flight of Europeans from the old city to new suburban neighbourhoods (see Blusse, 1985), the replacement of ‘miasma’ with bacteria to explain incidence of disease halted the previous patterns of dispersion, leading instead to a new concentration of parts of the city’s population, and the beginning of the city’s centralized urban water supply system.

However, contrary to the later modernist narratives naturalizing the establishment of the city’s artesian water supply system (see in particular Gemeente Batavia, 1919; Maronier, 1929), the rise of the ‘sanitary city’ in Batavia was more than a merely technical intervention prompted by the discoveries of the scientific properties of water and new relations to human health. Rather, the artesian water network was the product of the iterative relationship between governmentality and materiality - the influence of a new ‘nature’ of water upon, and enrolment within, relations of rule. Highlighting the contingency of the present, I illustrate how the production of a hygienic water supply in Batavia emerged parallel with a colonial governmentality that required a more visible distinction between racial categories. It was in the latter half of the 19th century when the racial superiority of Europeans, and subsequently the legitimacy of colonial rule, was considered compromised (see Gouda, 1993; Stoler, 1995), and, not coincidentally, this is when the city’s water supply came under the scrutiny of the government. For, as the colonial government responded to a new problematic of rule, the circulation of a new nature of water was
enrolled to help establish the ‘right relations’ of rule between nature/society (Europeans and water), and colonizers/colonized (Europeans and natives), becoming enrolled within the project of purifying the colony’s European population.

In relation to this argument, it is important to note that prior to the shifts in colonial governmentality over the 19th century, issues of clean water and public health in Batavia were considered problematic, but were not yet a problem of government. Since its founding in 1619, Batavia was plagued by high rates of morality, and in the 1700s was demoted from the ‘Queen’ to the ‘Graveyard of the East’ (Blusse, 1985). As historians of Jakarta have documented, much of this mortality was attributable to waterborne disease (Abeyasekere, 1985), and despite the fact that there were not yet any direct links made between the health of body and consumption of a standardized quality of clean water, there was perennial concern over the role of the city’s waters (Moens, 1873). The poor quality of water and drainage was repeatedly identified as contributing to the ‘killing vapours’ and ‘miasmas’, but the VOC repeatedly turned down proposals to address the problem of water supply, and flight from the spaces and populations characterized by death and disease was the only solution. Over the course of 1700-1800s, residents were left to continually move southwards away from the original port settlement, and in 1810 the city itself was re-established in Weltevreden, twenty kilometres south of the original settlement (Cobban, 1970). Not concerned with racial segregation (Li, 2007), and motivated by profit initiatives, small water works built to improve water supply for the inhabitants of the city built in 1740s were originally justified according to the considerable ‘lastpost’ (financial burden) which would be saved by the VOC for “her slaves, who so far have been put to work as water carriers” (Moens, 1873:289), but were then let to fall into disrepair after only a decade, as proposals for improvement were “delayed due to the large costs” (ibid).

Given this history of non-interference in the city’s water supply for over 200 years (1619-latter half of the 19th century), what then led to the rapid construction of the city’s first water supply system? Following the government directive of 10 February 1870, “desiring the joint meeting of concerned authorities to determine how best to bring pure drinking-water to Batavia” (Moens, 1873:301), a special conference between the Director of Public Works, Director of Education, Director of Industry, Director of the royal engineers, the head engineer of the Mining Department, and the head-engineer of the Mining department at Batavia was held on the 13th of June 1871. With the different government institutions meeting for the first time for the sole purpose of discussing the problems, and solutions, for water supply in Batavia, the committee came to the decision that the best way to obtain good drinking-water was to drill artesian wells. Construction of the first artesian wells and reservoirs began in 1873, with most of the artesian system was in place by 1876, and all financed by the colonial government (Maronier, 1929). To explain this sudden emergence of water as a problem of government, I argue that it was not until the mandate, purpose, and organization of the colonial government established new relations of rule effecting the constitution of a particular kind of capital city, and requiring the
production of a distinctly different colonial society that urban water supply in Batavia for its civilian residents comes under scrutiny. It was a particular system of ‘urban’ water supply (as of then still non-existent), and its production of a particular nature of water, that was identified as necessary for rule. This is discussed below, by exploring two shifts in colonial rationality that, in relation to the discovery of new properties of water, precipitated the construction of the city’s first urban water supply system.

First, central to the need to provide a pure and secure water supply, was the increasing racialization of relations of rule within colonial government. With issues of race becoming integral to rule only after transfer from the mercantilist government of the V.O.C. to the Dutch state (see Li, 2007; Stoler, 1992), the increasing emphasis on race throughout the 19th century had peaked around the time of artesian water supply – the 1860-1890s. By the latter half of the 19th century colonial society consisted of a blurred spectrum of native, Chinese, Arab, Eurasian, and full-blood European populations (Taylor, 1983b). The result of matrimonial alliances between wealthy native plantation owners and European colonials, both the elite and lower classes became ‘Javanized’ and the differentiation between the population was based on socio-economic status, not race (Van Doorne, 1983). Indeed, as the majority of the legally designated ‘European’ population had been borne and lived their entire lives in the Indies, the mestizo society characterizing colonial life during the 17-18th century was racially mixed, with residents classifying themselves along socio-economic lines rather than racial distinctions, and having more ties to the Indies than to the Netherlands (Gouda 1995; Taylor, 1983b).

The problem of this heterogeneous colonial society for government was that it visibly contradicted, and complicated the government’s claim to racial superiority (Stoler, 1995). The ‘natural’ dominance of European over native (and Chinese and Arab) and the valorization of ‘European life’ as the cultural and developmental ideal was contradicted by an Indische population who integrated ‘native’ cultural practices into their households, and lacked clear biological markers of particular racial identities. With the rationalization of colonial authority requiring clearer divisions between different racial groups, and the demonstration of a visibly superior ‘European’ population, the Indische society embodied both a material and discursive threat to colonial authority, and throughout the last half of the 19th century the government problematized the degeneration of European citizens into native life and targeted the existing mestizo culture for elimination. In 1825 all higher level civil service positions in the colony became restricted to those born and educated in Holland; in 1838 all of the native born European colonizers were banned from positions that might bring them into contact with Javanese; in 1849 all civil service posts in the colony were restricted to those educated entirely in Europe; and while in 1864 requirements for civil service posts changed again to remove the requirements of origin of birth and schooling, they required examinations that virtually ensured only those given extensive private schooling in Indonesia, or those educated in Holland would hold posts (Taylor, 1983b).

The second significant shift in colonial governmentality pushing the construction of the artesian water supply was the Liberal Policy. Formalized in 1870, the Liberal Policy introduced principles of
laissez-faire capitalism to supplant previous state-led economic development under the Culturrstelsel (cultivation system), a system of agrarian economic management that from 1840-1870 had obliged one fifth of all plantation land on Java and other colonial territory to be planted with products under the direct supervision of the colonial government (Robison, 1986). Reorganizing the colony in a way that restructured its investments along corporate and multinational lines, the Liberal Policy changed the very purpose of colonial government. With the development of the colony left to market forces the role of the government shifted from managing was in effect a state plantation and generating capital, to providing the conditions for capital. These conditions for capital involved the production of particular kinds of natures, spatial relations, and infrastructures. From 1870-1890 Batavia was equipped with railways, harbours, steam trams, electricity, and centralized telephone and communication services (Mrazek, 2002), and as the site of a new kind of colonial government administration with an increasing state apparatus\(^1\), the city was transformed.

Along with the emergence of Batavia as a proper colonial capital, becoming an actual urban conglomeration with infrastructure services, its population was also targeted for transformation as they too were to become urbanized, according to the requirements of the Dutch colonial government. Specifically, the city was to be populated by a different kind of colonial society, a new Dutch middle class whose ties to the metropole were stronger than to the Indies. And this, I posit, was the major factor behind the establishment of the city’s first urban water supply system, as a new hygienic nature of ‘urban’ water was enrolled within the racial purification of the city’s residents. Notably, artesian water provided through the city’s new system of production went solely to households, not industry. Hotels for the new European investors and related commercial establishments remained reliant upon private water sources and providers, and although the artesian water supply was supplied to the economically important shipping industry, they were reluctant users\(^2\). In addition, during this time the colonial government repeatedly rejected the private sector proposals to develop water for the city’s elite residents, commerce and shipping industry on the grounds that they would only deliver water to areas (and residents) of profitable means (Maronier, 1929; Van Raay, 1915a). Clearly, the city’s first urban water supply system was first and foremost a domestic project; set out in parallel to other government policies and practices working to instil a more ‘Dutch character’ into the colonial life through gradual changes in governmental institutions, administration, and lifestyle (see Stoler, 1995), the artesian water supply system set out to transform the ‘native character’ of European domesticity.

Finally, motivating the very need to establish a new middle class European domesticity was water itself. As an ‘actant’ within the assemblage of relations of power precipitating the city’s water supply system, the biophysical composition of different waters – the existing surface water sources, and

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\(^2\) See Moens (1873) for comments on military regarding artesian water and their preferences (already in the 1860s) for piped spring water; see table of the artesian wells, and location within the city provided by Smitt (1922).
artesian water – was what in fact informed the articulation of what new ‘right relations of rule’ in the colony were to be. Throughout the 19th century water was beginning to be understood, and defined, by its biophysical composition with definitions for potable water became standardized and scientifically defined (Goubert, 1986; Hamlin, 2000). The scientific methodologies of analysis and standardized definitions of ‘clean’ water published in the professional journals of Europe were read by government officers in Batavia, and subsequently the previous conception of the city’s many waters, with a variety of geographically specific qualities each with its own particular use became suddenly unhygienic.3 Suddenly, the city’s groundwater sources - although previously in some places considered holy, and providing clear, odourless water – were reassessed according to new methods of evaluation. The editors of ‘Annuaire des eaux de la France’ stated that ‘good drinking-water should never have more than 0.5 gram of solids per litre’ (cited in Moens, 1873), while the military doctor leading the study of the quality of Batavia’s water supply provides a more detailed list of requirements for good drinking water properties from Germany (Dr. E.Reichardt, Grundlagen zur Beurth.des Trinkwassers, listed in Moens, 1873):

- for 1,000,000 parts water, 10-50 parts solids
- for 100,000 parts water, 18 parts lime
- for 100,000 parts water, 0.4 parts nitric acid
- for 100,000 parts water, 3 – 5 parts organic matter
- for 100,000 parts water, 0.2 – 0.8 parts chlorine
- for 100,000 parts water, 0.2 – 6.3 parts sulphuric acid

Together with the simultaneous ‘discovery’ of relations between water and human health, this led to dramatic changes in the ways in which water was understood, assessed, desired, and used in relation to the human body. It was this new understanding of water, and the articulation of a specific scientifically defined biochemical composition which was then was enrolled within the problematization, and subsequent constitution of a new ‘European’ colonial subject. Just as the Liberal Policy and colonial government in general was defining new relations between native/European, state/society and public/private, the newly discovered ‘nature’ of water articulated new standards for relations between nature/society. Through this shift in the nature/society relationship, it was the colonial rulers who were in need of behaviour change, their traditional practices no longer sufficient in a scientific world where recognition of the unseen microscopic threats in water became a marker of civilization.

The scientific understanding of water quality compounded problems of government in how to organize society and maintain legitimacy of rule. For, given both the new understanding of the relations

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3 Moens (1873) references the drinking-water quality requirements used in Vienna, and published by the Dutch commission for research on drinking-water.
between water and health, and the need to constitute a distinctly European body (both individual and social) and concretize racial superiority of Europeans, the current water supply practices in the city of Batavia, particularly amongst those who were ostensibly European, became highly problematic. In the 19th century, the residents recognized legally as European were problematized as unhygienic, and unscientific in their perception, treatment, and use of water supplies (Indische magazine, 1875; van Dijk, 1873). Using traditional sensory assessments to determine water quality and selecting sources based on ‘irrational’ localized preferences, residents procured, treated, and consumed water without reference to science or what was now conceived of as proper hygiene. As documented by Moens (1873), in the city of 1870s there were a variety of mechanical systems and chemicals for water treatment, the ‘lekstonen’ and ‘martevanen’ – simple lime-sandstone filter and large water pots for settling of particulate matter in river water, but none filtered for unseen contaminants and did more for colour, clarity, and taste.

Placing the water supply practices and hygiene habits of the European residents under a series of microscopes, the government initiated a decade of research into the water supply sources used in Batavia (see Bleekrode, 1865; Maier, 1854, 1868; Scharlee, 1861; van Dijk, 1873). Documenting the development of different water sources in the city from its founding (1600) to the present (1870), the subsequent report described the historical and current practices of households, the variety of filtration and treatment systems employed, the various types of water providers available (vendors, bottled water, water factory), and recent advancements in urban water supply in other colonies and Europe. Along with annexes containing the results of laboratory analyses of water quality from different sources in Batavia - accompanied by artistic renditions of the unseen microbes – the current water supply practices of European residents were proved unhygienic and the cultural superiority of the city’s European residents to be sorely lacking. As was remarked by the report’s author, “in general, care for drinking water is often remarkably neglected by otherwise very civilized people and the inherent danger is very little respected” (Moens, 1873:416). Issuing detailed, and culturally specific, instructions for residents of the city to take more care in their selection of drinking water, the report stressed that sensory perceptions of water quality were no longer valid:

“colour, odour and taste of water are no longer accurate reflections of whether or not it is good…even if water is very clear and free of malodour and taste, it can still contain hazardous elements” (Moens, 1873:292)
Crucially, in order to juxtapose the ‘ignorant’ and ‘traditional’ habits of the native populations around water supply with the supposedly superior and scientifically informed selection and consumption of water by the culturally advanced European colonial population, the government needed first to physically transform the ‘European’ water practices. In the late 19th century, colonialism was not (yet) a secure bourgeois project, and so while the colonial government was encouraging the importation of middle-class sensibilities to the colonies, it also set about to cultivate this identity within the existing colonial population (see Stoler, 1995). Other colonial scholars have documented how in the late 19th century Netherlands Indies racial membership was partly sustained through the keeping of a ‘European household’, inciting an obsession with moral, sexual, and racial affronts to European identity in colonial houses that included precautions with food, servants, language, hygiene, and a generalized danger of having ‘too much intimacy’ with things Javanese (Stoler, 1992, 1995).

What is sometimes overlooked or under-emphasized by scholars focusing on the discursive construction of ‘European’ race is the fact that the distinction of new, modern, ‘European’ domestic practices, and cultural competencies also required material practices and particular physical or spatial arrangements (see in particular Stoler, 1995). In order to replace the use of ‘native waters’ and get rid of ‘native traditions’ in bathing and washing – these ‘European’ residents needed to be able to access
alternatives. And, not just any alternative, but a scientifically monitored, standardized, and centrally controlled, artesian urban water supply that ensured particular populations would be selecting water based on scientifically defined properties. Following this, by restricting access to the hygienic and scientific artesian water supply to ‘Europeans’ by proxy of its spatial location, this meant that only certain kinds of residents were able to modernize their habits of water use. In particular, the system targeted the middle class and bureaucratic elite who lived along the narrow strip of artesian water supply development, as documented in Chapter Three. The government’s need to draw new boundaries around race and citizenship was thus both discursive (as emphasized by Stoler, 1995), but also inherently material and spatial. The city’s first water supply system made this possible, instituting new relations between particular bodies and specific kinds of waters and enabling new material practices and discursive categories that were not being circulated by the already existing water supply technologies.

Illustration 5.2 Artesian water hydrant, 1880

Adorned with the Dutch royal insignia, the lion of Holland, the architecture and imagery of the water supply infrastructure reflects the citizenship it was meant to convey to the racially mixed ‘European’ population in Batavia. The instructions as to how a ‘proper’ European citizen should live and govern themselves were class specific and racially coded (Stoler, 1995), and the very design of the points of distribution themselves emphasize for whom the water was intended, and what kinds of relations between residents and the Dutch state it was intended to reinforce.
Illustration 5.3 Artesian well and reservoir in the Koningsplein, 1880

Source: Afdeeling Waterstaat (1880)

Illustration 5.4 Artesian well and reservoir at Meester Cornelius, 1880

Source: Afdeeling Waterstaat (1880)
Once established, and working to secure European identity, this physical intervention in the city’s infrastructure operated through its material properties to deepen the differences between European and native (or, increasingly, ‘modern’ and ‘primitive) urban residents. Physically, the new water supply system enabled a specific set of material practices related to indoor hygiene to increasingly be coded for a racially pure European identity. In turn, discursively, the prevalent water-related practices - bathing in canals, drawing drinking water from rivers - could be, and were, denoted as ‘degenerate’ and unhygienic. Colonial scientists noted that, “among the native population it is very common to drink murky water, not or not adequately filtered” (Moens, 1873:402), practices that had until recently also characterized ‘European’ households. In this way, the identity of Europeans as modern and developed was secured through comparison with the native population, who remained ‘in the past’ with their traditional practices.

Of course, as noted by scholars of governmentality, government projects are not totalizing, and often resisted. In the case of the artesian water supply system this resistance involved the colonial rulers themselves. In the Netherlands East Indies the project of ‘changing tastes’ was not accomplished overnight, and is also noted in the West, sometimes not at all (see Parr, 2002). Up until the around the 20th century, at which time there was a growing population of the new middle class European colonizers bringing with them the taste and habits of the metropole, water supply continued to be selected based on a variety of factors, principally geographical convenience. Reflected in the very gradual growth of the artesian water supply system over the 1870s-1890s, there was a low demand for household connections. As was later noted by colonial engineers, this was blamed on the habits of the ‘Old Indies hands’, the racially mixed Indische colonials who were content with their ‘native practices’, and had not yet developed tastes for the 'normal' attributes of civilized domestic life (Veth, 1900). As commented by one colonial engineer,

“Somebody who has lived in Indië for years, or who was born there, lives in a house with a well in the inner-courtyard, of which there are no complaints [over water quality]. From this well the 'mandibak' (manual-shower-basin) is filled and water is taken for further household life…The bathroom and toilet are, as with many older homes, somewhat backward in appearance and equipment, compared to current living standards…” (Koster, 1919:5).

As documented in Chapter Three, it was only from 1910-1920 that the demand for piped water supply and household connections increased, and even then this was partly accomplished through making mandatory household connections, since, “there always remains a part of the population that has a connection in the home but doesn’t use the water. Only by opposing the use of normal water wells is it possible to improve the users’ percentage.” (Maronier, 1929:236).

In conclusion, looking at the development of the city’s first urban water supply system as a material artefact of governmentality, it is apparent that perceptions of water quality and subsequent hygiene practices (or lack thereof) were problematic for far more than public health. Consumption of
contaminated water might have jeopardized health and the economic productivity of the colony, but more importantly, it upset the established order by undermining the assumptions that Europeans could provide the model and vanguard of progress (see also Cote, 2003). With the legitimacy of colonial government premised upon racial superiority, the ‘traditional’ practices and uses of water by ‘European’ residents did not support the reorganization of colonial society according to the new hierarchy of race. As with the problem of a heterogeneous population, who blurred the boundaries between racial categories and integrated ‘native traditions’, so too the use of heterogeneous water supplies and traditional technologies of treatment and supply by the citizens supposed to be classified as ‘European’ threatened colonial government by undermining the morality and civilized status of the ‘European’.

Seeking to classify the differently modern races within a continuum of (racialized) development and modernization, there were, yet, no clear distinctions between the water supply preferences and technologies of these different populations. As documented by Moens, the Europeans also used ‘native practices’, demonstrated very ‘local tastes’ for water, and, in general, although civilized, did not pay enough attention to the quality of their water supplies (Moens, 1873).

Therefore, despite ostensible concern with public health, it was also the need for racial purity that led to the particular selection and operation of the artesian supply system. In and of themselves, the hygienic, or technical, reasons for the selection of an artesian water supply are inconclusive, especially considering the financing of the entire system by the Dutch government, and the distribution of the water for free. Colonial documents themselves record that the selection of artesian water supply as the technology with which to complement the development of a modern colonial capital was not an initially obvious choice. Previous experiences with artesian water in the Netherlands Indies had not produced good results: in 1840 the first artesian well was drilled at Fort Prins Frederik but good water was not obtained, and the second well drilled in 1854 on the Island Onrust gave ‘equally bad results’ (Moens, 1873). When artesian water was selected as the best of three options investigated by the government commission its success was not at all certain, “No-one can say in advance whether or not that water will be good drinking-water….whether or not the soon to be drilled artesian wells will deliver drinkable-water remains to be seen.” (Moens, 1873:319). Research conducted in the 1860s on the various qualities of Batavia’s waters identified rain water as having the best quality according to scientific definition. It would also seem that the promotion of various methods of treatment currently in use by households would have been more cost-effective for the government, while still ensuring their ostensible aim of improving public health. The colonial official conducting the first scientific research on Batavia’s water supplies concluded that although “good drinking water is not abundant in Batavia, but by making some effort you can obtain it” (Moens, 1873:320), and the dissemination of better practices for the treatment of the various existing water supplies, and subsidization of different treatment technologies, could have served the same goals.
Therefore, while the later colonial chronologies reconstruct the development of Batavia’s urban water supply from its heterogeneous and unhygienic origins through to more centralized artesian water supply system, to the subsequent fully centralized spring water network as a ‘natural’ process of modernization informed by science (Maronier, 1929), the ‘progress’ of Batavia’s water supply was the product of a particular dialogue between governmentality and materiality. In other words, the construction of the artesian water supply system was also a product of the need to materialize, and spatialize particular relations of rule. This is illustrated in the ways in which the artesian water supply system was subsequently enrolled as both a physical and discursive technology through which to address problems of racial superiority. Specifically, the artesian water supply system produced a particular nature of urban water, facilitated the formation of particular urban spaces, and contributed to the visible constitution of a recognizably ‘European’ subject in opposition to the traditional native. Thus, it served dual purposes – purifying the European body politic as it purified urban water supply.

5.3 Hydraulic Modernity, 1901-1945

The colonial city’s second urban water supply network introduced a new era of infrastructure, with new technologies of production, treatment, and distribution. The dramatic shift in urban water supply coincided, not coincidentally, with a new era in colonial governmentality. Principally, it was the Ethical Policy that precipitated the need to circulate a new nature of urban water; introduced in 1901, this policy and the governmentality it entailed replaced the previous colonial hierarchy premised upon racial classification with a hierarchy of modernization and development. “Modernity was now the tool used to create a vision of the world in which white skinned dominance over natives was seen as ‘natural” (Gouda, 1995:22), and the new rationality for colonial rule was supported through the technological sophistication of the west (see Cote, 2000; Moons, 2005; Mrazek, 2002). Establishing the western project of modernization as central to colonial governmentality, the city needed to modernize its water supply, making it more amenable to the new mandate and rationality of colonial government. Specifically, it had to be able to facilitate the development of the native population, while securing the superiority of colonial rulers.

