ELSEVIER
www.elsevier.com/locate/worlddev

World Development Vol. 36, No. 10, pp. 1891–1915, 2008

0305-750X/$ - see front matter

doi:10.1016/j.worlddev.2007.09.015

Governance Failure: Rethinking the Institutional Dimensions of Urban Water Supply to Poor Households

KAREN BAKKER, MICHELLE KOOY *
University of British Columbia, Canada

NUR ENDAH SHOFIANI and ERNST-JAN MARTIJN *
ESP-USAID, Jakarta, Indonesia

Summary. — This paper applies a conceptual framework of "governance failure" to an analysis of the institutional dimensions of urban water supply provision to poor households, focusing on the case of Jakarta. Data from a household survey, archives, GIS-based mapping, and interviews are used to document governance failures that create disincentives for utilities to connect poor households *and* for poor households to connect. The paper concludes by suggesting that the debate over the relative merits of public and private provision has diverted attention from the pressing issue of governance reform, and by raising the question of whether household provision of networked water supply by monopolistic providers (whether public or private) is universally feasible given the current water supply policy norms.

Key words — water, infrastructure, poverty, access, Asia, Jakarta

1. INTRODUCTION

Inequitable access to water supply and sanitation has been characterized as a critical development challenge for the South. Halving by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation is one of the Millennium Development Goals (UNDP, 2003). The World Health Organization estimates that 1.1 billion people worldwide do not have access to safe drinking water (WHO/UNICEF, 2004; WHO, 2000). An increasing proportion of users without access to adequate water supplies live in urban areas; poor families in large cities in the South frequently do not have networked water supply access (UNCHS, 2003, 2006; UNDP, 2006; UNWWAP, 2003, 2006). The most recent assessment by UNCHS estimates that 970 million urban dwellers are without access to "adequate" water supply (cumulative total for Africa, Asia, and Latin America and the Caribbean) (UNCHS, 2006). Given the lack of reliable data, [1] current estimates of urban dwellers without access to "adequate" provision for water supplies are necessarily highly uncertain, but it seems likely that the true number of urban dwellers with inadequate provision

* Abidin Kusno, Bharat Punjabi, Michael Leaf, Sylvy Jaglin, Olivier Coutard, Steve Graham, and three anonymous reviewers provided helpful comments on various drafts of related material. Research assistance from Ernst Jan Martijn and Nur Endah Shofiani is gratefully acknowledged, as is the role played by host Professor Teti Argo at ITB during research visits to Indonesia. The research upon which this paper is based was funded by a grant from the Social Sciences and Humanities Research Council of Canada. Much of the material is drawn from a background report originally commissioned by the UNDP HDRO as part of the 2006 Human Development Report. Assistance from archival staff at KIT (Amsterdam) and KITLV (Leiden) during research in 2003 is gratefully acknowledged, as is that of water supply managers at PAM Jaya and staff at numerous government departments and NGOs during fieldwork conducted in Jakarta in 2001, 2004, and 2005. The usual disclaimers apply. Final revision accepted: September 8, 2007.

for water supply is significantly underestimated by governments and international agencies, and is growing as rapid urbanization continues in many regions (UNCHS, 2003, 2006).

This paper examines factors that explain the persistent failure of both public and private water supply system operators to achieve high rates of individual network connections to poor households in urban areas. [2] Section 1 presents a conceptual framework of "governance failure," which focuses on the institutional dimensions of urban water supply provision. In developing the conceptual framework in Section 1, the paper summarizes the recent literature pertaining to the "ownership" versus "institutions" debate, focusing on the putative merits of public versus private management of water supply systems. The analysis concludes that institutions have an important impact on management and performance, and argues that more systematic attention should be given to the institutional dimensions of water supply provision with respect to urban poor households. Building on this discussion, we present a concept of "governance failure" as it applies to urban water supply to poor households, positing that governance failures apply not only to water supply providers and governments, but *also* to poor households, whose capability to connect may be undermined by a range of economic and non-economic factors.