In 1901, two decades prior to the actual construction of the spring water network, the Ethical Policy established the development of the native population as a mandate for colonial government (van Kol, 1901). Responding to the critics in Holland and the Indies who argued that colonial policies had worsened the condition of the native population, the Dutch government set about vast administrative apparatus to ‘raise up’ the children of the colonial state (Cobban, 1974, 1993; Cote, 2002, 2003). With the new purpose and means of government lying within the development of the native population, there
were new problems with the city’s water supply. First, if the water supply was to be extended to include the vastly more populous native residents through programs of ‘kampong improvement’, then there was the problem of producing a large enough volume of water, of the taste, colour, and odour that was acceptable to ‘less scientific’ native population who were “not yet convinced of the hygienic importance of good drinking water” (Grijns, cited in van Leeuwen, 1917:92). Not yet selecting water according to its microscopic composition, the ‘blood warm’, and sulphur smelling artesian water was “not to the taste” of native populations, who would not drink, or pay for, such water (Ir.Drost and Dr.Grijns, cited in van Leeuwen, 1917). European households cooled and aerated the water prior to use, but this entailed necessary physical space, storage containers, infrastructure, and expense (van Leeuwen, 1917). Discussions about the need to provide water to urban kampongs began around 1908, with the first public hydrants built ostensibly according to the mandate from 1909-1912 (Eggink, 1930). Second, parallel to the kind of water needed for programs of native improvement, there was the problem of providing water - of a particular biophysical composition, under particular pressure – to support the accelerated modernization of the European population. These discussions began already in 1906, one year after the formation of Municipal Government in Batavia (van Breen, 1916; van Leeuwen, 1917; van Raay, 1915a; van Raay, 1915b).

However, although these two objectives of colonial government after 1901 were articulated within the same project of urban water supply, they were undeniably contradictory, embodying as they did the ‘diverse finalities’ of an inherently contradictory colonial government (see Li, 2007). While the colonial government wanted to modernize the native population, it still needed to maintain difference and secure the legitimacy of colonial occupation (Cote, 2003). Subsequently, this anxiety of the colonial state over being able to affirm the respective positions of the colonial and the colonized, and sustain taxonomy of colonial order within the project of development and modernization, meant that the material technologies of supply and distribution also had to be able to maintain difference between the ‘differently modernized’ water users. Through documenting how the city’s second urban water supply system was first selected in relation to these contradictory needs, and then operationalized to circulate these contradictory relations of rule, the city’s spring water supply network is identified as a material artefact of colonial governmentality.

Prior to its actual operation, the very selection of the spring water supply system was already contentious, reflecting the fact that it itself embodied different ideas on ‘how best to govern’. The newly established Municipal government of Batavia, the central government, and various departments within the central government all had different opinions on how to improve the city’s water supply, at what cost, and for which users. A reading of the colonial documents recording the development of the spring water supply system reveals how the conflict over the purpose and means of government were manifest within debates over the selection of this new system of urban water supply. Debates on how to improve the city’s water supply began already in early 20th century, two decades prior to its actual construction.
and the extensive set of debates are recorded in a special edition of the water engineering journal of the Netherlands Indies (Waterstaats Ingenieur, 1917). Although the official decision to go ahead with the spring water network had already been taken in 1914, the debate continued and was eventually summarized in a report to the Municipal Council (Van Breen, 1916). The report, published by the Gemeente, details the technical plans for the network design, geological research, public health research and a variety of creative cost-benefit analyses, giving weight to the comment of one colonial engineer that it was not “…without a fight, sometimes even quite a heavy fight, that the current spring water network came to existence.” (Maronier, 1929:230). In brief, the heated debates over how to improve urban water supply for Batavia centered on two options, each with their ardent group of promoters. One group of advocates argued that improvements to the existing system of artesian water supply could correct problems of pressure and quantity, was still hygienically suitable, would be less costly, and thus enable construction of a more inclusive distribution network (Koster, 1917; Weijts, 1917; van Leeuwen, 1917). A second group of advocates, led by the secretary of the Dutch Association for Water Network Interests (Veeringen van Waterleidingbelangen in Nederland), promoted the need for a completely new system of spring water supply, which they acknowledged was more costly, but argued was ultimately highly superior in quality and quantity4.

In the end, despite their belief that science was on their side, and that “Al was de overdrijving nog zo fel; de waarheid achterhaalt haar wel!” (Although the exaggeration was so fierce; the truth perseveres!) (Koster, 1917:539), the parties arguing in favour of the existing artesian water supply were defeated. Despite the anxiety of the economically conservative Municipal Council, and predictions as to how the construction of a costly new water supply system would constrain a more widespread distribution (see debates recorded in van Leeuwen, 1917), the inevitability of the western, modernist project seemed to have pushed this technology forward “like a wall of water pressure”, in the words of one colonial engineer who was describing the momentum around spring water system (Sitsen, 1922:293). However, what the transcript of the debate reveals is that the stated certainties around the superior ‘hygienic advantages’ of the spring water supply – ostensibly the most important reason for constructing an expensive new supply – were in fact just as uncertain as the ‘successes’ of the artesian water supply were in 1870. Analyses done on the artesian water quality showed the sources to be “bacteriologically good’ (Grijns, 1916, cited by van Leeuwen, 1917:86; see also Eijken and Jansen, 1918; Houink, 1914); any contamination of the water supply was occurring in the distribution network, a problem which could also occur with spring water sources. In addition, as pointed out by the supporters of the artesian water system,

4 The secretary of the Dutch Association for Water Network Interests, and design consultant for the spring water supply system in Batavia, Ir.D.Drost, was often purposefully mis-named as ‘Engineer Thirst’ (dorst=thirst) by his opponents (van Leeuwen, 1917; van Breen, 1916).
“the [artesian] water is hygienically completely useable, the dangers to the consumers have not been detected in 40 years and, in any case, no-one knows how to define them” (Koster, 1917:540), and, “If the conclusion [about the unhygienic nature of the artesian water] contained a grain of probability, then every source here in Indië should give suspicious water” (van Leeuwen, 1917:86).

As already intuited by advocates for artesian water, the selection of the spring water supply system was not so much based on technical or hygienic requirements, but because of the need for new nature of water and new kind of circulation to support relations of rule. Supporters of the artesian water supply system argued that campaigns on behalf of a new spring water system were in fact political, not technical:

“See, all of that would have been very useful for an election campaign and perhaps such expressions can impress ‘Jan Publiek’ [Joe Public], however when used in front of members of an association of professional engineers, it is not strange that these remarks [claims regarding technical superiority of spring water design] don’t just joyously slip by.” (Koster,1917:539).

As proved by colonial scientists, the underlying dissatisfaction with the artesian water supply system was not based upon its bacteriological deficiencies, and its inability to meet standards of public health. Rather, the deficiencies of artesian water system was related to the ways in which it constrained intended relations of rule, and prevented the new – albeit – contradictory purposes of colonial government

Examining the ways in which the spring water supply system was used to address other problematics of colonial government, and advocated on such grounds, it is clear that the importance of achieving the ‘western technological ideal’ for urban water supply in Batavia went far beyond its purported significance for ‘public health’. As stated earlier, there were two –contradictory -requirements for the city’s new technology of urban water supply: it had to be able to facilitate the ‘development’ of the native population, while securing the superiority of colonial rulers.

First, central to the rationalization of the spring water supply system was the ‘ethical mandate’ for native development, and the ways in which the new water supply system could be enrolled in technologies of improvement. With the project of sanitizing European households was now complete, the task of the colonial government (mandated by its Ethical policy) turned towards a ‘cleaning of the contaminated kampongs’ and educating the native population of “the importance of the knowledge of cleanliness of the body, of clothes, of property and of home” (Tillema, 1913:82) – a project that required a new technology of water supply in order to reengineer the native populations into more modern, productive, hygienic urban citizens. Towards this project, previous plans for the spring water network designed to supply water only to European areas of the city were revised, and projected costs were increased from 8.5 million guilders to 10 million guilders to facilitate provision of water to
kampong residents (van Breen, 1916). Justifying the enormous expense of the spring water network as a project ‘necessary for the native population’, public health professionals argued that “the first requirement for improving kampong conditions is 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).

Becoming a channel for government intervention into native society, the supply of water to native areas of the city introduced new relations between the state and the native population, while promoting new relations between the ‘modern body’ and water. As part of the government’s project targeting of the native population for reform, preparing them for citizenship in a progressive world demanded a “radical improvement in the habits of the people” (Brandenburg, 1924:150) and this development was to be facilitated by new flows of urban water.

Specifically, it was new interactions between the native body and water - the materialization of modernized, hygienic identities - and new demarcations of how the body inhabits public/private urban spaces that were implicit in the kampong water supply programs of the early 20th century (Cote, 2002; Tillema, 1913). Through the provision of public bathing and washing facilities in the kampons 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 (formerly all done in the canals), 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). The utility of bathing was not considered recreation, and what was previously combined in the canal was to be separated by providing bathing facilities and modern swimming pools – these enclosed, ‘modernized’ concrete spaces demarcating what were formerly ‘public’ and undifferentiated and spatially unregulated activities, and removing the ‘spectacle’ of native life marring the image of the capital city which was deemed European, “except for the native freely bathing in canals” (van der Kop, 1926:148).
**Illustration 5.5** Washing, Bathing, and Recreating in the canal

Source: Vervoort (1926)

**Illustration 5.6** European swimming pool, Batavia

Source: Gemeente Batavia (1937) “One of the 5 European swimming pools by night”.
Colonial officials argued that if these more ‘rational’ and efficient approaches to the functions of life were 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”, counselled another colonial custodian (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 literally embodied 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 (see van Doorne, 1994).

However, despite the desire to increase the use of a hygienic water supply in the kampongs, the contradictions in the colonial government - its need to modernize native population while ensuring their lower order within colonial hierarchy – produced ambivalent results in achieving widespread use of spring water by native residents and reflected the generally half-hearted engagement of the colonial government with modernizing native society (see Kusno, 2000; Mrazek, 2002). This is, I argue, because the provision of ‘modern’ urban water supply to the native population under the auspices of ethical development still needed to affirm the colonial taxonomy. In turn, this led to this circulation through different distribution technologies, rather than the pursuit of a universal, single standard water supply. Consequentially, native households were provided with less water, at lower pressure, via communal standpipes rather than house connections. As illustrated in Chapter Three, this held important implications for cost, and accessibility for different populations, and led to decreased use of piped water in kampongs.

These technical choices regarding different distribution systems for Europeans vs. natives, were rationalized by the colonial government in terms of economic efficiency, but in fact were also fully rooted within the colonial taxonomy of development and modernization. As clearly and repeatedly expressed by colonial engineers, communal standpipes and lower per capita consumption were ‘appropriate’ for the less developed native population (see Brandenburg, 1924; Maronier, 1929). Significantly, the program to increase the number of public hydrants in the kampongs did so only after the first years of the spring water network operation. In other words, it was only once the spring water network guaranteed the circulation of a pressurized supply directly into European households that the hydrants no longer needed in European neighbourhoods were transferred for use by the native population – the technology outgrown by the European households now passed down to natives (see records in Eggink, 1930).

Therefore, until native residents grew out of their reliance upon local water supplies, making it profitable for the municipal water supply company to distribute through household connection, and until
residents improved their socio-economic status through a more ‘rational’ approach to life so that they could afford the costs of pipe water, they were supplied with water through technologies deemed appropriate to their level of development. Communal hydrants and water vendors were identified as a transitional technology, one which would be gradually eliminated in the trajectory of native modernization.

“The delivery of option b [water through hydrants and vendors] is only intended as an emergency measure which should slowly disappear.” (Eggink, 1930:64), and provision of water supply through hydrants was “only meant as temporary, the intention was to gradually stimulate people to use water from house connections.” (Maronier, 1929:236).

The emphasis in the above statements seems to have been on the word gradual. For, by ensuring a long delay in the more complete adoption of piped water supply within urban kampongs conveniently maintained the existing colonial hierarchy that would continue to posit native residents as less developed. Tellingly, an increase in demand for piped water supply by the native population was not predicted to occur for at least another 30-40 years, thus indicating the rate of their development into modern citizens like the Europeans, and ensuring their need for colonial guidance for many years yet to come (see Brandenburg, 1924). This prediction was virtually ensured through the technology of distribution installed. Providing water at a higher cost to native residents effectively ensured the continued use of multiple water supplies by native households, and, as documented in Chapter Three, lowered their overall demand on the network. Therefore, although the project of the colonial government was to ‘raise up’ modern citizens – both European and native – this was to occur according to different rates of development, as is evident from the different physical technologies of urban water supply distribution.

The government’s parallel project of reinforcing the modernity of European population provided the second, although less widely advocated, justification for the spring water network. Simply put, to secure colonial authority, European residents needed to be securely modern. As repeated throughout the decade of debates, it was doubted if the existing artesian water supply – even with improvements for pressure – could physically support a ‘modern European lifestyle’ or promote the development of Batavia into modern western city (see Drost, 1917, 1919; van Breen, 1916). Those in favour of the spring water system highlighted how the artesian water supply was beginning to constrain, rather than facilitate the ongoing transformation of Batavia into a modern European city.

First, the artesian water no longer met the aesthetic standards of a ‘modern European lifestyle’. Interestingly, despite the purported development of Europeans out of sensory selection of waters (instead using microscopes etc), a large objection with artesian water was related to its smell, colour, taste, and temperature.
“People started to feel objections because the artesian water smelled of sulphur-hydrogen…Furthermore, people had an apathy for the yellow color and it was also still warm as blood (39°C), which with drinking or bathing did not feel refreshing and it was also hard to wash off soap.” (Maronier, 1929:230).

Clearly, artesian water was unappealing to those residents who had transformed their domestic habits according to middle class European sensibilities, where personal hygiene had become a reflection of the moral standards and class affiliation (Goubert, 1986; Kaika and Swyngedouw, 2000). As these new meanings were attached to the private space of the bathroom, only the spring water network would enable a specific set of material practices related to indoor hygiene that were coded as signifiers of ‘modern’ (European) identity. As advertised by all of the ‘modern’ hotels in Batavia, this status was correlated with the provision of ‘flowing water within the rooms’ (Gemeente Batavia, 1927), and artesian water was not used for bathing, because “after an exhausting warm day one has longing for a bath in cool, clear water, which imparts new vigour to the tired out body” (Eijken and Jansen, 1918:41).

Illustration 5.7 Batavia hotel advertising ‘modern rooms with running water’, 1927

Source: Gemeente Batavia (1927)

Second, there were specific technical requirements that needed to support the domestic modernization of European households. Specifically, as European residents followed the trajectory of western urbanization, relying on piped water for all of their needs instead of combining two or more different sources, these domestic habits required the delivery of greater volumes of water, at increased pressure. The European residents began to build new bungalows equipped with ‘every kind of modern convenience’ – including “indoor bathrooms from which the fresh water from the tap may be showered over the body” (Gemeente Batavia, 1937:70), and the provision of piped water through in-home connections now a mandatory standard to “impart households with a more European character” (ibid).

The water pressure required to fulfill this requirement was difficult to achieve with the existing artesian system, with some of the city’s residents clearly disgruntled with this inadequacy. One letter to the editor in 1917 laments,

“due to a very low pressure on the waterworks, at most places no more than 1 or 2 meters above street level, a household tap would only yield some water if the non-paying-consumers (‘gratis-consumenten’) would be so kind to leave the public hydrants alone for a while.”(Weijs, 1917:43)

Illustration 5.8 Advertisement for Eau de Cologne and Toiletzeepen, 1927

Source: Gemeente Batavia (1927)
More alarmingly, lower pressure in the artesian water network meant that “in 1922 the [artesian] water had to be distributed over the supply area by means of daily regulation of the closure-valves, and sometimes one only had water in the house pipes after 9 o’clock at night after having suffered a whole day of water shortage.” (Maronier, 1929:245).

Following the construction of the spring water network according to these (implicit) justifications, the spring water supply system enabled new spatial relations between the ‘differently modern populations’ in ways that facilitated intended relations of rule. Guaranteeing the delivery of a reliable, continuous volume of water directly into the home, iron pipes replaced the traditional nodes in the network (mobile water vendors), and made physically possible the increased segregation and isolation of European residents. Along with other new domestic technologies like electric appliances (see Mrazek, 2002), piped water helped to render native society more distant from both public and private European urban spaces. Replaced with iron pipes, native vendors were subsequently banned from physically traversing certain European spaces of the city (Karsten, 1958). Allowing European households to become increasingly self-contained, the spring water network facilitated the increasing isolation of European colonial households, and the withdrawal of the European colonial community into an increasingly racist white community (Gouda, 1995; van Doorne, 1983). As documented by special colonial commission investigating race relations in the colony, over the course of the 20th century there was less social integration with Europeans becoming more exclusive in attitude and lifestyle (Gemeenteraad Batavia, 1941).

In conclusion, the spring water network was the material artefact of a new colonial governmentality. The artesian water supply system was no longer conducive to relations of rule within a new system of colonial authority. With the western project of modernization now central to colonial governmentality, the colonial state required both new technologies of supply (increasing water quality, volume and pressure) and distribution (piped networks, household connections) to both support a ‘more modern’ and spatially segregated European population, and carry out its new mandate to ‘lift up’ the native population. These contradictory objectives were embedded within both the discursive rationalization and the physical operation of the urban water supply infrastructure. As material artefacts of colonial governmentality, the network pipes embodied the inherent conflicts of the Dutch colonial ethical policy: the mandate to uplift versus desire to dominate, the project to modernize but yet retain distinctions and hierarchal relations between authority and subject.
Indonesia’s first decades of independence were a period of dramatic change – political, economic, and social. With the nationalization of key industries and appropriation of private assets by the state, an overturning of the colonial racial hierarchy between Indonesians, Eurasian, Chinese and Europeans, and the establishment of an independent, constitutional democracy, the early years of post-independence introduced many radical new relations of rule (Feith and Castles, 1970; Robison, 1986; van der Kroef, 1955). Accompanying the introduction of these new socio-cultural and political economic changes was a new system of urban water supply. Moving the primary source of the city’s water from enclosed and distant springs, to the open surface water flowing through city, large scale water treatment plants Pejompongan I&II introduced both a new quantity and quality of water supply, as the technical developments in Jakarta’s water supply system reflected the seismic shifts in the composition, purpose, and means of government and subsequent relations of rule. The following section documents how both the technology of surface water purification and the accompanying infrastructure works were enrolled within the circulation of new relations of rule within the postcolonial city.

Physically, the replacement of the spring water system with water treatment plants offered the possibility of achieving more equitable urban water supply. With the city’s population continually increasing, and the independent Jakarta inhabited by a much larger number of ‘citizens’ than under the colonial hierarchy, the city’s capacity for urban water supply had to be dramatically increased. Dwarfing the 400 L/s capacity of colonial spring water supply system, the first large scale water purification plant, Pejompongan I, produced 2000 L/s. The second water treatment plant – Pejompongan II produced 1,000 L/s. The achievements of the city’s new water supply system were compared favourably with the colonial spring water supply system, ridiculed as providing “barely enough water for 100,000 residents by the minimum standards of 25 years ago.” (Hanna, 1961:2). Of course, during the colonial era, the construction of an exorbitantly expensive pipeline to deliver a limited quantity of high quality water to a small proportion of urban residents was ‘rational’, and the social implications of this technical choice made sense within the system of colonial authority. This was no longer the case within the postcolonial city, and the democratic ambitions of a new Indonesian government demanded a reversal of colonial priorities — and the shift in technology of urban water supply to surface water treatment. With the water treatment plants using the city’s rivers as a raw water source, a far greater volume of water could be produced at less cost. Better yet, its supply was virtually unlimited and transport of the water in the rivers and canals to the treatment plants was free, unlike the spring water system expensive cast-iron pipeline built from imported materials.

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5 In 1948 Jakarta’s population was 823,000, by 1952 there were already 1.8 million residents (Abeyasekere, 1989).

6 See original cost estimates comparing surface water treatment with spring water supply in Sitsen (1922).
The city’s new water supply infrastructure was also cited as symbolically important for the new nation. Although not reflected within contemporary re-readings of the history of urban infrastructure development in Jakarta, where most emphasis is placed on Jakarta’s monuments rather than public works (see Chifos and Suselo, 2000; Kusno, 2000; Leclerc, 1995; Nas, 1993), the city’s new urban water supply infrastructure was seen to hold great promise for the transformation of colonial Batavia into independent Jakarta – a home for new citizens and the capital of a new nation. Since the revolution, the city had become a symbol of “modernism and unbounded progress, or opportunity and sophistication” for Indonesians (van der Kroef, 1954:156), and as the “greatest public improvement in Djakarta in recent years” (Hanna, 1961:5), the water treatment plant, “one of the largest and most modern in the world” (Abeyasekere, 1989:150), was representative of these new ideals. Surrounded by revolutionary rhetoric, the water treatment plant was seen as the “concretization of revolutionary aspirations” (van der Kroef, 1954: 157) providing ‘modern facilities of a modern city’. Functionally and aesthetically modern, Pejompongan I gave pride and marked the entrance of nation, its capital city, and its citizens into the modern era.

Illustration 5.9 Water Treatment Plant Pejompongan II

In addition to its symbolic and physical importance, the city’s surface water treatment plants also entailed the constitution – or evolution – of new subjectivities for Indonesians, no longer ‘natives’, but citizens. Specifically, there was a new imbrication between identity and water supply infrastructure that entailed a confrontation with colonial rationalities which had racialized urban waters, and ruled out the colonial consumption of surface water both physically and discursively ‘contaminated’ by native users. As revealed in the debates over the selection of a more centralized water supply technology that raged throughout 1901-1920s, colonial authorities refused to even entertain the possibility of surface water purification:

“It is remarkable that no voice – not even one voice has yet been heard in Batavia to argue for a cheaper, quicker, and just as adequate method of supplying drinking water through surface water filtration.” (IBT, 1914:148).

Economically superior - representing one-tenth of the costs of the selected spring water supply system (IBT, 1914), and technically feasible - “the technique of water purification has advanced so much in the last decades, that currently a hygienically reliable and low-cost method for the treatment of river water exists.”(Sitsen, 1922:293), this option was still not palatable for colonial authorities. Forgoing any investigation at all of this option over the two decades of various designs, and consultants, the municipal council instead chose a water supply system requiring imported German manufactured cast-iron pipes. With the fifty three kilometres of pipes alone comprising almost fifty percent of the total budget of the system7, this suggests that surface water remained a culturally and politically unpalatable option for the colonial government. The kali (canals) of the city were decidedly visually native spaces; even with chemical treatment methods they would remain ‘contaminated’ by association with native bodies displaying the spectacle of primitive living (see van der Kop, 1926; Vervoort, 1926) and inappropriate for use as a piped water supply to European neighbourhoods.

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7 The pipe materials conveying the spring water sources to the high reservoir on the outskirts of the city cost 4,023,691 guilders (not including cost of installation); the total cost of the spring water supply system was nine million guilders (see Maronier, 1929).
Illustration 5.10 Fifty three kilometres of colonial cast iron pipes, 1937

Source: Gemeente Batavia (1937)

The spring water network sources in Mount Salak (the white circles in the right quadrant of the photo) were channelled to a high reservoir outside of the city network system through fifty three kilometres of cast iron pipes, illustrated by the white line running from the center to northern tip of the photo.

Illustration 5.11 Spring water network pipes, Buitenzorg to Bogor

Source: Smitt (1922). Cast iron pipes, and the pump station illustrated here, channeled spring water from from Buitenzorg to Batavia.
Rescuing water in the city’s canals and rivers from their place in the pre-modern past as a traditional and contaminated source, Jakarta’s new water treatment plant routed this water – and Indonesian identity – through modern technology to bring them back to the present. River waters were thus rescued from their colonial connotations with contamination by using the very technologies of modernity inaccessible to most Indonesians in the colonial era and circulated through an independent, postcolonial city which had graduated out of dependence upon its colonial parent.

Ironically, the water treatment plant drew its raw water source from the Banjir canal, another icon of colonial engineering capacity which carried flood waters away from European neighbourhoods. Using the flood canal – considered one of the greatest achievements of the colonial Municipal Council (see Abeysaekere, 1989) - as the conduit for delivering raw river water to the water treatment plant was an interesting inversion of infrastructure functions. Colonial rationalities classifying surface water as ‘native’ and ‘contaminated’ built this surface water channel for the disposal of dirty floodwaters. In the colonial city the ‘clean’ (European) water supply was channelled into the city via enclosed, underground pipelines, and dirty water was funnelled out of the city via the Banjir canal. The postcolonial
government drastically reversed the function of this urban infrastructure: rather than serving to control
the flood of surface waters for a minority of urban population (it was the European residential areas of
the city protected against flooding), the installation of large scale water treatment plant used it to
channel water back into the city’s piped network. With the city’s new technology of water supply, this
water was re-routed back into the city to quench thirst of the previously excluded residents.

Thus, after over fifty years of colonial progress and development through artesian and spring
water supply systems, the return to surface water purification technology brought both surface water
sources (and their users) from the racialized role they had been ascribed to in colonial hierarchy into the
postcolonial present. Of course, this modernization of surface water relied completely on its circulation
through modern technologies of treatment and distribution – without them, the waters (and bodies) in
the canals were still ‘undeveloped’, as is evident when the narrative of modernization was seen to be
disrupted by the residents who continued to use water in the canals for bathing, washing, and drinking
(Hanna, 1959).

Despite these promises for radically different relations of rule, the democratization of urban
water supply was never achieved. As documented in Chapter Three, by the end of the first decade of
independence, only twelve to fifteen percent of Jakarta’s residents enjoyed this public service (Fischer,
1959). The contrast between democratic ideals of a more public urban water supply in Jakarta and its
limited realization is explained as a product of the shift in postcolonial governmentality. As the
democratic experiment of the 1950s collapsed, the system of ‘Guided Democracy’ imposed President
Sukarno as both the master planner for the country, and its capital city (Abeyasekere, 1989; Kusno,
2000). With the urban design of central Jakarta part of Sukarno’s larger political plans to enforce his
authoritarian regime (Kusno, 1997), the new technology of urban water supply was enrolled within new
relations of power – and limits to democracy were imposed through technical choices that prioritized the
production of water over its distribution to a wider public living outside of the new, postcolonial center
of ‘new’ Jakarta.

Significantly, the transition of government towards the authoritarian regime of ‘Guided
Democracy’ began in 1957, the year when Pejompongan I actually became operational. The system of
guided democracy was the official legislative system of postcolonial government from 1959-1965
(Abeyskekere, 1989; Berger, 2001). During these years, Sukarno’s imprint upon the urban landscape of
the capital city has been widely acknowledged; given increasing power over both the country, and the
capital city, he shaped a “new cityscape to demonstrate the power and the splendour of the ruling
regime” (Kusno 1997:30). Although the imprint of Guided Democracy on Jakarta’s urban water supply
- and vice versa – is not yet acknowledged, the city’s water supply infrastructure played a crucial role in
creating a new, modern, national urban space intended to ‘brighten the beacon of Jakarta’ and project
the nation onto the world stage. The piped water supply contributed to both the constitution of new
spatial center of power in the city, and contributed to the creation of important new postcolonial symbols within the built environment (Hotel Indonesia, Kebayoran Baru, Asian Games Complex).

First, with the treated water from Pejompongan I (1957) designed for distribution to West and South Jakarta, it facilitated the parallel geo-political shift from the ‘old colonial center’ to the ‘modern, postcolonial center’ in the city’s southwest corner- the area where President Sukarno was constructing a ‘new Jakarta’ free from colonial contamination (Abeyasekere, 1989). Subsequently, water distribution pipes below ground mirrored the newly built above ground highways connecting the modern elements of the ‘new’ city (Kebayoran Baru, Senayan), and channelled the increased flows of water alongside the new flows of international traffic. Circulating water through the Asian Games complex, Indonesia’s first ‘international standard’ hotel (Hotel Indonesia), the high rise development along Jalan Thamrin-Sudirman, and the new upper class satellite city of Kebayoran Baru, the pattern of piped water supply physically contributed to what other scholars have termed the ‘outline of the new center’ of the city (see Leclerc, 1993). Therefore, while the city’s water treatment plants might not have been important for how they could provide for the material needs of the majority of the city’s residents, they did facilitate the demarcation of a new kind of national space, and fulfilled Sukarno’s political goal of serving the spiritual needs of the nation (see Kusno, 1997).
Map 5.1 The outline of the new center: Pejompongan I&II

Source: Created by Ernst-Jan Martijn, based on data from Bakker et al. (2006).

Second, as with the rest of the city’s monuments that were planned to ‘subsume the sober realities of life in Jakarta’ (Kusno, 2000:54), the investments of the first postcolonial government into Jakarta’s urban water supply were intended to remind the nation (and Jakarta’s residents) not of what they currently were, but what they (and the kinds of modern identities) they should aspire to. However, while fulfilling the requirements of Guided Democracy, the contrasts between the current state of the city’s environment, and ‘what it had yet to become’ (and physically provide for) eventually became too much for the residents to bear. By the late 1950s there was an obvious inequality of suffering and poverty; a small minority of well placed politicians, civil servants, military officers, and businessmen were prospering, very often through corruption, but living conditions were getting worse for the majority (Abeyasekere, 1989). In response, the discursive technologies of government were appropriated by residents who resisted relations of rule that provided a lot for some (who were already modern enough to be part of the international city), but nothing for many. The prioritization of the city’s Friendship fountain over basic needs became a point of protest: “what we ask is just a dike; no monuments or football stadiums; or coloured fountains; send us lime and cement” (Taufiq Ismail, cited in Kusno, 1997:36).

Illustration 5.13 Friendship fountain, channelling international ambitions

Source: Photo by Author (2006)
In addition to the resistance to the speeches of protest, government was also frustrated by the very properties of water and its biophysical cycle through the city. Drawing raw water supply from the Banjir canal, the government could not stop the thousands of unserved residents who were also using these open channels: “the bulk of the population is without piped water supply and is dependent upon kampong wells; thousands must still resort for laundry, bath, or toilet, or all simultaneously, to the sluggish canals” (Hanna, 1961:5). As a result, it did not take long before the technical capacity of the water purification plants was compromised. By the late 1960s the first complaints over the quality of piped water supply were recorded, as the treatment methods of Pejompongan I&II no longer adequately purified the increasingly contaminated surface water supply (Argo, 1999; PAM Jaya, 1992b). In the coming decades, the progressively declining quality of the city’s waters (both surface and piped water) continued to be a material effect of government – a direct product of the lack of urban services given to the majority of the urban population. Perversely, this began to place additional technical and financial burdens on the city’s water treatment plants (PAM Jaya, 1992b). Requiring additional treatment technologies for which they were not originally designed, the gradually declining raw water quality reduced the capacity of treatment plants, increased the costs of production, and, as was increasingly the case, encouraged even those modern residents to opt for other water sources. As is discussed in the next section, this made the New Order’s shift to new decentralized technologies of production and distribution, and the further isolation of the elite from the ‘unserved masses’, even more rational.

5.5 Lubricating Capital, 1966-1990

Indonesia’s experiment with Guided Democracy ended violently in 1965, leaving the nation in a state of political, economic, and social chaos. The flow of international aid had been shut off by President Sukarno’s policies, the state budget deficit was three times the state revenues, and inflation rates of 1500 percent (Hill, 1994; Tardiyan, 2000). With poverty and famine on the rise it was time to address the material needs of a nation no longer solely content with the symbolic elevation of the nation under the ‘old order’. Entering into power under the twin promises of economic and social stability, the New Order government began to re-order the country according to its mandate of development and modernization (Bourchier and Hadiz, 2003; Robison, 1986). From 1966-onwards, the development of this ‘new order’ of rule held particular implications for the technical configuration of Jakarta’s water supply system – with new political rationalities dictating technical choices about the urban water supply system. Specifically, the centralized technologies of production and distribution were gradually abandoned, and replaced with decentralized systems of supply that were more complementary to the New Order’s mandate of mobilizing free market capital. Respatializing Jakarta according to the needs of private sector investment required the selection and operation of particular managerial and physical
technologies to direct the flow of urban waters. However, this was not without ‘uncooperative’ results from both flows of water, and those urban residents which frustrated intended relations of rule and produced unexpected fragmentations of their own.

First, prior to any physical construction, was the discursive production of a new nature of water as an economic good, and more ‘rationally minded’ citizens. Setting out a programmatic guide for economic recovery, the New Order government replaced politicians with economists and technocrats who laid out plans for the reorganization of the nation according to the mandate of material progress. Achieving the necessary economic development was deemed to require the restructuring of government administration, and the national psyche according to ‘rational’ systems of thought, behaviour, and operation (MacDougall, 1976). The application of these rationalities also circulated through the operation of Jakarta’s urban water supply system. The reorganization of both administrative and technical systems within Jakarta’s urban water supply reflected the pursuit of a more disciplined, efficient, calculating, realistic, technically minded, and commercial mindset deemed necessary for material progress. The chaotic management of the water supply system under the ‘old order’, which had no record of the number of consumers, nor of actual consumption, used estimated volumes of use upon which to base a flat tariff, and therefore was judged to practically deliver water for free (PAM Jaya, 1992b), represented an ‘irrational public expenditure’ within the New Order government, and along with the elimination of subsidies for urban services like transportation (see MacDougall, 1976), urban water supply was now to be restructured into an economically efficient enterprise.

The reforms required for renovating Jakarta’s water supply system according to its new role within the nationalist project were both political (discursive), and technical (material). First, decentralizing responsibility for Jakarta’s water supply from the central government to the city, the state devolved the operation of the two water treatment plants from the Ministry of Public Works to a municipal water supply company (PAM Jaya, 1992b). Established in 1968, the municipal water supply company (PAM Jaya) took over the management and operation of the production facilities, and, together with the Jakarta government, became fiscally responsible for generating finances necessary for the maintenance and further development of the system that – after all, “only benefited the people of Jakarta” – not the entire nation (PAM Jaya, 1992b:15).

New physical technologies followed the application of this political technology, as the increased control over water flow soon complemented the economic discipline imposed by decentralization. Throughout the 1970s, a program of ‘meterasasi’ re-introduced metering and monitoring devices (not used since the colonial government) to impose new kinds of regulations around water supply (PAM Jaya, 1992b). An actual list of customers was recorded for the first time in 1975, and based upon their actual volume of water use (now possible with the installation of water meters), new tariff structures were based on cost-recovery principles (PAM Jaya, 1992a). In the early 1970s, the average household water tariffs jumped from the previous flat rate of Rp. 100-200/month to Rp. 2000-3000/month (PAM
Jaya 1992b). Also, now able to monitor rates of flow, and hence able to identify irregularities in patterns of consumption, the water use made newly visible to the government resulted in the regularization of illegal connections (PAM Jaya, 1992). In 1974 illegal connections were estimated to account for forty percent of total water supply, indicating the potential of substantial potential profits for PAM Jaya (World Bank, 1974).

These changes in both management and physical distribution reflected the production of yet a new ‘nature’ of water, with the emphasis this time on the economic, rather than biophysical properties of water. Within the New Order, Jakarta’s urban water supply was to be a strictly economical – not symbolic – enterprise. The Government Decree No.3, April 30th 1977 set out PAM Jaya’s ‘dual function’ mandate: to reflect the social aims of the government through the provision of a necessary urban service, but also to contribute to the program of regional economic growth (PAM Jaya, 1992a). Water was now a lubricant for capital, and as is evident in the selection of production, and distribution technologies, the physical operation of Jakarta’s water supply came to reflect this profit maximization ethic.

Jakarta’s urban water supply was subsequently reconfigured to reflect the rationality of the New Order. This entailed particular technical and financial choices. First, little money was reinvested back into the rehabilitation and/or extension of the central distribution network. As PAM Jaya’s mandate to ‘contribute to regional economic growth’ meant that the transfer of profits from the water supply company to the budget of the DKI government was a higher priority than re-investment. Meanwhile, the ideology of public office under the New Order normalized corruption, which diverted revenue stream into personal pockets of politicians and PAM Jaya management (Server, 1996). With the political demands by the population for public services conditioned under the New Order’s authoritarian regime, the investment into the city’s water supply infrastructure was often delayed, or neglected altogether, unless it complimented the priorities of New Order development. As stated by the World Bank in its infrastructure report on Jakarta,

“The water distribution system has deteriorated to the extent that officials contend an increase in pressure would increase leakage rather than supply. Some excess capacity is available at the pumping stations but distribution lines need to be replaced and new lines constructed.” (World Bank, 1974:3).

The technical implications of this neglect meant that the historical emphasis on production over distribution was now a technical necessity. For, as the leaky pipes of a decaying distribution system lowered the water pressure, an increasing percentage of non-revenue water made it necessary for the two water treatment plants to produce more water in order to supply the same size service area. The increase in non-revenue water from both physical and administrative leakage and subsequent low water pressure provide an explanation for PAM Jaya’s claim that the lack of increased coverage has always
been due to inadequate production capacity, an argument still heard today despite the fact that UFW is close to fifty percent (‘Water operator seeks contract review’ Jakarta Post 6 December 2007). Given that the production capacity of Jakarta’s water treatment plants has always outstripped its actual distribution, this statement only makes sense in light of the large volumes of non-revenue water ‘lost’ – both physically and administratively - within the system. The fact that this UFW was the product of the technical, financial, political, and social choices of the New Order reveals the leakage as a rationality of rule – a physical complement to the New Order’s ‘trickle down’ theory of development, which left benefits of the nation’s economic productivity to select beneficiaries (see Heryanto, 1988; Morfit, 1981).
Figure 5.1 Jakarta water supply production versus distribution, 1950-1990


NOTE: Over time, accounting for the increase in Jakarta’s urban population and the expansion to production capacity, the city should have been consistently able to serve between 20-35% more of the population.
Tellingly, when the consistently high percentage of non-revenue water threatened PAM Jaya’s capacity to adequately serve the targeted consumer base, the central government did intervene. Subsidizing the increases in production capacity of the existing water treatment plants Pejompongan I&II, the continuation of service to selective areas of the city was secured through the installation of ‘booster pumps’ – a technology that collected the water from the main pipeline in a reservoir mid-way along the distribution network, before giving it additional pressure through a second ‘boost’ through the remaining length of the distribution network. Using these booster pumps with which to improve water pressure for particular areas of the city, the additional volume of water being produced by Pejompongan I&II was channelled to commercially viable consumers. Two of the city’s earliest booster pumps (installed in 1971 and 1974) were installed to improve water delivery into the northeast industrial and commercial area around the harbour of Tanjung Priok. Meanwhile, the 1977 booster pump ‘Rawasari’ was used to channel seventy percent of the increased capacity of Pejompongan II into the new industrial area of Pulogadung. The warning of the World Bank, that an increase in pressure in the system would increase overall leakage, was therefore not addressed by a system wide rehabilitation, but led to the targeting of select areas of the distribution system.

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8 Before the construction of the Pulogadung WTP to serve the P.E.I., Pejompongan II capacity was increased by an additional 1,000 L/second; 770 L/second of this additional volume of water went to P.E.I. (see figures given in PAM Jaya, 1992 and World Bank, 1974)
Booster pumps ‘Digul’ and ‘Sungai Bambu’ were installed in north east Jakarta in 1971 and 1974 to improve pressure of water delivered from Pejompongan I&II. Digul was installed in Koja Utara, where container terminals and the Pertamina depot are located. Sungai Bambu is in an industrial area, dominated by car manufacturing. Rawasari channelled water from Pejompongan I to the Pulogadung Industrial Estate.
While the selective rehabilitation of the distribution network continued throughout the 1960-70s as stop-gap measures, the more fundamental improvements and additions necessary to the centralized water supply system were neglected. Both the 1972, and then the 1985 Jakarta Urban Water Supply Master Plans laid out plans for the construction of additional large scale water treatment plants, and called for the installation of more distribution pipes (World Bank, 1984). However, these master plans were only ever partially, and unsatisfactorily, implemented (Argo, 1999), and no significant extension of the centralized distribution system was achieved until the 1990s, under the World Bank Jakarta Urban Development loan. Instead, moving towards decentralized systems of both production and distribution allowed the benefits of New Order development to trickle down to its particular beneficiaries – private sector investment and economic and political elites. The only water treatment plants built in this twenty year period limited distribution to the surrounding industrial area, and ‘new towns’ outside of the city’s boundaries, while mini-water treatment plants built within industrial and elite housing estates were physically disconnected from the disintegrating centralized network system. The central government did eventually finance the city’s third large scale water treatment plant, but distribution was limited to a newly developing profitable area – the new industrial concentration in Pulogadung Industrial Estate described in Chapter Three. Meanwhile, the Jakarta government and PAM Jaya began to enrol the participation of private land developers to finance profitable mini water supply systems disconnected from the main network, and the last piece of new urban water supply infrastructure built under New Order (prior to PJSIP) was completely physically disconnected from the city’s centralized distribution network.

With the central government priorities focused on water supply for industrial led economic growth, the local government focused on water supply for residents, while still following the mandate of promoting regional economic activity and demonstrating to the central government the profitable role of urban water supply within the city’s economy (pers.comm., Department of Public Works, 19 February 2005). This also led to particular technical choices for water supply production and distribution, as the local government and PAM Jaya turned to the decentralized mini-water treatment plants described in Chapter Three. Although often over-looked in the history of Jakarta’s water supply since their production capacity only ever represented between five and eight percent of the city’s total water volume, the mini-plants are particularly important as the material artefacts of New Order development. Physically embodying the debates on ‘how best to govern’, this infrastructure was a precursor to the outright privatization of the centralized city network in the 1990s. The construction of these mini-WTPs can only be seen as economically efficient if interpreted according to New Order rationalities, which from the outset articulated them as the beginning of private rather than public supply systems. If viewed as part of the centralized, public supply system, the mini-plants were decidedly economically inefficient; large scale systems produced treated water at about one-sixth the volumetric cost of the mini-plants (pers.comm, PAM Jaya, 14 February 2005). In addition, as they used open surface water
channels for raw water sources, the treatment costs of the mini-plants quickly increased as raw water quality in the city worsened due to the lack of environmental regulation under the New Order (Argo, 1999). Ironically, it was not until the private sector participation in Jakarta’s water supply system that these mini-plants came back into the umbrella of the public, centralized network system: the private sector concessionaires took the economically inefficient mini-plants out of operation, and connected the remainder to the centralized distribution system (pers.comm, Palyja 14 February 2005; Palyja, 2004).

With an ideology of development encouraging economic growth but restraining social change (Morfit, 1981), New Order governmentality made technical decisions not to achieve more widespread distribution of urban water supply. Rationalizing the inequities in access to urban water supply services, the New Order government argued that the public had to be ‘realistic’ in terms of their expectations of government services; the government’s emphasis on economic priorities was not unrolled under promises of ‘plenty’ for citizens of Indonesia, but was a necessary measure in response to the ‘catastrophic legacy of impractical politicians’. Meanwhile, “compelled by practical realities to emphasize practical priorities” (MacDougall, 1976:1169), the emphasis on economic productivity over equity held technical implications for Jakarta’s urban water supply.

However, as in the colonial era, government was incomplete, and an often unevenly successful project. Even under the authoritarian regime of President Suharto which employed military force if needed, there was resistance by both human subjects and non-human objects of government. Both water theft, indicated by the increased rates of unaccounted for water, and the biophysical properties of water frustrated intended relations of rule and partly informed the subsequent technical selection of decentralized production and distribution systems.