In subsequent sections of the paper, this conceptual framework is applied to the case of Jakarta, using primary data from household surveys, archives, water utility reports, GIS-based mapping, and interviews with water managers, government officials, lenders, and NGOs. [3] Section 2 documents the differentiation of access to water supply in Jakarta, and argues that the spatial dimensions of network access and exclusion—that is, the urban macro-geography of network distribution—are an important and under-documented aspect of the failure to achieve high connection rates for poor households. Sections 3 and 4 of the paper attempt to explain this differentiation of access through presenting an analysis of governance failures, respectively, pertaining to Jakarta's water supply utility (under both public and private management) and poor households. Specifically, Section 3 analyzes governance failures pertaining to the water supply utility and municipal government, which include water supply utility governance norms, land use policies and related municipal decision-making processes, the water supply utility business model, and discriminatory connection policies on the part of water utilities linked to tariff-related economic disincentives for connecting poor households. Section 4 then analyzes sources of governance failure pertaining to the capability of individual households to connect to the water supply system, which include connection fee policies, transaction costs, housing and residency status (tenure), security of water supply, and perceptions of water quality. The findings indicate that governance failures produce important disincentives for the water supply utility to connect poor households *and* for poor households to choose to connect to the water supply system.

The final section of the paper argues that the institutional and spatial dimensions of water supply are under-documented aspects of the failure to supply water access to poor households in urban areas, and concludes with a discussion of policy implications.

2. MARKET FAILURE, STATE FAILURE, GOVERNANCE FAILURE: EXPLAINING LACK OF ACCESS TO NETWORKED WATER SUPPLY BY THE URBAN POOR

Supplying water to the world's poor has been high on the agenda of the international community for decades, yet lack of universal access to urban water supply has persisted despite sustained and significant investment by bilateral aid agencies and multilateral financial organizations. Water supply figured prominently on the agendas of the Stockholm Environment (1972) and Vancouver Habitat (1976) conferences. At the UN's Mar del Plata conference (1977), the United Nations Water and Sanitation Decade was formally agreed; over the period 1981–90, bilateral aid and multilateral finance were directed toward water supply projects in the South in unprecedented amounts (WHO, 1992). At the end of the decade, more people (in absolute terms) were being supplied with "improved water supplies" than ever before; during the decade, it was estimated that 1.2 billion people gained access, for the first time, to a safe and adequate water supply (WHO, 1992). Yet, in many countries, the increase in supply had failed to keep pace with the population growth, and growing numbers of people remained without access to the World Health Organization minimum of 25 L per person per day of potable water; the number without access to a safe and adequate water supply fell by only 450 million

during the same period (WHO, 1992). Much attention during these decades was devoted to water supply in rural areas, but more recently the particular problems posed by the lack of access to water supply by poor households in urban areas in the context of rapid urbanization have been given greater attention (UNCHS, 2003, 2006; UNDP, 2006; UNWWAP, 2003, 2006; WHO, 1992).

The failure to achieve improved rates of connection of poor households to water supply, particularly in urban areas, was part of the reason for the emergence over the past decade of a wide-ranging debate on new approaches to water supply in the South. An important dimension of this debate has been the question of the relative importance of ownership versus institutions [4] in influencing the performance of water supply utilities, and network utilities more generally (e.g., Newbery, 2000). This question has particular salience given the significant increase in private sector participation (PSP) in water supply in urban areas in developing countries over the past two decades, and the strong support for some bilateral and multilateral agencies for private sector involvement. Indeed, much recent research focusing on the institutions/ownership debate with respect to water supply focuses on the question of the relative merits of the public and private sectors, in the context of heated debate about the role of "state failure" and "market failure" in low penetration rates for water supply utilities.

A significant emphasis of the recent debate over the role of ownership versus institutions has focused on the question of the relative merits of the public and private sectors in managing water supply systems. What does this research tell us? Reviews of the performance of water supply utilities in Asia, the United States, the United Kingdom, and Europe indicate that ownership (public or private) does not predict the efficiency of water service providers (Bayliss, 2003; Braadbaart, 2002; Estache & Rossi, 2002; Hodge, 2000; Hunt & Lynk, 1995; Kirkpatrick, Parker, & Zhang, 2006; Lobina & Hall, 2000; Prasad, 2006; Renzetti & Dupont, 2004; Wallsten & Kosec, 2005). More generally, the public administration literature states that there is no association between the formal-legal status of a public service provider and its service delivery performance (see Holmes, 2000, with respect to water utilities and (Verhoest, Peters, Bouckaert, & Verschuere, 2004) for a more general argument). According to this view, institutions [5] have a greater impact on water utility performance than ownership (Budds & McGranahan, 2003; Gleick, Wolff, Chalecki, & Reyes, 2002; Martin, 2004).