First, there was the difficulty of physically controlling the piped network, which although in the 1990s only covered less than forty percent of urban area, was increasingly vulnerable to theft and illegal tapping. Although the persistently high levels of UFW were repeatedly blamed on the lack of network rehabilitation, it was also due to widespread water theft. Some water theft was unofficially condoned by PAM Jaya who pocketed profits of public hydrant operators and illegal sales (Yayasan Dian Desa, 1989; Server, 1996), but much theft was also completely illegal and ‘off the map’ – quite literally as the private sector operators later found, when conducting rehabilitation of the system and discovering entire networks of illegal connections (Jakarta Post 6 October 2007, “Water firm cuts pipes in slum”). Up until the late 1990s multi-lateral development banks under-estimated the degree to which illegal connections contributed to unaccounted for water (see World Bank, 1990b, 1998; JICA, 1997), but the administrative losses were well known to PAM Jaya far earlier. Recalling the operation of the water supply network in the 1980s, a former director of PAM Jaya recalls the ‘Three Kings’ of the public

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9 Of the eight original mini water treatment plants, only Cilandak and Muara Karang are still in operation. Their production capacity was increased to, respectively, 400 L/s and 200 L/s, as Palyja connected these plants to the centralized piped distribution system.
hydrants (‘Raja Hydran Liar’), who, when approached by PAM Jaya employees, “threatened to break their necks, raised mighty hands and displayed bare chests with their torso full of tattoos” (Pandjaitan, 2004:3)\(^{10}\).

Illustrating the role of physical materials in either facilitating or frustrating relations of rule is the pipe material PVC. Low cost and lightweight, this physical material made illegal connections much more easy to install, and maps from PAM Jaya document the explosive growth of secondary and tertiary networks in PVC piping in the 1980s, when much of the network development is recorded with dates ‘undocumented’ Although since ‘regularized’, many of these secondary and tertiary networks were initially illegally constructed (pers.comm., PAM Jaya, 14 February 2005). Therefore, whereas before residents were illegally tapping into the leaks in iron and glass-ductile pipes when and where they became visible throughout the city\(^{11}\), there were suddenly entire tertiary networks illegally installed. In the case of one neighbourhood in central Jakarta, there was in the early 1980s already an entire illegal network serving 350 customers (Pandjaitan, 2004). With the volumes of UFW difficult and time consuming to trace, and with the district meters used to detect water theft also sometimes stolen, both the kinetic properties of water and physical properties of pipes jeopardized its control by government.

**Map 5.3 Illegal tertiary networks**

![Illegal tertiary networks](image)

Source: Created by Ernst-Jan Martijn (2008), based on data from Palyja (2005) and Forkami (2006)


\(^{11}\) PAM Jaya staff recall occasions where low-income populations living illegally under the bridges of flood canals would tap into the water network pipe as it emerged above-ground to cross the bridge; these incidents were always embarrassing to the company, especially when in one instance photos of the ‘free showers’ created by holes in the network pipe were illustrated in the pages of a city newspaper (pers.comm, PAM Jaya, 14 February 2005).
In conclusion, Jakarta’s urban water supply infrastructure developed throughout the 1960-90s represents the politics of the New Order ‘rendered technical’. Embodying the shift from the ‘Old Order’ to the ‘New’, the role of urban water supply within the city shifted from supporting ‘symbolically modern’ areas to facilitating an emerging urban property development market (see Cowherd, 2002) and industrial productivity (see Robison, 1990). This required both new physical and discursive technologies for production, distribution, and control – and led to the physical splintering of the centralized water supply system into smaller, more manageable, more secure, archipelagos of service. However, government was not a smoothly operating, uncontested project; debates between national and provincial government on how best to govern manifest in the mini-WTPs, while the ways in which properties of water itself, and physical materials like PVC frustrated the capture of urban water supply for the elite. Thus, the gradual abandonment of a centralized piped water supply system, and its replacement with decentralized, archipelagos of production and distribution were both the product of New Order governmentality, but also included responses to resistance, and were articulated in relation to the uncooperative nature of water itself.

5.6 Conclusion: Uncooperative natures

This chapter presented the genealogy of Jakarta’s urban water supply infrastructure development in parallel to the chronology constructed in Chapter Three. Through this genealogy, I have identified how the selection of particular water supply technologies (artesian, spring water, water treatment plants, mini-treatment plant) and their built infrastructures, are material artefacts of governmentality. By excavating the role of physical pipes and the properties of water within contradictory and contested government rationalities I have highlighted the ways in which physical technologies of water supply production and distribution were simultaneous political technologies that had been ‘rendered technical’.

In articulating the relationship between materiality and governmentality within Jakarta’s urban water supply, I highlighted three aspects of the materiality of governmentality. First, I showed how particular political rationalities and ideas on how best to govern were productive of particular technologies of urban water supply. In addition, documenting how the circulation of relations of rule through these physical objects (pipes, hydrants, filters) had material effects I identified how governmentality was productive not only of pipes, but also of spaces, socio-natures, and bodies. Second, I focused specifically on the constitution of European Dutch colonial residents to illustrate how subjectivity was constituted in relation to the physical environment and through material practices. The pivotal role of the city’s piped water supply network in constituting modern European colonial subject emphasized the ways in which the constitution of subjects and populations is not only achieved through
the construction of discursive categories, but is also constituted in relationship to material environments. Finally, illustrating how the specific physical technologies of urban water supply (pipes, network connections, treatment technologies, public hydrants) became implicated in the project of producing particular kinds of citizens and urban spaces, I have suggested ways in which material objects affected relations of rule – compromising, frustrating, or facilitating.

The genealogy of urban water supply and urban governance has also shown that the circulation of government rationalities through urban water supply in Jakarta has not been an uncontested project, rolled out over passive objects and subjects. Rather, government is shown to be an incomplete and contested project, influenced by material environments and non-human natures. Indeed, the current ‘chaos’ within Jakarta’s urban water supply attests to ways in which relations of rule have been resisted and/or or frustrated by non-human objects and the ‘trickly/prickly subjects’ noted by Li (2007). This resistance in turn calls attention to the iterative relationship between governmentality and materiality. Socio-natures are both produced by but also constitutive of relations of rule and government rationalities and in Jakarta, resistance and uncooperative natures have been productive of both new political and physical technologies of water supply.

Attending to the resistance and contradictions within government, the next chapter follows more closely the resistance of human subjects, specifically focusing on those who have been persistently excluded from access to the piped water supply network. Identifying the water supply patterns and preferences of the urban poor as forms of resistance to postcolonial relations of rule, I highlight how the households which have been persistently excluded from Jakarta’s formal urban water supply network have also been agents in its fragmentation.
Chapter 6

Preferences of the Poor:
Facilitating fragmentation and frustrating development

6.1 Introduction: Problematic and paradoxical preferences for non-network waters

An apparent paradox underlies attempts to extend piped water connections to low-income households in Jakarta: even where connections are physically available, many low-income households choose to remain disconnected, despite the fact that piped water is the cheapest (per unit volume) means of supply available in the city. This apparent paradox is explored in this chapter. Using an analytical framework of postcolonial governmentality, I highlight the ways in which relations of rule, and resistance to rule, inscribed in physical spaces and ecological processes have conditioned (and are in turn shaped by) the preferences of low-income households. Specifically, I argue that the perpetual splintering of Jakarta’s water supply must be understood as more than the physical product of rationalities of uncontested (post)colonial government, as could be read through the chronology of Jakarta’s water supply development presented in Chapters Three, Four, and Five. For, the fact that the poor may not choose to be connected to the city’s piped water supply network reveals their role as agents within the ongoing fragmentation of the city’s water supply network. Seeing the progressive fragmentation of Jakarta’s centralized water supply network as both the product of government rationalities, and resistance to these rationalities, also problematizes analyses of splintering urbanism (cf Marvin and Graham, 2000) through suggesting the need to account for the ‘splintering from below’, as well as above.

The preferences of the poor for flexible, easy to access, ‘no questions asked’ services from informal providers, and their patterns of use – that combine multiple water sources selected according to sensory assessments of water quality – documented in this chapter are explained as responses to (post)colonial government strategies that have set up socio-economic but also discursive and spatial barriers for the poor to connect. Thus, while low-income households have been historically excluded from access to piped water supply, and the last two decades of urban water supply development have exacerbated the barriers to access by the poor, it is also true that given the subjectivities and spatialities in which the urban poor are situated – they simply may not wish to be connected. This means that the ‘failure to connect’ the urban poor documented in Chapters Three and Four can not only be explained in terms of the oft-discussed political economic disincentives of the public or private sector operators
Rather, I argue in this chapter that successive centuries of (post)colonial policy materializing relations of rule have erected considerable social, political, and financial disincentives for poor households to connect to the city’s piped water network. This is illustrated in particular through a review of the failures and frustrations of current pro-poor water supply projects in Jakarta. For, tellingly, the development interventions being led by MDBs, iNGOs, and bilateral aid agencies trying to increase access of the poor to piped water by subsidizing household connections are being met with mixed responses by the low-income communities they are targeting.

Within this analysis of the materiality of governmentality in Jakarta’s waters, I also continue to explore the contemporary effects of the discursive technology of ‘rendering technical’, as I argue it explains why this population is not yet acknowledged within development discourse, and why they are problematic. As I go on to illustrate, the preference of the poorest households in the city for higher per unit cost supplies of water contradicts current efforts of pro-poor water supply projects in the city, and has introduced gaps within the incomplete, apolitical analyses of international development agencies, thus casting doubt upon the completeness of their diagnoses or the feasibility of their solutions (Li, 2007). However, because they need to be devoid of reference to questions they can not address (Li, 2007) contemporary development programs are complicated, or frustrated, by the relations of power within which these interventions are physically and discursively embedded. As a result, pro-poor water supply projects in the city have been severely compromised.

Of course, challenging the current discourse of the thirsty poor is controversial. Lower-income households not connected pay the highest per unit prices for water, and spend the highest proportions of overall income on household water supply (AcF, 2007; Bakker et al., 2006; Kooy et al., 2007). It is important to clarify that while I argue that relations of rule have produced an urban poor population who are not always thirsty for networked connections, I am not implying that patterns of access to clean water in Jakarta are currently beneficial for the poor. On the contrary, low-income households consume fewer liters per capita per day than better off households, and are disproportionately affected by poor water quality (Agatini et al 2005; Leitmann 1995; McGranahan et al 2001; Simanjuntak et al 2001; Surjadi 2003).

This chapter does not therefore present a romanticized portrayal of the ‘weapons of the weak’ (Scott, 1985): the choice of poor households not to use piped water should not be read as an act of spitefulness towards the state. Rather, acknowledging what is an incontrovertible need for more equitable and sustainable access to clean water, more so given the failures of ongoing pro-poor strategies, this chapter argues that current developmental approaches need to rethink and rework their existing constructs of the thirsty poor. Specifically, the experts designing ostensibly pro-poor water supply programs need to understand how relations of power inform what are economically and politically rational - but perhaps still inequitable and environmentally unsustainable - patterns of water use by low-income households.
Table 6.1 Per unit volume costs of water supply: piped, vended, bottled, and groundwater in Jakarta

<table>
<thead>
<tr>
<th>Water Source—from most to least expensive</th>
<th>Cost Price</th>
<th>Per unit cost price (Rp./m³)</th>
<th>Extra costs*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air isi ulang (bottled water)</td>
<td>Rp.2,500/19L</td>
<td>131,579</td>
<td></td>
</tr>
<tr>
<td>Vended water: water from public hydrant delivered to household by ambulatory vendor</td>
<td>Rp.1,500-2,500/40L</td>
<td>37,500-62,500</td>
<td>Purchase of 60-100L water storage tank</td>
</tr>
<tr>
<td>Public hydrant** (transport of water done by household)</td>
<td>Rp.250-500/20L</td>
<td>12,500-25,000</td>
<td>Purchase of 20L jerry cans to transport water, and 60-100L water storage tank</td>
</tr>
<tr>
<td>Illegal public hydrant (transport of water done by household)</td>
<td>Rp.350/20L</td>
<td>17,500</td>
<td>Purchase of 20L jerry cans to transport water, and 60-60L water storage tank</td>
</tr>
<tr>
<td>Illegal tank***</td>
<td>Rp.4,000/m³</td>
<td>4,000</td>
<td>Purchase of 1000L water storage tank</td>
</tr>
<tr>
<td>House connection to piped network: Poor household (house size between 28.8m²-70m³)</td>
<td>Rp.3,550/m³ for 1-10m³</td>
<td>3,550</td>
<td>Administration/meter rental=Rp.18,110</td>
</tr>
<tr>
<td>House connection to piped network: Very poor household (house size &gt; 28.8m²)</td>
<td>Rp.1,050/m³</td>
<td>1,050</td>
<td>Administration/meter rental=Rp.8,660</td>
</tr>
<tr>
<td>Unofficial pipe connection****</td>
<td>Rp.50,000/month</td>
<td>Flat rate per month</td>
<td></td>
</tr>
<tr>
<td>Spaghetti pipe connection to deep well</td>
<td>Rp.50,000-75,000/month</td>
<td>Flat rate per month</td>
<td></td>
</tr>
</tbody>
</table>

Source: Data derived from field research (2006), and Palyja and TPJ tariff brochures (DKI Jakarta, 2007).

*The only potable water source is from air isi ulang distributors, therefore these costs do not include the costs of treatment (most commonly boiling, but also chlorination or ceramic filtration).

**Water from a public hydrant varies in cost, depending on the operator. Historically implemented as water supply for the poor, hydrants are charged a ‘social tariff’ of Rp.1,050/m³, however the majority are operated for-profit by owners, who sell the majority of the water (and make the majority of their profits) by employing water vendors to transport the water to neighbouring households.

***Whereby an illegal piped connection is transported in large volumes via trucks to a household water storage tank.

****A connection ‘shared’ by a neighbouring household legally connected to the piped water network.

Note: Tariffs for poor and very poor households are the same for both private sector operators; after the first 10m³, tariffs increase for poor households to Rp.4,700/m³; for consumption of more than 20m³/month tariffs for poor households increase to Rp.5,550/m³, while tariffs for very poor households increase to Rp.1,575/m³.
Figure 6.1 Percentage of residents using network water, vended water, shallow groundwater, and bottled water by socio-economic quintile

Source: Survey by author (2005)

Table 6.2 Average L/capita/day consumption, according to socio-economic status

<table>
<thead>
<tr>
<th>Socio-Economic Status of Households</th>
<th>Average water consumption (Liters/person/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>126</td>
</tr>
<tr>
<td>Upper-Middle</td>
<td>62</td>
</tr>
<tr>
<td>Middle</td>
<td>58</td>
</tr>
<tr>
<td>Lower-Middle</td>
<td>60</td>
</tr>
<tr>
<td>Low</td>
<td>43</td>
</tr>
</tbody>
</table>

Source: Data from Kooy et al. (2007)

Note: World Bank (2003a) gives an average consumption of 100 L/capita/day for low income households, 150 L/capita/day for middle income, and 250 L/capita/day for high-income residents in Indonesia.
6.2 Patterns of Water Use and Preferences of the Poor: Rational responses

6.2.1 The thirsty poor?

Unequal 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 (MDGs) established by the international community at the World Summit on Sustainable Development in Johannesburg. Indonesia’s National Action Plan on Clean Water echoes the targets of the MDGs, setting a strategy to halve the total population currently without sustainable access to safe drinking water by 2015 (World Bank, 2006b). Nation-wide, this means that current level of access (seventeen percent) will have to increase to sixty two percent in 2015. The strategy to achieve this development goal is focused primarily on increasing production and distribution of piped water supply, reducing dependency of the population on alternative water sources, and increasing the number of household connections to centralized water supply networks (ibid). In Jakarta, access to the centralized network through individual household connections has been the ‘pro-poor’ strategy since the 1990s – both under public and private management (Evans et al., 2001; World Bank 1998; World Bank, 2006a).

However, while the total number of connections has more than tripled over the last decade, connections for the poor have been limited (see Bakker et al., 2006), targeted aid programs subsidizing connections for poor households are falling dramatically short of projections (see Castalia, 2006), and national progress to achieving the MDG for urban water supply is on the decline. Nationally, coverage of urban water supply is below the level required for Indonesia to be on track to achieve the MDGs for water supply; urban water supply coverage actually regressed from ninety two percent coverage in 1990 to eighty seven percent coverage in 2004 (UN-ESCAP et al., 2007).

Puzzlingly for development experts, the most recent failures of development projects seeking to improve water access by the urban poor seem due in part to what seem as perverse preferences of residents. The intended beneficiaries are not always thirsty for household connections to the piped water network, and continue to use multiple water sources while paying higher per unit cost prices for the waters that they do purchase. I explain these paradoxical preferences as the product of relations of rule inscribed in physical spaces and ecological process. The patterns of water use and preferences of the poor which do not prioritize piped water supply are responses to (post)colonial governmentalities whose relations of rule are inscribed not only in socio-economic relations, but also physical space and material infrastructures. This is explained in the following sections.

However, in acknowledging that relations of power are implicit, and important, within the identification and definition of the ‘poor’ (Escobar, 1995; McClinton, 1992; Mitchell, 1988), the
population under discussion in this section first requires explicit identification. At the beginning of my research I engaged with the population that was most accessible from my position outside of Indonesia, but these poor were also partly imaginary, or at the very least, voiceless. Represented within the development documents, the urban poor were described as universally disadvantaged due to lack of access to piped water supply (ADB, 2001a, 2004c; World Bank, 1993, 2006c; McIntosh, 2003). Admittedly, this conveniently suited the orientation of my initial investigation into the (presumably negative) impacts of water privatization on access for the poor.

The empirical material presented in this chapter is drawn from first-hand data gathered during my visits to low-income neighbourhoods in Jakarta in 2005 and 2006 through a series of site visits, in-depth interviews, and focus group discussions facilitated by an Indonesian NGO, the Urban Poor Consortium¹ (UPC). Focus group discussions and interviews conducted during a series of site visits to residents of communities in East, West, and North Jakarta² revealed individuals who made choices about water supply and had preferences contradicting the dominant discourse of ‘disadvantaged, disconnected’ urban poor population. Notably – households in areas of the city with poor quality groundwater and a lack of alternative low-cost sources were not thirsty for connections to the piped network. As I observed, these residents were buying no-name brand bottled water for drinking (air isi ulang), using vended water for cooking and washing dishes, and combining vended water, brackish groundwater and sometimes surface water for bathing and cleaning with the best quality of water used for the final rinse. Not ignorant of the advantages of better quality, lower-cost water sources, residents in these areas were looking to other water sources, not the centralized piped network. As I fielded inquiries from residents about the technical possibilities of decentralized desalinization units (then being promoted as a new technology for water supply by the Jakarta government), or deep groundwater wells (popular with NGOs and community based organizations) during focus group discussions, I found myself wondering: who, and where, are the “thirsty poor”?

As I discovered, the specific identity of a low-income household matters for how they do or do not articulate thirst. For, while UPC works with a population of very low income urban residents who are below the Indonesian government criteria for poverty³, the urban poor of the UPC are defined by their socio-economic status, but also through their lack of official documentation for both identity, and land ownership. As will be documented below, this exerts a strong direct, and indirect, influence upon preferences for water supply. Of course the legal requirements for connection, explained below, act as barriers, but choices were also impacted by the spaces in the city in which illegal/undocumented

¹ See http://www.upc.org for more information.
² UPC communities visited were in East Jakarta (Cipinang Besar Utara/Prumpung, Pulogadung), West Jakarta (Kampung Rawa), and North Jakarta (Marlina, Tembok Bolong, Penjaringan, Kamal Muara). A map of the location of these areas is presented in Appendix 5.
³ The government’s poverty criteria is based on expenditures rather than income; the national poverty line is identified as those households with expenditures less than Rp.166,696/capita/month; Jakarta poverty line is set at expenditures of Rp. 197,306/capita/month (BPS, 2006).
residents are allowed to live under the radar of authorities, as the spatiality of these areas in relation to network access created additional financial and physical barriers.

6.2.2 Patterns of water use amongst low-income households in Jakarta

Parallel to engaging with residents of low-income areas in UPC communities, I conducted quantitative research within communities defined as poor, through strict socio-economic criteria, by the government of Indonesia. Seeking to document the change (if any) in patterns of water use, and preferences, amongst households who were beneficiaries of pro-poor water supply programs through the Fuel Subsidy Reduction program of the national government, I conducted a household survey in ten sub-districts (Kelurahan)\(^4\). While uncovering the ineffective use of government funds in these programs (see Kooy et al., 2006), the survey also revealed strong correlations between patterns of water use and socio-economic and political identity similar to the results found through discussions with members of UPC communities. While statistically small, the survey of 110 households echoes the findings of numerous other studies and surveys conducted in Jakarta over the decades (discussed below), identifying similar patterns of water use by certain kinds of households. The characteristics of water use and patterns of access by low-income households documented in my own survey, and echoed in other surveys throughout the years, are presented in the figures below.

**Table 6.3** Household expenses for water supply, as a proportion of income

<table>
<thead>
<tr>
<th>Income Range (Rupiah)</th>
<th>Average (%)</th>
<th>Maximum (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 750,000</td>
<td>14</td>
<td>96</td>
</tr>
<tr>
<td>750,000 – 1,500,000</td>
<td>5</td>
<td>23</td>
</tr>
<tr>
<td>1,500,000 – 3,000,000</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>3,000,000 – 6,000,000</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>&gt; 6,000,000</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Survey by author

The above table records what is already known by many international development agencies: lower-income households pay more, proportionate to income, for water supply than better off households. This has been documented extensively throughout Jakarta’s history (see also AcF, 2007; Bakker et al., 2006; Crane, 1994; Kooy et al., 2007; World Bank, 2006a). The figure below explains, in part, why lower-income households are paying more, since higher expenses for water (both overall and

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\(^4\) Information on the water supply projects of the Jakarta government and the criteria through which beneficiaries were selected is documented in Kooy et al. (2006), DKI Jakarta (2001, 2004). The location of the household survey sites is presented in Appendix 5. The household questionnaire used is in Appendix 4.
proportional to income) relate to the types of water sources used. As presented below, vended water represents the greatest expense, which makes sense in reference to Table 6.1.