However, other studies have found that ownership does have an effect. Proponents of PSPs argue that private sector involvement improves performance through, for example, higher efficiency and cost recovery, enabling additional sources of finance, or higher connection rates for poor households (Cross & Morel, 2005; Johnstone & Wood, 2001; Nickson & Franceys, 2003; Shirley, 2002; Winpenny, 1994; World Bank, 1994, 1997a, 2004a). Conversely, opponents of PSPs have argued that private sector participation negatively affects performance through raising the cost of capital, reducing long-term investment in infrastructure repair and replacement, increasing corruption, or reducing affordability due to tariff increases (Bayliss, 2002; Bayliss & Fine, 2007; Bond, 2002, 2004; Hukka & Katko, 2003; McDonald & Ruiters, 2005; Wilder & Romero Lankao, 2006). In short, both proponents and opponents of private sector involvement attribute an important role to the ownership of water supply system managers.

To some degree, these divergent interpretations of the relative importance of ownership versus institutions are dependent upon different definitions of "performance": for example, studies focusing on efficiency have found little effect of ownership, whereas studies focusing on distributional concerns (e.g., tariff rates, connection rates to poor households) have found a greater effect (Prasad, 2006). These divergent interpretations may also be due to ideological bias: opponents (or proponents) of privatization may be more likely to focus upon negative (or positive) effects of involving the private sector, thereby emphasizing the importance of ownership. Notwithstanding their differing conclusions, most recent research on water supply utilities acknowledges that institutions do matter. Inadequate or absent regulation, for example, is widely acknowledged to contribute to poor PSP outcomes (ADB, 2003a; Anwar, 2001; Brown, 2001; Budds & McGranahan, 2003; Franceys & Weitz, 2003; Gutierrez, Calaguas, Green, & Roaf, 2002; Robbins, 2003; UNDP, 2003). In short, the literature suggests that whereas institutions are determinant of utility performance, the effect of ownership (positive, negative, or neutral) is disputed. In reality, of course, it may be the case that ownership and institutions are to

some degree inter-related; for example, a change in ownership will result in (and perhaps be enabled by) a change in institutions (Ostrom, 1990; Ostrom, Schroeder, & Wynne, 1993).

Despite the acknowledged importance of institutions in the literature, institutional analysis has not been prioritized in the recent debate on urban water supply, particularly with respect to PSPs (although, for more general discussion, see Saleth & Dinar, 2000, 2005; Trawick, 2003). Much of the literature seeks to assess the merits of public and/or private providers, relying (at times implicitly) on concepts of market failure and state failure. The concepts of market and state failure are admittedly important, particularly when considering the case of water supply in cities in the South, where water supply networks are not universal and where non-networked sources include government, NGO, and private sector providers drawing on different sources of water (ground water, surface water, rainwater), and employing different technologies of water provision (networks, wells, treated bottled waters, bulk water deliveries, and rainwater harvesting) (Collignon & Vezina, 2000; UNCHS, 2003, 2006). This is the case because networked water supply in many cities is not a natural monopoly. Rather, in many cases, state and private sector actors [6] are simultaneously involved in various aspects of water supply, and often compete for clients. Both market failure and state failure may thus characterize specific aspects of urban water supply delivery.

However, insofar as the concepts of market and state failure tend to encourage a focus on ownership, rather than on institutions, the complex set of institutional factors underpinning the failure of both public and private networked water supply operators to effectively and universally supply poor households may be insufficiently understood. Recent debates on water governance, in contrast, focus explicitly on these institutional factors, where water governance is defined as the range of political, organizational, and administrative processes through which stakeholders (including citizens and interest groups) articulate their interests, exercise their legal rights, take decisions, meet their obligations, and mediate their differences (adapted from Rogers & Hall, 2003 and UNDP, 2007; see also Nunan & Satterthwaite, 2001). Although water supply governance is typically defined as a process dominated by governments, water supply utilities, and companies, the literature on "distributed governance" reminds us that it is also a process in which non-state actors—including citizens—can participate, although their degree of participation may vary significantly (Pierre, 2000; Pierre & Peters, 2000; Strange, 1996; Rhodes, 1996).

Following from this definition, "governance failure" occurs when institutional dimensions of water management and decision-making do not effectively take into account the needs of poor households, creating disincentives for the water supply utility to connect poor households *and/or* for poor households to connect to the network (Table 1). The concept of governance failure thus requires analysis of the bases and processes for decision-making across the four key dimensions of water management: administration, delivery (technical services), financial and economic management, and political oversight (UNCHS, 2003). This formulation of the concept of governance failure thus suggests that decision-making structures and related institutions may contain systematic biases against poor households despite, for example, officially stated pro-poor policies, and independent of the ownership status (public or private) of the water supply network and its manager. This aspect of governance failure is explored in greater detail in Section 3.

This definition of governance failure has obvious overlaps with Sen's concept of capabilities (Robeyns, 2005; Sen, 1992, 1999). Following Sen, the term capability is defined as individual's ability to achieve desired functionings, where functionings represent actual achievements in "doing or being"—both tangible and intangible (e.g., being well-nourished, adequately hydrated, healthy, well educated, or having self-respect due to active participation in community decision-making). A "capability set" is defined as the set of attainable functionings that an individual is able to achieve (Sen, 1992, 1999). The concept of a capability set is analytically useful because it provides a means of explaining why different individuals are able to differentially mobilize specific commodities to achieve certain functionings. This approach is also useful because it emphasizes agency, insofar as individual choice, values and preferences play an important role in determining which functionings are chosen from a possible capability set (Ibrahim, 2006). The implication follows that the "capability set" of having, for example, a high level of water-related hygiene and health may be met through a variety of functionings,

Table 1. *Connecting poor households, to networked water supply: selected examples of market, state, and governance failures*

State failure	*Water supply systems owned and operated or regulated by governments may fail to operate effectively when one or more of the following occur:* 1. Rent-seeking (by officials) 2. Unincorporated externalitie 3. Poacher–gamekeeper problem (if both supplier and regulator are public) 4. Regulatory capture (if supplier is private)
Market failure	*Water supply networks operated by private companies may fail to operate efficiently when one or more of the following occur:* 1. Imperfect competition 2. Asymmetric information (between regulator and company) 3. Unincorporated externalities 4. Public good (health benefits of universal water supply provision are non-excludable and non-rivalrous)
Governance failure	*The decision-making process for water management may fail to address the needs of poor households because of* 1. Absence of consumer entitlements to basic services (e.g., lack of universal service requirement on the part of utility) 2. Political disenfranchisement (e.g., lack of "voice" on the part of poor households) 3. Culture of governance (e.g., elite-focused, top-down) 4. Economic disincentives for connecting poor households *Individual households may be subject to institutions, incentives, or other factors, which undermine their capability to connect to the water supply system* 1. Tenure system (lack of clear property rights) 2. Lack of skills (e.g., literacy) facilitating interaction with service provider 3. Cultural beliefs (e.g., appropriate water treatment protocols) 4. Tariff structure (e.g., high connection fees)

Source: Authors.

not all of which correspond to the conventional view of the optimal approach to water supply delivery (i.e., individual household network connections). In other words, adopting a capability approach opens up two possibilities: that exogenous factors constrain the capability set of individuals (precluding their choice to connect to the water supply network) and that poor households may be making a rational choice not to connect to the water supply network despite its inclusion in their capability set. These aspects of governance failure are explored in greater detail in Section 4.

In summary, the concept of governance failure may usefully be applied to the study of water supply to poor households in urban areas in the South, because it (1) formalises an analysis of institutions and associated incentives to which governments, water supply utilities, and consumers are subject; and (2) enables the analysis of decision-making processes and related institutional incentives on the part of both water supply providers and consumers. Moreover, and as argued in the following sections of the paper, this conceptual framework provides insight into the failure of both public and private water supply system operators to expand water supply access to poor households. Specifically, a focus on governance failure allows identification of institutional barriers common to both the public and private sectors (which suggests that the debate over the relative merits of public versus private ownership and/or management of water supply systems has, to some degree, missed the point (Budds & McGranahan, 2003). To illustrate these arguments, Sections 3 and 4 of the paper apply this conceptual framework to the case of Jakarta, respectively, providing empirical examples of governance failures pertaining to the water supply utility and the poor households. Prior to this, Section 2 briefly provides background on the case study, providing evidence on the degree of differentiation of access to water supply in Jakarta, which

emphasizes the degree to which spatial and socio-economic exclusion from networked water supply access overlap within the city.