**Figure 6.2** Expenses on water supply, according to water source accessed

![Figure 6.2](image)

Source: Survey by author (2005)

The figure below affirms the fact that it is lower-income households who are using the most expensive sources of water supply; the poorest households are most heavily reliant upon the most expensive source of water from vendors. As a result, lowest-income households use a combination of water sources, most often shallow groundwater (extracted through a bucket and rope, or electric pump, depending on income status) in combination with vended water. Meanwhile, although all of the low-income households surveyed used a combination of water sources, the households who were most well off represent the largest percentage of piped water supply customers.
Figure 6.3 Type of water source used, according to income

<table>
<thead>
<tr>
<th>Income (million rupiah)</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.75</td>
<td>10</td>
</tr>
<tr>
<td>0.75 - 1.50</td>
<td>20</td>
</tr>
<tr>
<td>1.50 - 3.00</td>
<td>30</td>
</tr>
<tr>
<td>&gt; 3.00</td>
<td>60</td>
</tr>
</tbody>
</table>

Source: Survey by author (2005)

The fact that the poorest households often rely on the highest per unit volume cost sources of water, and as a result pay more in proportion to income than do more well off households has long been recognized by development agencies. What is less well documented is why this pattern occurs. As the figures below illustrate, access to different sources and different per unit volume costs of water is correlated with issues of land tenure, building type, and livelihood occupations (formal/informal). Following the presentation of the data in figures, I explain how this relates to the intersection between identity, urban space, and infrastructure access.
Figure 6.4 Source of water supply, according to regular vs. fluctuating income

Source: Survey by author (2005)

NOTE: Regular income represents engagement in the formal economy, with residents receiving bi-weekly or monthly salaries. Fluctuating income represents engagement in the informal economy, whereby residents self-employed (often as food vendors) generate a daily, and always fluctuating, income.

Figure 6.5 Type of water supply used, according to land tenure and building status

Source: Survey by author (2005)
The correlation between water use and socio-economic status has been extensively documented over the years, providing many pictures of patterns of water use, and preferences, in low-income communities in Jakarta (see AcF, 2007; Bakker et al., 2006; Chifos, 1996; Crane, 1994; Crane et al., 1997; McGranahan et al., 2001; Susantono, 2001; USAID-ESP, 2007a; World Bank, 2006a; Weimer, 2006). Surveys have highlighted in particular the higher per unit cost paid by the poor, sometimes up to twenty times the per unit cost of water from a household connection to the water supply network (see AcF, 2007; Bakker et al., 2006; Crane, 1994), and, as a result, the strategic combination of multiple water sources by the lowest income residents of the city. However, as the following paragraphs go on to explain, these patterns are not only the result of political economic barriers preventing connection to the centralized piped water supply network (see World Bank, 2006a), they also reflect the preferences of low-income households for decentralized providers. Indeed, as other research on the informal water sector in Jakarta documents, low-income households rely on informal water vendors even when they have the option of house connections to the centralized network (Susantono, 2001; Waspola, 2007).

Unfortunately, while extensively documenting the water supply practices of low-income households, little research to date has explored how these practices of the poor are in fact economically and politically rational responses to relations of power that have inscribed differences within physical space, and infused conditions of access to urban water supply infrastructure with identity. Looking primarily at what is most problematic in light of current development strategy promoting pro-poor water supply through individual household connections, I argue that the preference of low-income households for decentralized and/or informal water suppliers need to be understood as economically rational and politically savvy responses to ways in which relations of rule were materialized within access to piped water supply.

### 6.2.3 Rational responses to spatialized access and service quality

The preferences for low-income households for non-networked water supply can first be explained in response to the ways in which (post)colonial policies perpetuate spatial variations in network density. For, given the materialization of citizenship into network pipe diameters and quality of infrastructure documented in Chapter Five, many urban poor households have direct financial incentives to stay disconnected; households living in the marginal spaces of the city incur direct financial costs if relying on piped water, costs which go beyond those addressed through World Bank subsidy programs. Specifically, the material and spatial effects of government continues to affect patterns of water access by the poor by creating extra and ongoing costs of connection to the piped water supply; lack of network coverage and low water pressure in particular are discussed below.
First, with the low-income areas of the city historically the least likely to be covered by the city’s centralized piped water supply network, low income households are typically farther away from any existing tertiary piped network. With the costs of a connection increasing in relation to the distance from the network, thus reflecting increments of cost for piped materials, households farther away from any existing infrastructure face much higher charges. This holds true for both legal and illegal connections, as documented in site visits to UPC communities, a household in North Jakarta reported paying Rp. 2.5 million for an illegal connection, while households in a more heavily networked area in West Jakarta reported paying only Rp.200,000 for their illegal connections. Meanwhile, although the table below presents the standard costs of connection per tariff group, these costs are calculated according to the assumption that households are within five to ten meters from an existing tertiary piped system (Palyja, 2007). Therefore, while households in the lowest tariff group (Kelompok II) are quoted a connection cost of Rp. 474,000, this is the standard from which many of the lowest-income households, as indicated in the map below, will deviate.

Table 6.4 Cost of new household connection to the piped network, according to tariff group

<table>
<thead>
<tr>
<th>Tariff Group</th>
<th>Connection fee</th>
<th>Administration fee</th>
<th>Deposit fee</th>
<th>Total cost of new connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-II</td>
<td>427 000</td>
<td>12 000</td>
<td>35 000</td>
<td>474 000</td>
</tr>
<tr>
<td>IIIa</td>
<td>525 000</td>
<td>12 000</td>
<td>55 000</td>
<td>592 000</td>
</tr>
<tr>
<td>IIIb</td>
<td>525 000</td>
<td>12 000</td>
<td>55 000</td>
<td>592 000</td>
</tr>
<tr>
<td>IVa</td>
<td>525 000</td>
<td>12 000</td>
<td>260 000</td>
<td>797 000</td>
</tr>
</tbody>
</table>

Source: Data from Palyja (2007).

Note: These costs also assume connection to a piped diameter of between 0.5-0.75 inches in diameter; larger diameter pipes (delivering more L/s) are more costly both for initial connection and monthly maintenance and administration costs.
Map 6.1 Density of tertiary pipe network coverage according to socio-economic status, distribution cluster PC-049, East Jakarta

Source: Data from Thames PAM Jaya (2005).
Although these additional infrastructure costs are sometimes borne by development projects, as in the World Bank’s first Urban Sector Development project (World Bank, 1974), the national government’s Fuel Subsidy Reduction Program pro-poor water supply project (Koooy et al., 2006), and the current Output Based Aid program of the World Bank (Castalia, 2006), these initiatives have been limited. If not included as recipients of these sporadic development programs, low-income households face high connection costs that are onerous, even with recently revived policies allowing a 12 month payment plan. Indeed, following the first extended payment initiative in the early 1990s it was noted that “the extended credit scheme for paying the house connection fee is little used” (Crane, 1994:80), and a 2007 survey conducted by Mercy Corps Indonesia in North Jakarta reports the opinions of many residents that connection fees continue to be prohibitive. Households with an average income of Rp.1 million/month are already expending up to thirty percent of this income for existing debt payments for household goods (Koooy et al., 2007), and stated that they simply ‘tidak punya uang’ (don’t have the money) to pay for a connection.

Providing a technocratic solution to this barrier to connection, Palyja and other development actors in Jakarta (USAID-ESP) are initiating alternative and flexible financing schemes to provide low-income households access to affordable credit for household connections. However, while these are positive and needed initiatives when piped water supply is still the lowest per unit volume source in the city, it is important to note that they do not address the underlying inequities cemented within the infrastructure system that cause low-income households to have to pay more in the first place.

In addition to the higher costs of initial connection for households living in areas of low network density, there are also the not insignificant ongoing costs borne as a result of low network pressure. As documented in Chapter Five, the lowest-income areas of the city have historically been a low priority for network rehabilitation and pipe repairs, and subsequently, these areas are most likely to suffer from low pressure and intermittent service. As reported in a 2004 civil court case contesting the poor service of Jakarta’s private sector operators (‘Consumer group battles water giants over poor service’ Jakarta Post 17 June 2004), residents in one North Jakarta community had not been receiving any water from their taps for years as a result of low pressure (but had been billed for it) (pers.comm, Walhi 4 August 2004).

A long standing complaint for water supply customers of many districts in Jakarta, spanning decades before privatization (see Yayasan Dian Desa, 1989), low water pressure entails additional, and ongoing, expenses for households. However, while the requirement of reservoirs to store piped water that only flows during non-peak hours (1am-5am), entails financial costs for
cement tanks and electric pumps, there is also the additional requirement of physical space. This last requirement is not an insignificant issue in high density urban neighbourhoods, where a large percentage of lowest income households live in second story rented rooms (Mercy Corps, 2006). Perversely, but not coincidentally, urban areas with the highest percentage of low-income residents (North Jakarta), are also those areas of the city with the lowest water pressure.

Table 6.5 Percentage of low-income residents according to Municipality, 2004

<table>
<thead>
<tr>
<th>Municipality</th>
<th>Population</th>
<th>Number of Poor* Residents</th>
<th>Percentage of Poor by total population</th>
<th>Number of additional illegal residents (squatters)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Jakarta</td>
<td>1 423 845</td>
<td>116 060</td>
<td>8.18</td>
<td>22 800</td>
</tr>
<tr>
<td>East Jakarta</td>
<td>2 473 200</td>
<td>101 784</td>
<td>4.34</td>
<td>19 208</td>
</tr>
<tr>
<td>Central Jakarta</td>
<td>899 460</td>
<td>68 599</td>
<td>7.76</td>
<td>1 200</td>
</tr>
<tr>
<td>West Jakarta</td>
<td>2 020 030</td>
<td>55 915</td>
<td>2.94</td>
<td>8 585</td>
</tr>
<tr>
<td>South Jakarta</td>
<td>1 885 785</td>
<td>25 504</td>
<td>1.43</td>
<td>12 699</td>
</tr>
</tbody>
</table>

Source: Data from BPS (2004)

* Poor is defined by the Government of Indonesia as residents with expenditures less than Rp. 197,306/capita/month (BPS, 2006), which is considered approximate to income under minimum wage (at time of data, approximately Rp.750 000/month, or $83 USD). These figures are contested by the World Bank (2006) and local NGOs (UPC), who argue that it is an under-representation of the total number of poor on two counts. First, this definition of poverty does not include particular aspects of urban poverty such as lack of access to services whereby the poor pay more – and thus expend more – for basic services such as water (see Satterthwaite, 2001), and more basically the figure fails to capture the large number of unregistered low-income households.

**Squatters are residents living illegally along riverbanks, on public land, or along railways, and are not included within the official total numbers of poor residents.

NOTE: In this table I am not arguing the total number of poor, but rather illustrating their concentration in areas with the poor water network service (North Jakarta).
Map 6.2 Areas of low water pressure, Eastern half of Jakarta

Source: Created by Ernst-Jan Martijn (2007), based on data from Palyja (2005).
A case study in an area of North Jakarta, which houses the highest percentage of low-income residents in comparison to the other municipalities, gives an indication of the scale of the problem. In comparison to the city wide standard of 0.75 ATMs of water pressure, following a pipe rehabilitation program, areas in Kelurahan Penjaringan still only had water pressure of 0.10-0.15 ATMs, and this was from the network pipe, not the tap (pers.comm. Palyja, 15 October 2007; JWSRB, 2005b). As a result, residents of the area report a chronically poor, and intermittent supply of water from the pipes, while the meters, they report, keep recording non-existent consumption. As will be illustrated in the following section, this has provoked an ambivalent response to development projects that seek to increase access to piped water in communities where less than fifty percent are currently customers (Mercy Corps, 2007). Similarly, in other projects promoting access by the poor through house connections in West and Central Jakarta, the results of focus group discussions document the perception of the residents that household connections incur additional expenses beyond initial connection fees (USAID-ESP, 2007a).

Ironically, although Kelurahan Penjaringan still has negligible pressure following network rehabilitation work, the adjacent harbour area has benefited from a newly installed booster pump. In a pattern of spatialized development similar to that documented in Chapter Five, this allows 500 m3/day of piped water to be sold to the lucrative port industries (pers.comm. Palyja, 15 October 2007).

In conclusion, faced with these initially higher expenditures, and ongoing additional expenses for water storage and pumping, it is not surprising that many low-income households simply chose not to connect. It is also not surprising, in light of the ways in which successive strategies of (post)colonial government were materialized within urban water supply infrastructure, that the areas of the city with the highest density of low-income households (North and East), have the lowest water pressure. While no map of network water pressure was available from the private sector operators in East Jakarta to illustrate this point, the extremely low network pressure, and subsequently the available quality of service, has been documented as one of the reasons behind the geographic selection of OBA beneficiaries (pers.comm. USAID-ESP, 25 July 2007).

When considering the additional indirect costs incurred by low-income households when reliant upon piped water supply, this argument holds even more truth. For, as a result of delayed network rehabilitation and negative pipe pressure, the vacuum within network pipes allows wastewater (pipes flow through wastewater gutters and storm drains) to contaminate water supply, creating indirect costs of health care related to consumption of contaminated water.
Providing poignant illustration of this effect, a recent outbreak of diarrhea in North Jakarta, killing seven people, was attributed to TPJ’s ongoing network rehabilitation work (Jakarta Post 29 November 2007). The most comprehensive comparative survey of water quality of different sources in poor neighbourhoods in Jakarta to date it was found that samples of drinking water from the network were more contaminated with fecal coli form than groundwater (Surjadi et al., 1994), while a 2002 survey in east Jakarta found no significant difference in perceptions of water quality between piped or groundwater sources (IHS, 2002). Subsequently, as reported in 2002, “many non-customers were, at best, ambivalent about connecting to the system” (Waspola, 2007:27). Finally, in an, albeit contested, 2004 research report from the Ministry of Health, only forty six percent of the piped water samples in Jakarta met the requirements of ‘clean water’ standard (Forkami, forthcoming). Although the private sector operators themselves report over ninety percent compliance with the standards of clean water, this discrepancy is thought to arise from the difference between where the water samples are taken, the outflow of the water treatment plant versus the end of piped network areas (Forkami, forthcoming).

In response to this variation in piped water quality, low-income households in these marginalized areas of the city are thoroughly disrupting the developmentalist discourse of ‘thirsty poor’ by purchasing no-name brand bottled water\(^5\), which is sold for between Rp.2,000-3,000/19L - more than one hundred times the per unit volume cost of piped water at lowest tariff. Despite these per unit volume cost discrepancies, consumption of bottled water is an increasingly popular option for low-income households who are dissatisfied with, or wary of, the quality of piped water. A survey conducted in Kelurahan Penjaringan in 2007 noted that twenty percent of low-income residents purchase bottled water for strategic uses (drinking and washing dishes), saving time and fuel costs for boiling piped water to potable quality (Kooy et al., 2007). Another survey noted that bottled water purchases represent twenty two percent of the total household expenses for water supply (Waspola, 2007). As a result, in the last few years there has been a huge increase in this no-name brand bottled water businesses in low-income areas. Growing from 1999, when there were zero operators, to 2007, where there are now 2,000 registered refill businesses (Waspola, 2007), the Indonesian Drinking Water Suppliers Association (Apamindo) was established in 2005.

In recent years, these direct and indirect economic barriers for the poor to connect to the centralized piped water supply network have been recognized by international development players and private sector water supply operators (ADB, 2003a, 2004f; WSP-EAP, 2004; World

\(^5\) Brand name bottled water, such as Aqua (owned by Danone) targets the middle and upper class market, selling the equivalent 19L for Rp.10,000.
Bank, 2006a; World Bank, 2004a). However, focused on providing technocratic solutions, the response of development organization has been market, not politically, oriented. Thus, the integration of the existing formal and informal decentralized providers (termed ‘small scale independent water providers’, or SSIWPs) within the urban water sector strategies of development agencies is founded upon the belief that SSIWPs are better able to respond to the ‘market needs’ of low income households (WSP-EAP, 2004). Therefore, while the recognition, regulation and integration of small scale providers within formal system may be a legitimately pro-poor strategy (see Kjellen and McGrahanan, 2006), the promotion of water for the poor through small-scale providers does not acknowledge the political origins of these market preferences. The long due recognition of these ‘transitional technologies’ merely builds upon existing inequities inscribed through government within physical spaces (water pressure) and biophysical properties (water quality).

6.2.4 Identity and access to public water supply infrastructure: rational responses

With the political origins of household preferences for SSIWPs obscured, the promotion of these providers through technical inventions providing micro-credit and business development assistance (see ADB, 2004f; WSP-EAP, 2004) does not fundamentally increase overall equity of access. Low-income households will continue to pay higher (if not as high as before) per unit volume costs for water than they would through standard household connections to centralized networked systems, with the costs of these small-scale independent operators reflected in higher tariffs, which the development banks argue – the poor are willing and able to pay (World Bank, 20006a; US-AEP, 2002, 2004).

International development agencies have also – fatally – obscured other political origins of SSIWPs. This is documented later on when I discuss the oversights of the Output Based Aid project, but in this section I note the incentives for the lowest-income households themselves to remain disconnected. Specifically, contesting government rationalities defining who is entitled to pursue life in Jakarta, and rejecting the successive projects of ‘nationalist urbanism’ (Kusno, unpublished), low-income residents who would otherwise be excluded from the city’s spaces altogether make choices for water supply that minimize the importance of state criteria for legality, and reduce their visibility to a government that rejects them as legitimate urban residents.

As documented in Chapters Three and Five, citizenship, and access to water supply infrastructure, has been limited to those residents identified as ‘governable’ within successive
post)colonial projects. In the postcolonial era, this status as either international and modern, or economically mobile and politically obedient, has continually excluded the poorest residents of Jakarta (Abeyasekere, 1985; Cohen, 1974; Cowherd, 2002; Dorleans, 2000; Jellinek, 1991; Kusno, 2000). Indeed, the periodic attempts of government authorities to remove undesirable low-income populations spans from the 1950s-present, when recently over 5,000 residents living underneath Jakarta’s toll-road system in North Jakarta were evicted (‘Agency pledges zero tolerance for squatters’ Jakarta Post 22 August 2007). With successive governments locating the legitimacy of their rule within projects of building a ‘spectacular and modern’ Jakarta (1950s) (Kusno, 1997), a ‘beautiful and orderly’ Jakarta (1970s) (Papanek, 1975), and a ‘Clean, Humane, Powerful’ Jakarta (1980s) (Leaf, 1996), the low-income residents seen to contradict these images were systematically regulated against or physically removed. Documented extensively in Susan Abeyasekere’s histories of Jakarta (1985, 1989), the development of Jakarta throughout the 1950s-1980s involved moving large numbers of poor people out of desirable (and international) urban spaces. More recently, from 2001-2005 there were eighty six documented cases of eviction of low-income communities, impacting at least 75,000 residents (Human Rights Watch, 2006), and in 2006, 146 cases of eviction were recorded (Human rights Watch, 2006). Giving words to these actions, in 2000, the former mayor of Jakarta proudly (but prematurely) announced that the city will be ‘free of slums’ by 2005 (Dorleans, 2000).

Therefore, with access to public services in Jakarta often contingent upon pursuing state sanctioned residency and livelihoods, it is true that many of the city’s lowest income residents are not able to qualify for public water supply services. As stated by the public relations spokesperson for one of the current private sector operators, delivering piped water to slum neighborhoods poses something of a dilemma,

“We have to abide by the regulation on piped water distribution, which requires the home owner to present a house or land ownership deed before we can supply their property …the city administration prohibited the water company from making any connection between the slums and the domestic water system because the land was state property and not designated for housing.”

(‘Clean water luxury for North Jakarta slum dwellers’ Jakarta Post 27 January 2007).

However, it is also true that many of the urban poor do not wish to pursue, or adhere to, legitimacy as defined by government rationalities. Migrants continue to defy government criteria for legal residency, sometimes making their own residency cards and bribing officials to ‘legalize’ their existence (Mercy Corps, 2006). Meanwhile, informal livelihoods continue to exist
Despite repression (FAKTA, 2005) and migrants continue to seek their fortune in and around Jakarta. According to the Jakarta Population and Civil Registration Agency the number of new migrants entering Jakarta was 180,356 in 2004, 180,767 in 2005 and 81,850 in 2006, and estimates place as much as twenty percent of this population as unregistered with the Population and Civil Registration Agency (‘Migrants welcome in capital, provided they register first’ Jakarta Post 31 October 2007).

Creating alternative definitions of legal/illegal, the residents undesirable to city authorities seek employment in the informal sector, haven in the areas of the city where state presence is negotiated through other sorts of kinship connections, and where water supply is accessible through decentralized small-scale providers charging higher per unit cost prices. As is documented below, the two legal criteria for household connections to the piped water supply system are often not palatable for low-income households to pursue. Government rationality creates disincentives for low-income residents to validate their residency and land occupation in the eyes of the state – as such, it can often be most rational for low income residents to pay higher costs for water supply if it allows them to remain ‘invisible’ to city government.

Looking first at the legal requirement of a valid Jakarta residency KTP (Kartu Tanda Penduduk/Personal Identification Card), it has been noted that the bureaucratic path to obtaining a residency card granting government permission to live and work in Jakarta has always been both difficult and expensive for the poor, who face both official and unofficial discrimination (Server, 1996). In the 1970s the prices for government services (like birth certification, registration) were inaccessible to the poor, as an economist documented that the process of legal registration was between Rp. 3,000 – Rp.6,000 ($8-15 US dollars), whereas the daily income of poor residents was on average between Rp. 200-300/day (equivalent to $0.50-$0.75 US). More recently, in 2005, consistent discrimination against low-income residents for urban services like registration and birth certificates was again documented (INCIS, 2005).

In addition, although Jakarta is no longer officially a ‘closed city’, low-income migrants moving to Jakarta in search of economic opportunity, particularly in the informal sector, are officially discouraged through police raids called ‘enforcement sweeps’ and government rhetoric (‘Jakarta to monitor number of newcomers’ Jakarta Post 6 October 2007). Raids to capture unregistered migrants are regularly conducted following the annual holiday period of Idul Fitri; according to the city's Social Welfare and Self-Development Agency, the number of people captured in population raids reached 14,191 in 2005, 17,027 in 2006, and 9,891 as of August 2007 (‘Let jobless newcomers in the city’ Jakarta Post 22 October 2007). While this established practice is now getting more criticism as violating both human rights and the Indonesian
constitution, government officials justify these raids as necessary to “protect public and private property” and ‘reduce demand on overloaded public services’ (‘Migrants welcome in capital, provided they register first’ Jakarta Post 31 October 2007).

The second criteria for household connection to the piped water supply network, legal occupation of land documented by the state system, also discriminates against low-income households. It has been documented by many that land ownership is a highly contested issue in Jakarta (URDI, 2007). Given both the outdated land policy left over from the colonial era (Leaf 1993, 1996), the self-serving policies of land accumulation in the development of urban land market under the New Order (Cowherd, 2002), and the corrupt practices of land registration, it is often true that definitions of legal ownership are malleable to the highest bidder (Server, 1996; ‘Land disputes abound with no end in site’ Jakarta Post 19 June 2007). Furthermore, asides from the uncertainties of actually having (and exercising validity of) legal registration and land ownership, the processes for various forms of registration are often expensive and complex. The certification of land ownership involves seventeen steps, eighteen different agencies, at least five pieces of formal documentation and an average of two to three years to complete (URDI, 2007). As such, formal registration is rarely attained by low-income households, but even the documentation of more informal forms of land tenure involve payment to some official for signatures (URDI, 2007).

As a result of the costs of documenting land ownership, and in equal measure the product of a historical lack of affordable low-income housing in a city whose trajectory of development has not included accommodating low-income residents (Dorleans, 2000), many of the lowest income households either forgo the formal registration process, or are renters of poor quality housing, or are illegal ‘squatters’ of unoccupied public or privately owned land. In a survey conducted by URDI in 2007, over sixty percent of residents from a low-income neighbourhood in Jakarta did not possess any form of state sanctioned documentation guaranteeing either formal or informal land tenure (URDI, 2007). In turn this means that these sixty percent would not have proof of ownership for payment of land taxes (PBB), which is the requirement stipulated by the government for connection to the piped network.

In response to the government policies discriminating against low-income households, many of the poorest residents of the city negotiate state sanctioned legitimacy in favour of living illegally, or undocumented, within the city that has historically rejected them as citizens. When asked about land ownership and identity documentation, residents below state radar provide their own definitions and perception of formal versus informal status (see Shofiani, 2003; Susantono, 2001; URDI, 2007; Yayasan Dian Desa, 1989), and are alternately savvy or hesitant in answering
surveys documenting state-sanctioned legality, as was evident in a land tenure survey conducted prior to the 2007 Jakarta elections (Mercy Corps, 2007). As was documented already in the 1970s, many of the poor, especially those working in informal occupations less likely to come into contact with the state authorities, avoid the card altogether. A survey conducted in 1975 found only one-quarter of the sampled population had ID cards (Papadek, 1975). Similarly, 2007 survey of low-income residents found that over sixty percent of residents had ID cards, but over fifty percent of the poorest households had ID cards listing them as registered for residence outside of Jakarta; in total twenty percent of all residents surveyed did not have the proper identification, thus rendering them ineligible for health care subsidies, food distribution, disaster relief programs, and connection to the centralized piped network (Kooy et al, 2007).

Perceiving the government as capable of unpredictable and arbitrary actions, not subject to influence by the poor (Jellinek, 1991, 1997; Papanek, 1975), the trade-offs involved in avoiding state scrutiny, including being unable to legally access the lowest per unit cost of water supply, has historically been a rationally considered choice of the urban poor who are still not welcome as citizens. Other livelihood studies of urban poor populations in Jakarta confirm this analysis, documenting ways in which ‘active and knowledgeable’ low income residents are making informed choices, according a low priority for piped water supply in comparison with priorities for house size, land security, and strategic geographical location close to employment (Crane, 1994; Crane et al., 1997; Daniere and Crane, 1996; Struyk et al., 1990).

In conclusion, given the various ways in which government rationality has been inscribed within physical space, biophysical properties of water, and access to water supply infrastructure imbricated with the pursuit of state sanctioned identity, the responses of those excluded, but simultaneously disinterested, from connecting to the city’s piped network is eminently rational, strategic, and savvy. This does not mean that the subsequent patterns of water use observed as practiced by lowest income households are always environmentally sustainable, legal according to Jakarta regulations, or that access to water in Jakarta is equitable. In negotiating these relations of rule, the lowest income households do, as frequently documented, pay the highest proportion of their income for water supply, as well as occurring other indirect costs related to poor health (AcF, 2007; Bakker et al., 2007; Kooy et al., 2007; McGranahan et al., 2001).

However, while there is room for improving equity of access to clean water in Jakarta, development agencies have so far ignored, or been unable to address, the political relations in which these existing patterns of use are situated. However, unable to explain the existence of non-thirsty low-income residents within ‘expert discourses’, this has left the inherently political problems behind the existing inequitable access to clean water to be diagnosed in terms of
technical interventions (physical access or financial ability). As is documented below, this has frustrated the ability of development programs to improve the equity of access to clean water supply in Jakarta, and has often led to a misunderstanding of the ambivalent responses of intended beneficiaries.

### 6.3 Frustrating Development and Facilitating Fragmentation

#### 6.3.1 Development discourse: Water For All the ‘thirsty poor’

‘Water for the poor’ has recently become the new axis around which development agencies implement water programming (ADB, 2001a; World Bank, 2001, 2003c). As part of this program, the ‘need for development’ in the name of ‘the thirsty poor’ has become a powerful tool for mobilizing international development finance. In Indonesia, the “number of poor without access to piped water, an estimated 50 million people” (World Bank, 2006a:7) presents a compelling population of poor who are presumed to be universally disadvantaged given their lack of connection to the piped water network, and are thus thirsting for access - access which will be provided through technical, not political, interventions.

The exclusion of politics, and rendering technical the problem of access, was illustrated at a regional workshop entitled ‘Enabling Water Services Delivery for the Urban Poor in Asia – Setting an Action Agenda for Developing and Replicating Model Solutions’, where it was stated that “the poor represent a vast majority of underserved urban populations. Though studies show a high willingness among the poor to pay for piped water, government and water service providers perpetuate the myth that the poor are unable to pay for piped water services” (USAID, 2006:1).

Diagnosing the problem of access in terms of economics, the subsequent solutions for the urban poor were identified as new pricing policies, increasing their awareness of the economic benefits of connections, and creating new service models incorporating SSIWPs (USAID, 2006). Identified as the victims of poor governance, and low awareness (to be corrected through state and individual programs of improvement), the ‘problem’ of a thirsty poor is thus addressed through new managerial models, economic policies, or behaviour change campaigns delivered within development programs (see WSP-EAP, 2007a; World Bank, 2006a, 2006b).

Subsequently, the development planners fail to consider how water use patterns coded as unhygienic, ignorant, or undeveloped are actually rational responses of differently situated
individuals to relations of rule. Statistics of fifty million across Indonesia indeed cannot discern between those urban poor who desire access to piped water, and those urban poor who – like the middle and upper class – have opted out of piped water for more reliable, locally available alternatives (see Waspola, 2007). As a result, the complexity of water supply in Jakarta is thus often overlooked in favour of a picture of thirsty poor who are all in need of development, and the geographical differences, and variety of urban poor livelihood strategies are glossed over in favour of the powerful picture of a large population of low income households eager to connect to the formal water supply network.

In the face of all the evidence presented in the previous section, what this discursive construction of a thirsty poor obscures are the politics structuring the inequitable access: how the preferences of differently situated low-income households are informed by ways in which relations of power have been inscribed with spatiality of city, and access to the piped network infrastructure is imbricated with political identity. This occlusion of the political is not merely semantic, as I will illustrate these oversights by development exerts have had physical implications for increasing equity of access to water in the city. Specifically, with the politics of inequitable access excised, development programs are thus unable to acknowledge ways in which the relations of power within their interventions are inserted are either opening up, or closing off possibilities for development, and thus initiatives are being frustrated, or the ambivalent responses by beneficiaries are being misunderstood.

### 6.3.2 Output Based Aid: Excising the political

The largest explicitly pro-poor initiative in the last two decades has been the World Bank sponsored Output Based Aid project. In 2003, the British bi-lateral aid agency (DFID) and the World Bank established the Global Partnership on Output-Based Aid (GPOBA), a multi-donor trust fund administered by the World Bank. This development model is an increasingly important part of the World Bank’s approach to private sector development, which delegates service delivery to non-governmental third parties (non-profit or for-profit private sector, or public sector agencies operating on a ‘commercial’ basis) under contracts that tie payments to the outputs or results actually delivered to target beneficiaries. This approach has been used for water connections for the poor in Algeria, Cambodia and Paraguay, and in 2005 a program was initiated to connect the poor in Jakarta.
With $5 million USD of funding provided by DFID, the Output Based Aid program in Jakarta was intended to provide cheap capital to the two concessionaires to connect the poor; the goal was to expand network coverage amongst the urban poor by achieving 20,000 new house connections in both the eastern and western parts of the city. To date, the project is a less than shining example of the Output Based Aid mechanism; other development organizations seeking support to connect the urban poor in other areas of Indonesia have been cautioned not to take the Jakarta example as a model (pers. comm., USAID-ESP 15 June 2007). By mid-2007 the project had only identified less than 5,000 beneficiaries, implementation scheduled to begin after four years of negotiations between the World Bank, private sector partners, Jakarta Water Supply Regulatory Board, DKI Jakarta government, and PAM Jaya. In the following paragraphs I illustrate how the failures of this development initiative relate directly to the ways in which relations of power continue to structure access to – and preferences for – piped water, and complicate technical solutions.

First, most significantly, by being unable to acknowledge the relations of power within which the technical solution was being inserted, the estimated number of beneficiaries fell far short of the actual; much fewer low-income households are going to be connected to the network than was planned. This is primarily because, perversely, the project planners ended up drafting a set of socio-economic, political, and technical criteria for beneficiaries that were almost mutually exclusive.

First, the technical feasibility criteria used to determine the eligibility of households for subsidized connections stipulated that households included in the project had to be within 5-10 meters from existing network pipes, and, their connection could not in any way jeopardize the level of service being provided to existing network customers (Castalia, 2006). These criteria of course overlooked the physical embodiment of relations of rule in Jakarta, whereby access and infrastructure development has historically been spatialized to leave the areas of the city with the highest percentage of low-income households with the lowest levels of network penetration and lowest levels of service quality. Subsequently, with a large percentage of the disconnected urban poor living in East and North Jakarta, the two sectors of the city where water service is the poorest, the project was unable to target those who were truly thirsty (pers. comm, ESP-USAID May 22, 2006).

Beyond the issue of technical feasibility, there was the mutual exclusivity of the project’s socio-economic and political criteria: if households met the strict poverty criteria set by the
government (meeting both household and neighbourhood poverty assessments), and were considered truly poor enough to qualify for a subsidized connection, they did not meet the socio-political requirements of possessing proper residency cards and land tenure documents (Forkami, 2006). On the other hand, if households met the socio-political criteria, they were above the poverty level. Not surprisingly, this left very few households as potential beneficiaries. As emphasized by project implementers, the political criteria that households had to meet in order to qualify for a subsidized house connection were almost mutually exclusive with the poverty criteria: the poorest residents of the city are those who do not have a legally sanctioned identity (Castalia, 2006). Resisting pressure from the World Bank project planners, the two private sector operators, and Jakarta water supply regulatory board, the Jakarta government was adamant that no illegal households would be eligible for subsidized connections (pers.comm, Forkami July 11, 2006). In the words of one project staff, the extra-legal urban poor neighbourhoods considered “outside of government control”, were simply “left alone” by a government that would prefer to pretend these residents did not exist (ibid).

The result of these oversights as to the politics of access to piped water in Jakarta is a $5 million USD project that, as of early 2007, would achieve less than one-quarter of its intended impact. Of course, this reduction in targets is also due to the withdrawal of the private sector operator for the eastern half of Jakarta: the sale of shares from the parent company Thames Water International to the inexperienced Singapore based consortium Aquatico in 2007 has meant that it decided to forgo the OBA, presumably reducing beneficiaries from 20 000 over all of Jakarta to 10, 000 low-income households only in the Western (Palyja) area. However, the remaining fifty percent reduction in beneficiaries (from 10, 000 to less than 5,000) is directly related to the ways in which government continues rationalize exclusion of the poorest residents from public services on alternate grounds of economics, or public safety and social order. To the credit of project planners applying continual pressure to the DKI government, the project is finally, in early 2008, considering the addition of an extra 1,700 ‘Type II’ households, who do not meet the criteria for legality, but whose final inclusion is based on the results of achievements made by Palyja in Phase I of the project (Palyja, 2008).

Poor households were defined as those who earn less than Rp.27,900/person/day, while poverty variables for identifying ‘slum’ neighbourhoods are: population density, percentage of impermanent housing, percentage of housing without air ventilation; land to building coefficient; percentage of paved roads or footpaths; type and quality of access to water supply; percentage of households using clean water drinking; percentage of households without sanitation; percentage of coverage by municipal solid waste services (see Forkami, 2006).
6.3.3 Ambivalent responses

Other pro-poor water supply initiatives ongoing within Jakarta have also met with limited success. Reflected in the much lower numbers of beneficiaries than expected, pro-poor programs implemented by bilateral donors and international NGOs are also confronted with the politics of access in Jakarta, which – as introduced in the first section of the chapter, has left many low-income residents ambivalent for connections.

First, the water supply project being implemented by USAID-ESP in an area of western Jakarta has met with less than enthusiastic initial response in its plans for connecting the poor. Avoiding the political and economic complexity of the Output Based Aid consortium of private sector, public agencies, and local government, the USAID grant being implemented by its Environmental Services Program (ESP) is promoting the use of communal connections for pro-poor house connections. This model for household water supply is intended to allow those without legal land tenure and identity documents to receive piped water in the home, while simultaneously addressing financial barriers related to monthly (versus daily) bill payments, and high connection fees. However, ironically enough, in the areas of the city where this technical option is feasible (for this model requires a minimum of water pressure, by far not available in all low-income communities across Jakarta), the low-income residents in this community does not seem to be interested.

Working in a community in West Jakarta classified by the government as ‘heavily slum’, where approximately fifty percent of the 500 low-income households are officially identified as poor (BPS 2004a; BPS, 2005), there are limited alternative water supply options, and only thirty percent of households are currently connected, the project began with less than half of the seventy percent of non-connected households interested in participating in the project. Household surveys conducted by project staff to identify potential beneficiaries for the connection scheme found that many households had had negative prior experiences with piped water (lack of service, low pressure), and were content with their alternatives - combining shallow groundwater, buying drinking water from vendors and/or bottled water refill depots. With wary residents adopting a ‘wait and see’ attitude, the project began with an initial ninety households, out of a total of 350 potential beneficiaries.
Map 6.3 Household connections in low-income settlement: RW 4, Kel. Jembatan Besi


Community Profile: RW 4
- Location: West Jakarta, Kecamatan Tambora, Kelurahan Jembatan Besi
- Population: 500 households
- 50% of which classified as poor according to government criteria
- Currently connected: 43% of households
- Want to be connected: >50% of non-connected households
The pro-poor water supply model of communal connections is also being replicated in North Jakarta under other bilateral funding. Financed by the Canadian government, a project being implemented by international and local NGOs also seeks to connect the lowest-income, and often illegal, residents in a community in North Jakarta to piped water supply⁷. However, although working in an area of the city where there are fewer affordable alternatives (all shallow groundwater is saline), and less than half of the households are currently piped water customers, low income residents were found to be even more ambivalent than in West Jakarta. When more than 3,000 households of government designated ‘slum areas’ were surveyed to ask if they were interested in connections to the piped network, sixty nine percent of those not currently connected were not thirsting for this option. Of the total 3,381 households (13,018 residents), 41% of households are currently household consumers, 59% are not. From the 59% households not currently connected to the piped network, only 31% (1,048 households) expressed potential interest in either individual standard household connection or an individual connection through a communal metering system (Mercy Corps, 2007). With the poorest households in the community consuming only 43 L/capita/day, and spending up to 10% of household budget on water supply (Kooy et al., 2007), it seems perverse that only a third of non-connected residents were potentially interested in getting connected to the lowest per unit volume cost of water in Jakarta.

It is only when considering the politics of access, and the ways in which relations of rule have spatialized service quality and water pressure, entailing extra costs of connection for low-income households, that logic becomes apparent. With water pressure in the area extremely poor (0.15 ATMS means that the development project would require extra infrastructure/reservoir and pump to supplement), residents are legitimately wary of committing themselves to a project which, they believe, will eventually cost them more than it can deliver.

⁷ The project financed by IDRC is being implemented by a city team consisting of Mercy Corps Indonesia, SwissContact, URDI, USAID-ESP, and the North Jakarta municipality, see http://www.idrc.ca.
6.3.4 Splintering from below

Despite the ambivalence of low-income households for connection to the centralized piped network, residents do still desire the convenience of piped water supply. This is evident in the alternative forms of supply sought out by low-income residents, who like the middle and upper class, also chose to ‘opt out’ of the network system in favour of local alternatives. Tellingly, despite the growth of the centralized network in the last decades, government policies limiting extraction of deep groundwater sources (Adzan, 2001), and the continual decline in Jakarta’s aquifers (IWACO, 1992), the growth of autonomous, low-technology networks using ‘spaghetti pipes’ and electric pumps to distribute groundwater to households in the community has been expanding, not decreasing (Waspola, 2007). Acting either independently as private entrepreneurs, or within community initiatives supported by aid agencies and local community based development organizations, the growth of SSIWPs using decentralized piped water networks is a response to poor service quality of the centralized network, or its non-existence. Therefore, while the official policy of private sector operators is to ban the use of deep groundwater in areas where network access is physically possible, in 2006 four new deep wells were built in the networked eastern half of North Jakarta alone (pers.comm, Forkami 5 October 2007; Waspola, 2007).

Supported by the Jakarta Mining Agency, who advocates deep wells as solution to the city’s lack of centralized network coverage and service quality, four new wells were proposed for financing by the city government in 2007, “prioritizing areas with little or no access to the network water supply” (‘City water crisis could see deeper wells dug’ Jakarta Post 18 August 2007). Subsequently, a deep well installed in Kelurahan Penjaringan, North Jakarta by the Ministry of Women’s Empowerment project connected over 300 households to piped water supply, while another deep well was installed in a community located on the administrative border between DKI Jakarta and Bekasi, solving their lack of network service that resulted from disputes between the water network operators.
When coupled with the growth of autonomous decentralized piped network systems created through illegal water supply operators documented in Chapter Four, it is evident that the splintering of Jakarta’s water supply is not only the product of international political economic processes directing changes in networked infrastructure around the world (cf Marvin and Graham, 2000). Rather, although invisible in urban analyses like Marvin and Graham (2000), the persistent and pervasive fragmentation of Jakarta’s water supply system is also the result of resistance and responses to relations of rule by residents excluded from citizenship. Responding to the imbrication of infrastructure access with identity, some residents hook up to small-scale spaghetti piped systems that are created by tapping illegally in the centralized network, thus negotiating access into a system they are legally denied entry. Other residents, as documented, are opting out, because of the ways in which (post)colonial governmentalities have spatialized network infrastructure access and subsequent service quality.
Illustration 6.2 Spaghetti pipe network from illegal connection, North Jakarta

Source: Photo by Author (2006)

6.4 Casting Doubt

From the above review of the latest pro-poor water supply programs in Jakarta, it is apparent that these development interventions are producing – at best – mixed results. Furthermore, not only do experts misread preferences of the poor and design technocratic interventions that are ambivalently received by beneficiaries, but their pro-poor water supply projects are also perversely unable to target those who are truly thirsty. As illustrated in the experiences of the OBA project, the poorest of the poor are unregistered, undocumented, and illegal in the eyes of the state. Living on the most marginal of lands where alternative water sources are of the poorest quality, and engaged in livelihoods providing less than U.S. $1/day, every extra cost for these households is significant; these are the residents who are truly thirsty for access to lower cost water sources. However, while the inability of development programs to target this population is highly problematic, the issue is curiously absent within development discourses of the thirsty poor.

This is not to say that universal access to clean water should not be a common goal of the government, water supply operators, and other organizations, but rather it is time to acknowledge that a new discourse and new strategy might be needed. Therefore, while these failures of development programming are not broadcasted, only repackaged for donor consumption and ‘lessons learned’, this gap within development discourse and reality does provide conditions
within which the expert discourses can be punctured. The limitations of the World Bank Output Based Aid project illustrates how current development discourses are revealed as missing or lacking in their diagnoses, and provide a space in which to insert the political questions usually obviated. In particular, as the imbrication of infrastructure access with identity highlights the (usually missing) links between urban water supply and urban governance this can open up new possibilities of being for the ‘thirsty poor’.

Understanding how the patterns and preferences of the urban poor respond to relations of rule allows them to become rational individuals, creating the possibility for new articulations of identity whereby low-income residents using local water sources and informal providers can be seen as economically rational, intelligent, and strategic, rather than passive, undeveloped, unhygienic subjects in need of moral and cultural development programming. Subsequently, this can open up much needed new ways of viewing the thirsty poor who must currently be ‘taught’ to appreciate a scientifically determined/approved quality of water, or who have to be ‘taught’ to desire piped water from the centralized network through behaviour change programs (see USAID-ESP, 2007a; World Bank, 1995a). Illustrating this need for change is the documentation of the thirsty poor in the World Bank’s Voices of the Poor, where the discursive technology of rendering technical transforms the strategic combination of different qualities of water, purchased at different per unit volume costs, intended for different uses from strategic responses of households with limited options into the product of economic irrationality and ignorance.

“the poor are typically not aware that they are paying exorbitant rates because they pay small sums for small incremental amount of water…The poor pay 30 times the price [for water], but don’t know it” (World Bank, 2006c:26&29).

These other possibilities for ways of seeing and being are already visible within some of the programming of local NGOs. For, highlighting the political relations of power contributing to inequitable access, some local NGOs have followed a different strategy to address the issue of inequitable access to clean water in the city. Influential in fomenting the analysis of this chapter was the lack of local NGO advocacy around water supply for a general population of ‘the poor’ in Jakarta. First, although UPC worked directly in neighbourhoods in Jakarta, delivering programs on alternative health care, community empowerment, and other basic needs, their programs did not include access to piped water supply as a ‘cross-cutting theme’ across all of the urban poor communities. Instead, with activities in each community responding to articulated needs and priorities of the local residents, UPC only sporadically engaged with issues around urban water
supply, and then usually only in communities who were already connected to the city’s centralized piped water network.

Meanwhile, the NGOs who did have a specific focus on water supply, and Jakarta’s privatization, addressed broader political issues of national governance (accountability, transparency, corruption) and engaged in strategic political tactics of court cases, media campaigns, and demonstrations. Campaigns focused on pro-poor water supply, and documenting the anti-poor nature of Jakarta’s private sector contract, also focused on the low-income households who were already connected (Ardhianie, 2005a, 2005b, 2005c; KruHa, 2005, 2007; Rahayu, 2005; Suksmaningsih, 2005).