3. THE GEOGRAPHY OF EXCLUSION: DIFFERENTIATED ACCESS TO WATER SUPPLY IN JAKARTA

(a) *Access to water supply in Jakarta*

Several studies have characterized Jakarta's water and sanitation sector as one of the weakest in Asia (Brennan & Richardson, 1989; Leitmann, 1995; McGranahan, Jacobi, Songsore, Surjadi, & Kjellen, 2001; McIntosh, 2003; World Bank, 2004b). Official estimates of the proportion of the city's population with water supply network connections in the home ("household connections") range from 46% to 56% (BPS, 2005; Jakarta Water Supply Regulatory Body, 2004). [7] Unofficial estimates, which attempt to account for the large number of informal residents in the city, suggest that only 25% of DKI Jakarta's true population is being served (Tutuko, 2005). Domestic water consumption is estimated to be between 70 and 80 L *per capita* per day—one of the lowest of the 18 large Asian cities surveyed by the ADB in 2002 (ADB, 2003b; McIntosh, 2003).

The correlation between poverty and lack of access to a household connection has been documented in household surveys of Jakarta (Crane, 1994; Forkami/RTI, 2002, 2003; McGranahan *et al.*, 2001; Shofiani, 2003). This corresponds with national data which indicate that the urban poor lack access to water supply across Indonesia: data from Indonesia's census indicate that only 16% of the urban "very poor" (with monthly incomes of Rupiah 800,000 (approximately $80 USD)) have household connections, while 36% of the urban population is connected, on average, across the country (Woodcock, 2005). Those not connected to Jakarta's municipal water supply system rely on a variety of sources (shallow and deep groundwater; surface water *via* the municipal water supply network; spring water; and (less frequently) direct use of rainwater, rivers, and streams) and distribution methods (household wells or rainwater collection systems; water vendors; bottled water; public standpipes; small, private networks connected to deep wells; and water trucks) (Berry, 1982; Gilbert & James, 1994; Lovei & Whittington, 1993; McGranahan *et al.*, 2001). As with other large cities in developing countries, many of these water supply methods are more expensive, per unit volume, than piped water supply. Thus, given their lower incomes, many poor households pay a much higher proportion of their income for water than wealthier households do. Wealthier households with a networked connection, in other words, receive water at a lower cost per unit volume, spending lower proportions of income for much greater quantities of water, in a pattern typical of many cities in developing countries (see, e.g., Cairncross, Hardoy, & Satterthwaite, 1990; Gulyani, Talukdar, & Kariuki, 2005; Swyngedouw, 1997).

Most of the above-mentioned water sources are characterized by poor water quality. Jakarta's small municipal sewerage system connects less than 2% of households, a legacy of government policy treating sewage as a "private concern" (ADB, 2003b; Argo, 1999; Cowherd, 2002; World Bank, 1993). The vast majority of wastewater is disposed directly to rivers, canals, or to (often poorly functioning) septic tanks (Crane, Daniere, & Harwood, 1997; McIntosh, 2003; Surjadi, 2002). The resulting contamination of surface water sources by sewage and industrial effluent is exacerbated by the lack of an effective waste collection system in the city, with household waste collecting in canals which provided water sources and flood drainage for the city (see, e.g., Porter, 1996). Open canals, largely conduits for sewage, regularly overflow into city streets during the rainy season. As a consequence, poor water quality in the piped network (partially reliant on surface water sources within the city), and in shallow groundwater (the source for the majority of the city's poor residents) is of particular concern. Contamination by wastewater and industrial effluent, as well as salinization—purportedly due to seawater infiltration due to over-pumping—has polluted Jakarta's shallow aquifer, the sole household source of supply for many poorer families in many areas of the city (Braadbaart & Braadbaart, 1997). Rivers and canals are usually too polluted to use even for washing clothing. Nor is the water delivered through the network potable, due to the poor quality of the raw water available to the water supply utility and the poor infrastructural quality of the distribution network, leading to infiltration and contamination in the distribution mains after water has left the treatment plant. Indeed, public health studies repeatedly find fecal coliform contamination in Jakarta's net-

worked water supply system, and residents are advised to boil their water. The public health impacts of this situation are predictable, and have been well-documented: high rates of water-related diseases, including gastrointestinal illness due to contaminated water and parasite-related illnesses due to poor drainage, particularly in poorer areas (Agtini *et al.*, 2005; Leitmann, 1995; McGranahan *et al.*, 2001; Simanjuntak *et al.*, 2001; Surjadi, 2003). Results of the first community-based surveillance study of diarrhea in Jakarta found that diarrheal diseases, many of them water-related, are the third leading cause of morbidity and the leading cause of morbidity in infants (Agtini *et al.*, 2005).