6.5 Conclusion: Resistance to rule, facilitating fragmentation

This chapter has highlighted the ways in which relations of power inscribed within urban spaces, infrastructures, and subjectivities condition the choices of water supply by a population of low-income households. So doing, I have identified the historically problematic and targeted water supply behaviours of the poor as rational responses and resistance to (post)colonial governmentality which has materialized relations of rule by spatializing service quality and network density. However, as I have illustrated, the discourse constructed by development programs to explain problems of inequitable access to urban water supply have been unable to acknowledge relations of power, and have thus misunderstood the water supply preferences of low income households. In turn, this has led to failures, or frustrations, in current pro-poor water supply projects in Jakarta, as the spatial, material, and discursive legacies of government rationalities continue to affect ways in which poor prefer to use and access urban water supply in ways that pose problems for current programs.

In conclusion, the agency of the urban poor and their role in the ongoing fragmentation of the city’s network water supply, also revises the thesis of ‘splintering urbanism’ as presented by Marvin and Graham (2000). The fact that the poor may not chose to be connected to the city’s piped water supply network emphasizes the fact that they too have been – and still are - agents within the ongoing fragmentation of the city’s water supply network. The patterns and preferences of water use selected by the urban poor in response to relations of rule continue to contribute to the progressive fragmentation of Jakarta’s splintered network, despite a pro-poor development strategy which prioritizes centralization. Thus, the progressive fragmentation of Jakarta’s centralized water supply network needs to be understood as both the product of
government rationalities, and resistance to these rationalities. Viewing the urban poor as actors, rather than passive recipients, within the governmental strategy of differentiating access to water and fragmenting systems of supply both provides a more nuanced understanding of the operation of relations of power within governmentality, and acknowledges contestation, and compromise of government rationalities as an integral component of the progressive process of fragmentation.
Chapter 7

Conclusion: The colonial present, 1873/2007

7.1 Introduction

In 1873, at the conclusion of his report to the colonial government, Dr. J.C. Bernelot Moens made the following observation about water supply in Batavia:

“As long as [the city] does not have good, affordable, easy and generally available drinking-water, then everyone has to take care of themselves. Everyone chooses for themselves one or another sort of drinking-water and is guided in that choice by various circumstances.” (Moens, 1873:390)

More than 150 years after the origin of Jakarta’s piped water supply infrastructure, the conditions in the contemporary city are not so different. As observed by the World Bank in its Water and Sanitation Background Sector review for Indonesia, “one of the primary characteristics defining water supply is the extremely high level of self-provision by households.” (World Bank, 2003:9). Indeed, the report notes that, “it is not uncommon to find that affluent households have invested significantly in wells, pumps, and storage tanks. Many households use several sources of water even when connected to the public network.” (World Bank, 2003:9). Evidently, despite the exponential increases in the kilometers of piped network installed, and the volume of water produced, the selection of household water supply in Jakarta is still dependent upon Moens’ ‘various circumstances’.

This thesis has explained the articulation of the ‘various circumstances’ determining patterns of water provision as the product of (post)colonial governmentalities. Through a genealogy of Jakarta’s urban water supply infrastructure development I have highlighted how government, as a complex assemblage of discourses and practices shaping the conditions in which lives are lived (Li, 2005), has informed the ‘various circumstances’ by which different sources of water are made more or less easy to access. The genealogy has highlighted the interrelationships between the triad of waters, spaces, and populations - documenting from 1873-present the ways in which urban water supply has been enrolled within (although not always successfully) the production of particular, differentiated, urban spaces deemed necessary to rule, and the constitution of discursive categories of citizenship rationalizing racial or developmental superiority.

As I have documented, the production of what were alternately defined as European, modern, international, postcolonial, and economically productive urban spaces within Jakarta shaped the production of flows of water through the city. Along with the co-constitution of European, native, modern, undeveloped, politically obedient, economically mobile, and illegal categories of populations
formed in relation to urban water supply, these spaces and subjects were a vehicle for the legitimization of successive government rationalities. As documented in Chapters Three and Five, the result was a socio-spatial fragmentation of network access, in which relations of rule were inscribed within physical spaces and ecological processes within the city. Given the long lifetimes of water supply infrastructure, the fragmentation produced in each period remains embedded within the city, literally ‘layering’ relations of rule within Jakarta’s urban water supply infrastructure.

However, as illustrated in Chapters Four, Five and Six, these relations of rule were often contradictory, sometimes contested, and not always successful. To capture the contradictory, and inherently conflicted, nature of government, the thesis documented the ways in which responses to rule by uncooperative populations, enabled by unruly natures (water itself), also contributed to the splintering of the city’s networks. My genealogy has therefore not only traced the ways in which relations of power were mobilized through (post)colonial governments to establish the ‘right relations’ of rule, but has also included the ways in which responses to rule have been channeled through, informed by, and inscribed within the city’s urban water supply. Viewing Jakarta’s splintered networks as the product of contested and negotiated relations of rule thus provides an analysis which explains the seemingly paradoxical situation whereby low-income households denied access to the centralized network are not actually ‘thirsty’ for connection.

In presenting this conceptual triad (of waters, spaces, and populations), which I have used to explain patterns of provision in contemporary Jakarta, I have also attempted to make a contribution to the literature on governmentality. Attending to the ways in which relations of rule have been worked through, productive of, and ultimately limited by, not only subjectivities, but also urban spaces, natures, infrastructures, and corporeal bodies, I have highlighted the materiality of governmentality. As I have argued, a greater focus on these material dimensions addresses gaps within the literature of governmentality, and extends the framework of analysis by acknowledging the agency of the material world that is constituted by, but also constitutive of, relations of rule - alternately facilitating or frustrating the articulation of particular relations.

A caveat: although the analytic of governmentality, and attention to its material dimensions, sheds light on the significance of the city’s colonial pipes, this analysis does not simply superimpose the past upon the present, or suggest a simplistic influence of the colonial upon the contemporary. Rather, the chronology of the development of Jakarta’s urban water supply infrastructure has documented the ways in which rationalities of rule inscribed within the piped water system were negotiated by successive governmentalities - each layer of new water supply infrastructure (and the relations of rule it expressed) built upon the foundations of previous systems, and had to negotiate the existing physical and discursive relations of power.

Indeed, as illustrated in the current debates on the politics of access to water in Jakarta, the city’s colonial pipes continue to be engaged within new relations of power. Used to juxtapose the
durability and quality of colonial infrastructure against postcolonial construction (which is found wanting), or cited as reasons for high rates of unaccounted for water and poor piped water quality, the legacy of colonial government interacts with the present in unpredictable ways: disgruntled Jakarta residents look fondly back to the colonial era and its engineering achievements, while private sector partners currently operating the water supply system blame the colonial piped network as the reason for their unmet performance targets (Jakarta Post 23 October 2005; 6 February 2006; 19 July 2006; 19 January 2007).

7.2 (Post)colonial Natures and Cosmopolitan Urban Theory

Attending to the materiality of governmentality has also enabled the thesis to provide a theoretical framework whose analysis is relevant to the lived geographies of inequity within the contemporary city (Yeoh, 2001). Responding to critics who argue that the literature of governmentality has focused too narrowly on discourse and abstract, intangible subjectivities without acknowledging and incorporating the material aspects and relations of power (cf Harris, 2004), this thesis has highlighted the ways in which past relations of rule continue to inform the physicality of the present. Highlighting how relations of power are productive of physical spaces, concrete infrastructures, ecological processes and biophysical properties, as well as discursive categories and socio-economic relations has identified ways in which the past continues within contemporary city, as the patterns of water supply infrastructure and water use practices are either enabled or disabled by the ‘layers of relations of rule’ embedded in physical pipes.

As I have argued, and as is highlighted by the continued incorporation of colonial pipes within present relations of power, recognition of the (post)colonial nature of urban water is important. As urban water supply infrastructure is particularly long-lived (more than 150 years in Jakarta’s case), the biophysical production and kinetic flows of water through the city are still constrained and/or enabled through the material artifacts of past and present governmentalities. Excavating the often overlooked physical and discursive foundations of the city, I have emphasized how the past continues to intersect with the present, in ways that matter for current material lived geographies of inequity. Chapters Four and Six have illustrated some of these implications: as the past continues to influence patterns of water supply in the present, the pursuit of more equitable access to water in the city has been compromised, and fragmentation and inequity have increased during (and despite) the last two decades of development interventions.

Analyzing the patterns of provision in Jakarta through the analytical framework of governmentality has allowed the thesis to challenge both conventional development discourses, and also academic analyses rooted in a Western context. First, the thesis reveals that Jakarta’s lack of
progress towards the western urban infrastructural ideal can not be explained through urban development discourses of Jakarta’s failed modernization (UN-HABITAT, 1998; World Bank, 2004a); nor is the pervasive fragmentation of access to clean water in the city the product of recent neo-liberal rationalities (Graham and Marvin, 2001). Rather, Jakarta’s centralized water supply system has been splintered since its inception, and fragmentation of the network and access continued parallel to continual investment within centralized water supply infrastructure system. Second, the thesis has challenged the development discourse of a universally disadvantaged population of ‘thirsty poor’, showing preferences of low-income households for informal and non-networked water supplies to be rational responses to relations of rule rather than further ‘need for development’. Acknowledging the progressive fragmentation of Jakarta’s network as the product of both government rationalities and resistance has in turn highlighted the need to account for these processes of ‘splintering from below’ within explanatory frameworks (cf Graham and Marvin, 2001).

Making visible the gaps in the analysis, and casting doubt upon the completeness of the diagnoses of both western based developmentalist explanations and western oriented urban theory, this thesis has suggested the analytical framework of governmentality as a more useful method of interrogating the nature(s) of the (post)colonial in cities of the Global South. As illustrated in the thesis, when revised through critiques of postcolonial studies, and informed by analyses of power-nature-society, the framework of governmentality makes visible the influence of the past upon the present - in ways that speak to the material needs of the city’s current residents. I argue that the materializing and historicizing of relations of power in the contemporary city contributes to both the political and theoretical projects of rematerializing urban studies (Jacobs, 1996; Latham and McCormack, 2004), and decolonizing urban geographies (Robinson, 2003) by helping to construct alternative, more flexible, appropriate ‘cosmopolitan’ explanatory urban frameworks.

7.3 Analytical Gaps and Avenues for Further Research: Scale and subjectivity

The analytical framework of governmentality implies a historical approach. As applied within this thesis, this has meant an investigation of ways in which relations of power mobilized through over 150 years of colonial and postcolonial governmentalities were worked through the city’s water supply system. However, as a result of the span of years under investigation, and the volume of research material uncovered, some aspects of relations of power, and their contribution to the splintering of Jakarta’s network, have been under-emphasized, or left unexplored. In this section of the Chapter I identify the subsequent limitations of the analysis presented in the thesis and highlight the areas for future research. I limit my discussion in particular to issues of scale and subjectivity, and thoughts on
how a more detailed exploration of these issues carries implications for further development of the analytical framework of governmentality.

First, informed in part by the nature of large scale urban infrastructure, whose level of investment often (if not always) required financing by the central government and involvement of international agencies, my documentation of the governmentality of urban water in Jakarta has often focused on the influence of macro, rather than micro, relations of power. Subsequently, the attention paid to the influence of global governmentalities of multi-lateral development banks, and neo-liberal political economic relations has perhaps left under-examined some of the more micro-level scales of relations of power through which access to urban water supply is often negotiated, and subjectivity and space are co-constituted. In particular, the relations of power enacted by individuals through patron/client relations, kinship, and ethnic associations have been significant determinants in the production of informal, and sometimes illegal, networks of water supply that subsequently allow or forbid the extra-legal occupation of urban spaces, and the claiming of new identities by urban poor – who, as revealed through research interviews, in occupying marginal spaces and contesting their illegal identity view themselves as savvy ‘survivors’, proud of their resilience rather than being shamed by their exclusion. These relationships, and their effect on the splintering of water networks in Jakarta, were introduced in Chapter Six, but much more detailed investigation could be conducted into how the rationalities of government are worked through the micro-level relations of power within which individuals within institutions of authority (local government, water supply companies, ministry officials, development agency staff) are situated.

This, in turn, raises questions of subjectivity. Specifically, there is more work to be done in investigating how individuals, differently positioned within relations of power, differentially articulate, influence, inform, or enact governmentality. For, although governmentality “draws upon and is situated within a heterogeneous assemblage combining various forms of practical knowledge” (Li, 2007:6), and is not therefore a product of a singular intention or will, it is however worked through individuals. And, although the position and subsequent range of actions and relations of these individuals (whom Li terms trustees) might be “structured by the enterprise of which they form a part” (Li, 2007:6), there is difference. As I have argued within this thesis, the material practices of government matter in how they in turn influence discourse, and either constrain or enable future actions and identities. Also, as postcolonial scholars emphasize, difference matters, and it opens up avenues of exploration into how the different (racial, class-based, ethnic, gendered, sexual, religious) subjectivities of the trustees informs the discourses and practices through which government is enacted, and subsequently informed through.

Following this discussion of subjectivity, and in particular the reference to gender, it is noted that the analysis of this thesis conducted a specific, but a limited investigation of subjectivity in relation to piped water supply. Looking at key moments within the colonial and postcolonial genealogy of the
city’s development of the piped water supply network, I focused primarily upon first racial and then mainly at socio-economic class, and the ways in which these categories were scripted into moral positions of contaminated vs. hygienic, and legal vs. illegal in relation to water supply. This of course both left unexamined the multitude of other components of subjectivity (sexuality, gender) and also as highlighted in Chapter One, left unexplored the constitution of these identities in relationship to other sources of urban waters. Following the argument of Bondi and Rose (2003), as to the mutual constitution of sexuality, gender, class, and race, further research could explore in more detail the ways in which these aspects of subjectivity are co-constituted in relation to different sources of urban waters. In addition, maintaining a focus on the piped water supply network, both the overt masculinity of the small-scale water supply sector, and the ways in which (helpless) feminine water users are constructed as ‘victims’ to the masculine water thieves provide interesting areas for further investigation.

Returning to the issue of scale, and in particular the intersection between global, national, and local, I believe that the analytical framework of governmentality, as it is presented here, still requires more ‘messiness’ (see Rutherford, 2007) in order to delve beyond the boundaries of the nation-state, and produce more complexity within the notion of the ‘state’ as a single institution of authority operating according to similar rationalities of rule. Indeed, in both past and present Jakarta’s piped water supply system has been the product of negotiation between multiple state and non-state institutions, which have not always had the same idea on how best to govern. As documented, the colonial municipal council, the administration of the colony of Netherlands East Indies, and the Dutch Central government in Holland all had different ideas on how the Ethical Policy would be worked through water, with the tensions between these authorities and the contradictions between municipal concerns for profit and national programs of ‘uplifting’ producing perverse results. Following this, the introduction of a neo-liberal governmentality, promoted through the World Bank, also intersected in particular, and also perverse, ways within the privatization of Jakarta’s water supply in the mid-1990s. Currently, the rationalities of the World Bank, the private sector operators, and Jakarta state institutions are once again intersecting within programs of improvement. The contribution of both state and non-state actors, at different scales, to rationalities and relations of rule (see Rose-Redwood, 2006), is even more evident in the coming age of ‘government through community’, a new technology of government now being adopted by private water supply companies, and working through local actors (see Li, 2002, 2007). Given this, more work needs to be done in the analysis of the intersection between different state and non-state institutions of authority, between different scales of governmental institutions (such global organizations like the World Bank versus influence of local NGOs), and the tensions, contradictions, or reformulation of relations of rule arising from these intersections.

Finally, the thesis suggests a further avenue of research pertaining to the relationship between materiality and governmentality. Given the unique (and ungovernable) properties of water, one might
ask how urban water is enrolled within, and productive of rationalities or relations of rule differently than other socio-natures in the city. What are the particular knowledges and spaces associated with water, and how are these then productive of different ways of governing? As documented in Chapter Four, the kinetic properties of water make necessary the application of self-regulatory power, of government rather than discipline. This results in the production of new kinds of government technologies to moralize and ‘responsibilize’ low-income residents, as discipline alone can not control the illegal flows of water. Further study is required of how this has led to the formation of new governmentalities, in particular focusing on resistance as documented in the colonial archival material.

7.4 Possible Futures: Pro-poor water supply

In this section of the conclusion I discuss the current state of access to water supply in Jakarta. While highlighting the physical and socio-economic implications of the (post)colonial governmentalities for improving equity of access to water supply in the coming years, I offer suggestions for a more pro-poor approach.

First, I argue that connection to the city’s centralized pipe network is the most long term sustainable solution. In light of discussion in Chapter Six this may seem contradictory, but given the decades of myopic vision of the state and development donors on the centralized system, and the subsequent neglect of water quality regulations, and concomitant under-investment in sanitation it remains the most sustainable solution. Less than two percent of the city has access to centralized sewerage, and with the vast majority of resident relying on septic tanks or unsealed soak pits over eighty percent of the city’s shallow groundwater wells are contaminated with e-coli and/or heavy metals. In addition, an increasing area of the city will not even have access to shallow groundwater, which in its filtered and treated form currently provides the majority of non-networked water supply. Salinization of groundwater is already the case for most of Northern Jakarta, and with land subsidence continuing at a rate of between five to six centimeters per year (Boer et al., 2007), and sea level rises predicted due to climate change, the availability of shallow and deep groundwater will decrease (ADB and Pelangi, 2003).

Given this information, what is a strategy to increase access? First, as I have argued in Chapter Six, the recognition of the co-constitutive natures of infrastructure, urban space, and subjectivity implies a rethinking of the concept of the thirsty poor. Development interventions designed according to this discursive construction must reposition the poor as agents, making choices based on their geographical location and socio-economic and socio-political identity. Recognizing the patterns and preferences for water supply of the poor as rational responses to relations of rule, further research and development programming can then explore why, how, and where the choices for non-networked water
supply are made more palatable, and subsequently where connection to the network can be made more possible through physical or financial interventions (infrastructure or subsidies).

Second, following from this, programs to increase access to the city’s piped water supply network by the poor requires the recognition of the inter-relationships between infrastructure, identity, and urban space, and must acknowledge the ways in which access is made ‘more or less easy’ for differently situated residents. From here, development programs led by the state, MDBs, and NGOs can address the socio-economic and political barriers to connection, which includes, but does not end, with technical solutions such as subsidizing initial connection fees, or providing access to credit for low-income households to finance initial connections.

Of course, recognition of these realities, and perhaps reformatted development interventions will not, given the material effects of (post)colonial governmentality, be easy to implement. First: the water crisis being predicted by the state and private sector operators for 2008 will mean less water produced and available to distribute through the centralized system (‘Jakarta facing dry future’ Jakarta Post 19 January 2007; ‘Water crisis looms for city as groundwater dries up’ Jakarta Post 16 August 2007). Accordingly, with less water being produced and available to provide through the piped network, the reduction of the water ‘lost’ in the system due to illegal connections and physical leakages will become more important, and might, as I suggested in Chapter Six, lead to further reluctance to extend network pipes into low-income communities. Second, compounding this socially and naturally produced problem of water shortage is the socio-economic and managerial implications surrounding the 2006 withdrawal of Thames Water International from the concession in the eastern half of the city. The private sector consortium (Aquatico) taking over the contract from Thames Water International has no prior experience in the water sector, and their entrance into Jakarta is also clouded by suspicion of corruption (PSI, 2007). More fundamentally, with less technical experience, and without the financial and managerial support of a home firm (formerly RWE), Thames PAM Jaya has cancelled the implementation of the OBA project in the eastern half of the city, which has proportionately more lower-income consumers.

Meanwhile, although the private sector partner for the western half of the city (ONDEO) has chosen to remain in Jakarta, is engaging in pro-poor initiatives such as the OBA, and is promising increased investment into network expansion, they have also retracted their involvement. In 2006 ONDEO sold off forty nine percent of their shares in Palyja, and their persistence in the Jakarta contract is attributed to the potential financial loss if they withdrawal (Jensen, 2005; ‘Palyja sells 49 percent stake’ Jakarta Post 27 July 2006).

Given these physical, political, and economic realities, my prognosis is not an optimistic, or a simple one. There is no doubt that forms of self-provision, and continued growth of alternative suppliers will continue as residents continue to ‘take care of themselves’ guided in their choices by ‘various circumstances’. In light of the non-transitional nature of these technologies of water supply
(over 150 years), inclusion of these providers within the formal system, and regulation of their services would not be amiss; it was contaminated water sold by an unlicensed air isi ulang vendor, whose business increased during a shortage of water supply through the centralized network, that led to the deaths of residents in Jakarta in 2007 (Jakarta Post 29 November 2007).

7.5 Re-imagining Jakarta

In conclusion, and in light of the above paragraphs, I emphasize both the practical and political significance of the analysis offered by the analytical framework of governmentality. First, the historical, materialized, and politicized understanding of relations of power and networks of water allows engagement with the ‘material practices, actual spaces, and real politics’ of the present (Yeoh, 2001: 457) – making visible the influence of the colonial past within the present in ways that matter to current residents. Second, casting doubt on the dominant developmentalist and academic discourses, and making visible the gaps of inadequate diagnoses of the failure to provide, the analytical framework of governmentality can help to open up the possibility of new imaginations.

The importance of new imaginations should not be over-looked, or under-politicized. The introduction to this thesis ended with a reference to new ‘imaginings’ of Jakarta being generated by a group of urban planners, architects, artists and activists (Imagining Jakarta, 2004). To conclude, I return to the comments of some of the workshop participants. First, in the spirit of Imagining Jakarta, which wished to “reveal dialogues about the values that emerge along with the process of producing the artifacts of the city” (Effendy and Kusumawijaya, 2004:7), this thesis has excavated the (post)colonial values embedded within Jakarta’s urban water supply infrastructure. Second, as “the problems, and at the same time, the potentials of this city lie in the energy derived from the ever increasing hopes that people place on her” (Effendy and Kusumawijaya, 2004:5), this thesis has worked towards the hope for more equitable access to water supply in Jakarta. Finally, as “the hopes are based on imaginations, be they individual or collective” (ibid), the thesis offers the conclusion that the hope for equity must be fueled by a new collective imagination for a more just relationship between urban governance and urban water supply infrastructure.
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247


World Bank (2006c). Voices of the Poor: Making Services work for the Poor in Indonesia - A Qualitative Consultation with the Poor at Eight Sites. Jakarta, World Bank, East Asia and Pacific Region.


APPENDIX 1 - Research Chronology, Methods, Sources, and Timeline

Table 8.1 Research Chronology, Methods, Sources, and Timeline

<table>
<thead>
<tr>
<th>Research Chronology</th>
<th>Research Methods</th>
<th>Research Sources</th>
<th>Research Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1870-1950</td>
<td>Archival: Dutch colonial archives</td>
<td>Delft University of Technology (T.U.) KIT (Amsterdam) KITLV (Leiden) UBC (Vancouver)</td>
<td>2003-2004</td>
</tr>
</tbody>
</table>
| 1950-1990           | Archival & Key informants         | • Archives, Libraries, and resource centers: Jakarta municipal archives, World Bank resource center (Jakarta), UBC (World Bank and USAID documents), Cornell University (World Bank documents and 2nd Jakarta Water Supply Master Plan), JIBC resource center (Jakarta), IHE and IHS libraries  
                      |                                   | • Engineering Documents: Degremont, Nippon Keoi, Amsterdam Water supply company, IHE and IHS libraries  
                      |                                   | • Key interviews: Kimprawil, Public Works, PAM Jaya, Bappenas, KKPPPI, IWACO, Amsterdam Water Supply Company, PT Tirta Cisadane, | 2004              |
| 1990-2006           | In-depth interviews               | • Water Sector: PAM Jaya, JSWSRB, TPJ, Palyja, PERPAMSI, AKAINDO  
                      |                                   | • Development Banks and Organizations: MDBs, bi-lateral aid agencies, international NGOs                                                                                                                        | 2005-2006         |
| 2005-2007           | In-depth interviews               | • Municipal governments (Walikota): North, South, Central, East, West Jakarta  
                      |                                   | • Local governments (Kelurahan)  
                      | Qualitative study: FGDs, in-depth interviews | • FGDs and in-depth interviews: 8 urban poor communities  
                      | Quantitative survey              | • Household surveys, 110 households  
                      | Participant Observation         | • Local and international NGOs implementing programs in Jakarta                                                                                                                                             | 2005-2007         |
### APPENDIX 2 – List of Research Interviews, 2004-2007

**Table 8.2 List of Research Interviews, 2004-2007**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Organization/Institution</th>
<th>Interviewee(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GOVERNMENT OF INDONESIA</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Government (Indonesia)</td>
<td>Ministry of Public Works (P.U.)</td>
<td>SB-AB Program Officers</td>
</tr>
<tr>
<td></td>
<td>Ministry of Settlement and Regional Infrastructure (Kimpraswil)</td>
<td>Sub-directorate of urban water supply planning, Director and staff</td>
</tr>
<tr>
<td></td>
<td>National Development Planning Agency (Bappenas)</td>
<td>Director for water resources and irrigation</td>
</tr>
<tr>
<td></td>
<td>Committee of Policy for the Acceleration of Infrastructure Development (KKPPI)</td>
<td>Advisor, Urban Infrastructure</td>
</tr>
<tr>
<td>Provincial Government (DKI Jakarta)</td>
<td>Regional Planning Development Board (Bappeda)</td>
<td>Head of Sub Division for water system, structure and city utilities</td>
</tr>
<tr>
<td></td>
<td>BPLHD- Regional Environmental Planning Board</td>
<td>Division for City Structure infrastructure and environmental</td>
</tr>
<tr>
<td></td>
<td>Municipality of North Jakarta (Jakarta Utara)</td>
<td>Lurah, Kelurahan council official</td>
</tr>
<tr>
<td></td>
<td>Municipality of East Jakarta (Jakarta Timur)</td>
<td>Lurah, Kelurahan council official</td>
</tr>
<tr>
<td></td>
<td>Municipality of West Jakarta (Jakarta Barat)</td>
<td>Lurah, Kelurahan council official</td>
</tr>
<tr>
<td></td>
<td>Municipality of Central Jakarta (Jakarta Pusat)</td>
<td>Lurah, Kelurahan council official</td>
</tr>
<tr>
<td></td>
<td>Municipality of South Jakarta (Jakarta Selatan)</td>
<td>Lurah, Kelurahan council official</td>
</tr>
<tr>
<td>Municipal Governments</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>INTERNATIONAL DEVELOPMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MDBs</strong></td>
</tr>
</tbody>
</table>
| Asian Development Bank (ADB) | Urban Development Specialist  
                                           Senior Infrastructure Finance Specialist  
                                           Project Implementation Specialist  
                                           Regional Director – Urban water supply and sanitation |
| World Bank                | Senior Water and Sanitation Specialist  
                                           Senior Water Specialist  
                                           Infrastructure and Urban Specialist  
                                           Sanitary Engineer  
                                           PJSIP Project Officer |
| World Bank, Water & Sanitation Program (WSP) | Regional Team Leader East Asia & The Pacific  
                                           Senior Water Specialist  
                                           Senior Sanitation Specialist  
                                           Senior Institutional Development Specialist  
                                           Senior Community Development Specialist |
| Waspola (Bappenas, World Bank, WSP, AusAid) | Team Leader |
| **Bi-lateral Aid Agencies** |
| USAID                     | Municipal Water Services Advisor  
                                           Basic Human Service Project officer |
| USAID-ESP                 | Chief of Party  
                                           Deputy Chief of Party  
                                           Municipal Water Services Advisor  
                                           Health and Hygiene Advisor  
                                           Jakarta Program Manager  
                                           Surabaya Program Manager |
| US-AEP                    | Urban Infrastructure Adviser  
                                           UPDATE project staff |
| USAID Eco-Asia            | Indonesia Country Coordinator |
| JICA                      | Public Relations & General Affairs Division Program Officer  
                                           Assistant Resident Representative |
| JBIC                      | Representative |
| CIDA                      | Program Officer |
| IDRC                      | Urban Poverty and Environment, Director  
                                           Urban Poverty and Environment, Jakarta Focus City Project Officer |
<p>| GTZ                       | Water &amp; Sanitation Network, Director |
| AusAid                    | Program Manager, Human Security &amp; Stability |</p>
<table>
<thead>
<tr>
<th>WATER SECTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water Supply Companies (Private and Public)</strong></td>
</tr>
</tbody>
</table>
| PAM Jaya | Technical Director  
Engineering staff  
Personnel Director |
| Palyja | Contract and Planning Manager  
Water for All Program Manager (International)  
Water for All Program Manager (Jakarta)  
Technical Director  
Engineering and Planning staff |
| Thames PAM Jaya | External Relations & Communications Director  
Corporate Social Responsibility Coordinator |
| PT. Tirta Degremont – PT Traya and Degremont Suez (private sector Build Operate Transfer for Cisadane WTP) | Former staff |
| PT. Tirta Cisadane – PT Traya and Degremont Suez (private sector operators for WTP Cisadane) | Research and Development Coordinator |
| PDAM Tirta Kerja Rahana – Tangerang municipal water supply company | External relations director |
| Amsterdam Water Supply Company | Former Project staff for WTP Cilandak |
| **Regulatory Board** |
| Jakarta Water Supply Regulatory Board (JWSRB) | Chairman  
Technical Manager – Water Supply Specialist |
| **Professional Associations** |
| PERPAMSI | Management and Financial Advisor |
| AKAINDO | Director |
| FORKAMI | Senior Consultant  
Program staff - Output Based Aid Social Survey Assessment |
| Association of Air Isi Ulang Producers & Distributors | President |
| PAM Jaya Labour Union - Serikat Pekerja Air Minum | General Secretary |
| **Contractors** |
| PT. Pebea Instansarana-Engineering, Procurement and Construction | Manager Director |
| Castalia | Output Based Aid project staff (Jakarta) |
| Nihon Suido | Engineering staff, Buaran I&II WTPs |
| PIPA- PT. Pran Indo Perdana Abadi | Managing Director |
| **Consultants** |
| Nihon Suido | Consultant |
| Nikken Consultants Ltd. | Consultant |
| Nippon Koei Consultants | Consultant |
| PT. Ekamitra Engineering SHD.BHD | Consultant |
| IWACO, Royal Haskoning | Consultant - PJSIP former staff |
| HIS – Insan Hitawasana Sejahtera, Social Science Research and Consulting | Consultant |
## UNIVERSITIES & RESEARCH INSTITUTES

<table>
<thead>
<tr>
<th>University/Institute</th>
<th>Faculty/Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Tarumanagara (Jakarta)</td>
<td>Faculty of Architecture, professor</td>
</tr>
<tr>
<td>University of Atma Jaya (Jakarta)</td>
<td>Department of Urban Planning, Director of Graduate Program &amp; Faculty</td>
</tr>
<tr>
<td>Universitas Katolik Soegijapranata (Semarang)</td>
<td>Department of Community Health, Center for Health Research – Director</td>
</tr>
<tr>
<td>Universitas Indonesia (Jakarta, Bogor)</td>
<td>Department of Urban Environment Studies – Director &amp; Faculty</td>
</tr>
<tr>
<td>Diponegoro University (Semarang)</td>
<td>Department of Anthropology – Faculty</td>
</tr>
<tr>
<td>Trisakti University (Jakarta)</td>
<td>Center for Health Research – Director &amp; Faculty</td>
</tr>
<tr>
<td>Institut Teknologi Bandung (Bandung)</td>
<td>Department of Urban Planning - Faculty</td>
</tr>
<tr>
<td>URDI (Jakarta)</td>
<td>Managing Director</td>
</tr>
<tr>
<td>Urban Corner (Jakarta)</td>
<td>Senior Researcher</td>
</tr>
<tr>
<td>Business Watch Indonesia (Surakarta)</td>
<td>Jakarta Land Tenure Study research team members</td>
</tr>
<tr>
<td>INCIS (Jakarta)</td>
<td>Director</td>
</tr>
<tr>
<td>SMERU Research Institute</td>
<td>Managing Director</td>
</tr>
<tr>
<td>Institute for Housing and Urban Development Studies, Erasmus University (Rotterdam)</td>
<td>Research Coordinator</td>
</tr>
<tr>
<td>UNESCO-IHE (Delft)</td>
<td>Partnership for Governance Reform in Indonesia – Project staff</td>
</tr>
<tr>
<td>University of Leiden</td>
<td>Executive Director</td>
</tr>
</tbody>
</table>

## NON-GOVERNMENT ORGANIZATIONS

<table>
<thead>
<tr>
<th>NGOs</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercy Corps Indonesia</td>
<td>Urban Director HP3/Lestari Project Manager</td>
</tr>
<tr>
<td>Action Contre la Faim</td>
<td>Water supply and sanitation Program Coordinator</td>
</tr>
<tr>
<td>SwissContact</td>
<td>Resident Representative Jakarta Focus City Project officer</td>
</tr>
<tr>
<td>Save the Children</td>
<td>Project Officer</td>
</tr>
<tr>
<td>BORDA</td>
<td>Technical Advisor</td>
</tr>
<tr>
<td>HIVOS</td>
<td>Indonesia Country Director</td>
</tr>
<tr>
<td>CARE Indonesia</td>
<td>Block Grant Officer Regional Office Southeast Asia</td>
</tr>
<tr>
<td>World Vision Indonesia</td>
<td>Senior Program Officer</td>
</tr>
<tr>
<td>Catholic Relief Services Indonesia</td>
<td>Health &amp; Nutrition Program Officer</td>
</tr>
<tr>
<td>Urban Poor Consortium/Konsortium Kemiskian Kota</td>
<td>Deputy Country Representative Programming</td>
</tr>
<tr>
<td>Urban Poor Consortium/Konsortium Kemiskian Kota</td>
<td>Coordinator</td>
</tr>
<tr>
<td>Urban Poor Consortium/Konsortium Kemiskian Kota</td>
<td>Co-Coordinator</td>
</tr>
<tr>
<td>Indonesian NGOs</td>
<td>Area Coordinators</td>
</tr>
<tr>
<td>-----------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>UPLINK</td>
<td>Coordinator</td>
</tr>
<tr>
<td>KOMPARTA</td>
<td>Director</td>
</tr>
<tr>
<td>YLKI</td>
<td>Chairperson</td>
</tr>
<tr>
<td>INFID</td>
<td>Chairperson</td>
</tr>
<tr>
<td></td>
<td>Researcher</td>
</tr>
<tr>
<td></td>
<td>Program coordinator, MDGs</td>
</tr>
<tr>
<td>Institute for Global Justice</td>
<td>Director</td>
</tr>
<tr>
<td>INFOG Indonesian Forum on Globalization</td>
<td>Director</td>
</tr>
<tr>
<td>FAKTA</td>
<td>Director</td>
</tr>
<tr>
<td>Amrta</td>
<td>Director</td>
</tr>
<tr>
<td>KruHa</td>
<td>Coordinator</td>
</tr>
<tr>
<td>LP3ES</td>
<td>Researcher</td>
</tr>
<tr>
<td></td>
<td>Director</td>
</tr>
<tr>
<td>WALHI</td>
<td>Deputy Director, Jakarta office</td>
</tr>
<tr>
<td></td>
<td>Researcher</td>
</tr>
<tr>
<td>EcoSoc – Institute for Economic and Social Rights</td>
<td>Staff</td>
</tr>
<tr>
<td>LPPSE</td>
<td>Staff</td>
</tr>
<tr>
<td>YLBHI</td>
<td>Staff</td>
</tr>
<tr>
<td>Indonesia Corruption Watch</td>
<td>Former research staff</td>
</tr>
<tr>
<td>Pelangi</td>
<td>Research Coordinator</td>
</tr>
<tr>
<td>Perkumpulan PraKarsa</td>
<td>Associate Director</td>
</tr>
<tr>
<td>Institute for Policy Reform</td>
<td>Director</td>
</tr>
<tr>
<td>BEST</td>
<td>Director</td>
</tr>
<tr>
<td>PPMA</td>
<td>HP3/Lestari community mapping project team</td>
</tr>
<tr>
<td>Yayasan Emmanuel</td>
<td>Water Program, Coordinator</td>
</tr>
</tbody>
</table>
SECTION 1: GENERAL INFORMATION

1. Name / place of living (district) : ______________________________________

2. House ownership :
   - Private property, owner: _________________ (see the document)
   - Rental : Rp __________ per month / year, owner: _________________

3. Type of house :
   - Permanent
   - Semi permanent
   - Temporary
   - Other : _______________________

4. How long have you been living in this area : _____________ month / year

5. Where did you live before you moved into this area : _________________

6. Are you living in this area permanently (all year round):
   - No, where else do you live : _______________
   - Yes

7. Number of family and people living in the house :
   - Single family : _____________ people
   - Multiple family : ___________ families of __________ people

8. Education
   - Man  : _____________________________
   - Woman: _____________________________
   - Others : _____________________________

9. Occupation:
   - Man  : _____________________________
   - Woman: _____________________________
   - Others : _____________________________

10. Income:
    - Man : Regular / Fluctuating Rp ___________ per day / week / month / year
    - Woman: Regular / Fluctuating Rp ___________ per day / week / month / year
    - Other : Regular / Fluctuating Rp ___________ per day / week / month / year
11. Household monthly expenses (IF POSSIBLE):

- Meals : Rp _______________
- Transportation : Rp _______________
- Electricity : Rp _______________
- Water : Rp _______________
- Telephone : Rp _______________
- School Fee : Rp _______________
- Other : Rp _______________

12. Status of the area (get the answer from RT/RW head):

- Legal housing area
- Illegal housing area

SECTION 2: CURRENT HOUSEHOLD WATER SUPPLY

Kimpraswil Water Supply Facilities

13. Have you heard about/know of the Kimpraswil Fuel Subsidy Compensation Program?

- No
- Yes, from whom and since when : __________
  * Government officials : Kimpraswil / Pemda / Camat / Lurah / RW / RT
  * Community member : CBO / KSM / other : __________
  * News : TV / Radio / Newspaper / other : __________
  * Other : ________________________________________

14. Do you know what kind of water supply infrastructure was built?

- Water terminal
- Deep well
- Public hydrant
- Other : ___________________________
- Subsidized house connection

15. Were you asked what type of water supply infrastructure you wanted in the community?

- No
- Yes, by whom _______________________________

16. Was this choice the same option / module chosen by Kimpraswil?

- No, what kind of facilities do you prefer : __________
- Yes

17. Who manages / operates the facilities?

- Private individuals : _______________________________
Community-based organization: _______________________
Others: ___________________________________________

18. Distance from the water source / facility: ___________ meters

**Former Household Water Supply**

19. What type of water sources did you use before Kimpraswil water supply project, what for and how much did you pay for it?

<table>
<thead>
<tr>
<th>Water source</th>
<th>Water Usage</th>
<th>Cost per day / week / month</th>
<th>Water consumption (liter / cubic meter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public hydrant</td>
<td>□ Self</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance: ______ m</td>
<td>□ Vendor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shallow groundwater</td>
<td>□ Individual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depth: ______ m</td>
<td>□ Communal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deep groundwater</td>
<td>□ Individual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depth: ______ m</td>
<td>□ Communal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Networked connection</td>
<td>□ Individual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Since: ______</td>
<td>□ Shared</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminal air</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water source at MCK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottled water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rain water Collection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water from neighbors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: √ (check) ~ yes

20. IF household knew about Kimpraswil project; what sorts of problems for each water supply does the household think it is attempting to solve/improve

□ Continuity: _________ hours per day
□ Quality: odor / turbid / color / other: ________________
□ Quantity
☐ High cost, before: Rp ___________ per pikul (40 L) / meter cubic
☐ Other: ____________

**Current Household Water Supply**

21. Change in water use practice after Kimpraswil water facilities installed: what sources of water supply are used, what for and how much do you pay for it now?

<table>
<thead>
<tr>
<th>Water source</th>
<th>Reason*</th>
<th>Water Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Drinking</td>
</tr>
<tr>
<td>Surface/River</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shallow groundwater</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deep groundwater</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Networked connection**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public hydrant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminal air</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water source at MCK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottled water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rain water Collection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water from neighbors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: √ (check) ~ yes


**For networked connection, asked respondent to show the bill, recheck the consumer tariff group.

22. Distance from water facilities to your house: ____________ meter

23. What do you think about how much you currently pay for water each month?

☐ Affordable
☐ Unaffordable
☐ Expensive
☐ Normal
☐ No opinion
☐ Other: ____________________________
24. Has the household invested in any water storage/infrastructure?
   □ Building small reservoir: Rp __________ per month/year
   □ Buying gentong, jerigen, etc: Rp __________ per month/year
25. How much do you think that you should pay for water supply per month?
   □ Rp __________ per month, WHY__________________________

SECTION 3: HOUSEHOLD PREFERENCES FOR WATER SUPPLY

26. Which type of water would you prefer to use for each activity?

<table>
<thead>
<tr>
<th>Water source</th>
<th>Reason*</th>
<th>Water Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Drinking</td>
</tr>
<tr>
<td>Surface/River</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shallow groundwater</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deep groundwater</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Networked connection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public hydrant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminal air</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water source at MCK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottled water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rain water Collection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water from neighbors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: √ (check) ~ yes


27. Are you aware of the comparative cost options of these different sources?
   □ Monthly bill for household connection/connection fee: Rp ________________
   □ Cost to operate a water pump for shallow ground water: Rp ________________
   □ Cost to buy water from vendor versus collecting water themselves: Rp ________
Cost to buy bottled water : Rp _____________
Other : ___________________ Rp __________

28. Do you use the lowest cost option?
   □ Yes
   □ No, why __________________________________________

29. How would you rate the quality of these different sources of water, from best to worst?

<table>
<thead>
<tr>
<th>Water source</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Best</td>
</tr>
<tr>
<td>Networked connection</td>
<td></td>
</tr>
<tr>
<td>Public hydrant</td>
<td></td>
</tr>
<tr>
<td>Shallow groundwater</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Deep groundwater</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Water source at MCK</td>
<td></td>
</tr>
<tr>
<td>Bottled water</td>
<td></td>
</tr>
<tr>
<td>Rain water Collection</td>
<td></td>
</tr>
<tr>
<td>Water from neighbors</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

Note: √ (check) ~ yes
Other Network and Public Services in Community

30. What kind of public services exist in this area, which ones do you like to see, which ones are the most problematic, which one would you like to improve (improved access, lower costs, etc.)?

<table>
<thead>
<tr>
<th>Type of Infrastructure</th>
<th>Existed</th>
<th>Required</th>
<th>Problematic</th>
<th>Improvement</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Electricity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthcare</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garbage Collection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road maintenance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telecommunication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Supply</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: ✓ (check) – yes
APPENDIX 4 – Location of Research Sites in Jakarta

Map 8.1 Location of Research Sites in Jakarta
Table 8.3 Quantitative & Qualitative Field Research Locations: Household survey respondents and UPC communities

<table>
<thead>
<tr>
<th>Municipality</th>
<th>District</th>
<th>Sub-District</th>
<th>Household Survey Conducted</th>
<th>UPC Community: location of FGDs and in-depth interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>West Jakarta</strong></td>
<td>Kalideres</td>
<td>Semanan</td>
<td>X</td>
<td>Kampung Rawa</td>
</tr>
<tr>
<td></td>
<td>Kebon Jeruk</td>
<td>Kebon Jeruk</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>North Jakarta</strong></td>
<td>Penjaringan</td>
<td>Kamal Muara</td>
<td>X</td>
<td>Kamal Muara</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Penjaringan</td>
<td>X</td>
<td>Marliena</td>
</tr>
<tr>
<td></td>
<td>Kelapa Gading</td>
<td>Kampung Melayu</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>East Jakarta</strong></td>
<td>Jatinegara</td>
<td>Kampung Melayu</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cipinang Besar Utara</td>
<td>C.B.U./Prumpung</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cipinang Besar Selatan</td>
<td>Cipinang Besar Selatan</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cakung</td>
<td>Rawa Terate</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pulogadung</td>
<td>Jati</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pulogadung</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kramat Jati</td>
<td>Kampung Tengah</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>Central Jakarta</strong></td>
<td>Tanah Abang</td>
<td>Kebon Melati</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kemayoran</td>
<td>Gunung Sahari Selatan</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Household Surveys: conducted amongst 110 households covering 10 sub-districts, 9 districts, and 4 municipalities

UPC community field sites: 8 communities covering 6 sub-districts, 4 districts, and 3 municipalities
The protocol describing the above-named project has been reviewed by the Committee and the experimental procedures were found to be acceptable on ethical grounds for research involving human subjects.

Approval of the Behavioural Research Ethics Board by one of the following:

Dr. James Frankish, Chair,
Dr. Cay Holbrook, Associate Chair,
Dr. Susan Rowley, Associate Chair
Dr. Anita Hubley, Associate Chair

This Certificate of Approval is valid for the above term provided there is no change in the experimental procedures.