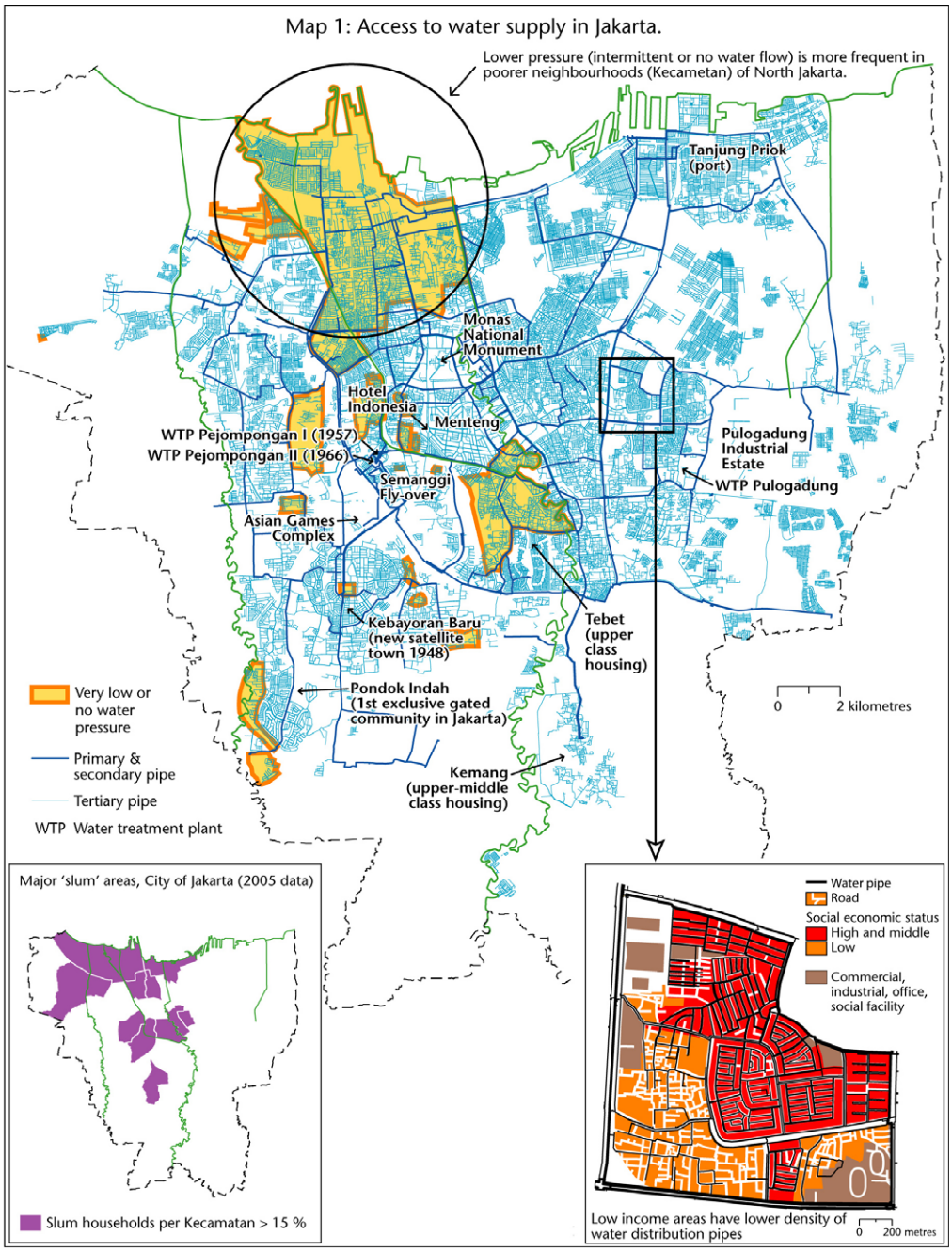
(b) *Jakarta's water network as elite "archipelago"*

Although available data indicate that a significant proportion of Jakarta's residents are not connected to the water supply network, no study has been conducted to date documenting the spatial dimensions of access. *Where* are Jakarta's residents connected (or not) to the water supply network? This section answers this question through presenting a reconstruction of the growth of the city's network, incorporating primary archival interview data using GIS-based mapping. The analysis is necessarily historical, drawing on colonial and post-colonial archival data, because water infrastructure networks have one of the longest turnover times of any dedicated utility infrastructure; in many cities around the world (including Jakarta), it is common to find pipes over 100 years old still in service. Given this longevity, water networks physically embody successive phases of management and investment; historical choices thus shape contemporary constraints on water supply network managers.

Our archival research on the original colonial network indicates that Jakarta's original water supply system was deliberately limited to the "European" urban population. A subsequent spring water-fed network built in 1920 had only limited extension into the "kampungs," [8] based on a dual design standard: 140 L/hhold/day to be distributed to 90% of the European households in Batavia, in contrast to an anticipated delivery of only 65 L/hhold/day to only 33% of the native population (van Breen, 1916; Van Leeuwen, 1917). Penetration of the water supply network into non-European neighborhoods remained limited. The result was a differentiation of access and consumption levels: in 1929, the European population, comprising only 7% of the population, consumed 78% of the volume of water supplied to residential customers (Eggink, 1930; Maronier, 1929). [9]

In the decades following Independence, water supply in Jakarta continued to be highly differentiated, and was characterized by many similarities to colonial patterns of water provision. In part, this was because of technical constraints: surface water supply continued to be distributed through the colonial piped network, and was thereby restricted to more affluent areas of the city. But this is only a partial explanation, as major investments were made in the first decade following Independence to both rehabilitate and expand the water supply network. In particular, two major water treatment plants were completed in the 1950s and 1960s, adding 3000 L/s to Jakarta's water production capacity. Networks to distribute this water were not, however, extended universally across the city, despite the fact that production capacity exceeded distribution capacity in the decades following independence (Martijn, 2005). Social policy choices made by the government are an equally important explanatory factor: in response to rapid (and usually technically illegal, given the lack of residency permits) in-migration of refugees, and then immigrants to Jakarta following Independence, the provision of government services in non-official neighborhoods (without tenure status) was curtailed or prohibited. Moreover, the government's emphasis on converting Jakarta into an international showpiece to symbolize Indonesian unity and development meant that financial resources were directed almost solely to showcase projects (Kusno, 1997, 2000). Network expansion was deliberately limited to upper class residential areas (such as Keborayan Baru), with new service mains following Jakarta's new "modern strip" of elevated highways and flyovers, Indonesia's first international standard hotel (Hotel Indonesia), the highrise developments along the main thoroughfare Jalan Thamrin-Sudirman, and the Asian Games Complex, thereby excluding the "unmodern" spaces and populations thought to "lower the status of the nation" (Abeyasekere, 1989; Kusno, 2000; MacDonald, 1995), from both spatial proximity to, and services from, the network (Map 1).

Map 1 presents the results of a GIS-based mapping exercise correlating network distribution with land use. The analysis demonstrates that the distribution of reticulation (tertiary)



Map 1. *Type of income and type of water supply. Source: Compiled by the authors (base maps supplied courtesy of Pam Jaya, household census data from BPS—Indonesian Office of Statistics).*

networks is concentrated in key economic zones (the Tanjung Priok port area, the Pulogadung Industrial Estate, and the commercial district surrounding the Hotel Indonesia) and elite residential zones (Tebet, Menteng, Kemang, Pondok Indah, and Keborayan Baru).

Most poor neighborhoods (still colloquially known as ''kampungs'') continue to be excluded from network access due to the spatial distribution of water mains and reticulation (tertiary service) pipes, as indicated by the left-hand inset, indicating that lower or no coverage is associated with higher rates of poverty (using percentage of slum dwellers per district as a proxy). Moreover, areas of low or no pressure, as indicated on the map, tend to be concentrated in the poorest area of the city—North Jakarta—the area of original colonial settlement and of the oldest, and most poorly maintained infrastructure. Even in neighborhoods with water mains, access to networks varies at an extremely fine spatial resolution, often on a street-by-street basis (as illustrated by the right-hand inset on Map 1): reticulation networks are densely and evenly distributed in high- and middle-income streets, but much less so in low-income streets: reticulation networks are densely and evenly distributed in high- and middle-income streets, but much less so in low-income streets. This pattern was established during public management of the water supply network, and remained largely stable following the introduction of private sector management of the water supply system, for reasons explored below.

In summary, the above analysis documents the link between inequitable water supply access, socio-economic status, and spatial distribution of water supply infrastructure in Jakarta. These factors—particularly the spatial dimension—are important barriers to water supply access by poor households (and are often only anecdotally acknowledged, rather than systematically documented). This suggests that the term ''network'' is a misnomer when applied to Jakarta's water supply system, which is more properly described as an ''archipelago,'' largely confined to elite residential and industrial areas of the city (Bakker, 2003).

4. GOVERNANCE FAILURE AND THE SUPPLIER: WHY WATER UTILITIES CHOOSE NOT TO CONNECT POOR HOUSEHOLDS

The previous section documented *how* the pattern of highly differentiated access emerged; here, we deploy the concept of governance failure to explain *why* this has occurred. Specifically, this section documents governance failures pertaining to the water supply utility (under both public and private sector management) and municipality: failures of the water management decision-making process and associated institutions to account for the needs of poor households. Our evidence is drawn from archival research, as well as from interview data collected in 2001, 2005, and 2006. [10] Prior to exploring specific examples of governance failure, it should be emphasized that the spatial heterogeneity of the network as presented in Section 2 was not solely due to a lack of water supply or water resources availability during the colonial and much of the post-Independence period. Indeed, the colonial water supply system could theoretically have satisfied Jakarta's entire population (of approximately 800,000) up until the end of the 1940s, assuming a *per capita* water demand of 50/person/day, respectively, and reasonable (e.g., 30%) distribution losses (Martijn, 2005). This surplus of potential over actual supply persisted post-independence, when production capacity consistently outstripped distribution capacity from the 1960s onwards (Martijn, 2005). In particular, from 1965 to the late-1980s, the rehabilitation of existing infrastructure, and the construction of an additional large-scale water treatment plant increased water supply production capacity threefold, but by 1990 the water supply system still only delivered 40% of the potential volumes of treated water (JICA, 1997), and the provision of piped water supply still only extended to less than one-quarter of the city's population (Porter, 1996). Yet, despite excess production capacity and a rapidly growing population, [11] the city's water utility embarked only on limited extensions of the distribution network, [12] and increased production capacity largely in support of industrial users in the 1970s and 1980s (Salim, 2005; Tutuko, 2005). In other words, a shortage of water resources was not the primary, or the sole reason for the failure to extend water supply network connections to poor households. Scarcity of potable water was indeed experienced in the city, but this was ''second-order'' or ''social resource scarcity'' rather than ''first-order'' or ''natural scarcity'' (cf. Ohlsson, 2000).

What, then, explains the failure of PAM Jaya, the city's water supply utility, to extend networks to poor households? A primary factor identified by interviewees is the culture of governance within urban government in Indonesia, which does not prioritize the poor. The ways in which this low priority has been expressed have changed over time. Post-independence, urban services provision and the urban

environment were given relatively low priority (Chifos & Hendropranoto, 2000; Firman & Dharmapatni, 1994; Ford, 1993; World Bank, 2004b), despite sporadic national government-led development plans to accelerate service delivery (e.g., Silas, 1992; World Bank, 1999). Water treatment and distribution, as "invisible" infrastructure, was a relatively low priority for the newly independent government dedicated to modernizing services for the elite, rather than universalizing services for the masses (Kusno, 1997; Leclerc, 1993). This provides a partial explanation for the reported lack of official concern about the fact that the majority of the urban population could not afford to connect to the network (Fischer, 1959; Kusno, 2000).

Subsequently, low priority was placed on the provision of piped water; this was rationalized as a policy to discourage rural migrants, who were blamed for over-taxing the city's public services (KIP, 1976). However, anti-migration policies are not the sole factor; coordination with PAM Jaya to extend piped water supply into poorer neighborhoods did not greatly improve after the "closed city" policy was relaxed in 1976 (Taylor, 1983). Indeed, the first project focused on urban water supply to the poor occurred only in the 1990s (the World Bank-financed Pam Jaya Supply Improvement Project, 1990–97); although it resulted in over 200,000 new connections, the expansion of production and distribution capacity did not catch up to increasing (potential) demand due to population growth (Cestti, Batia, & Van der Berg, 1994; PAM JAYA, 1992a, 1992b; Porter, 1996; JICA, 1997; World Bank, 1998). By the end of the 1990s, only approximately 10% of kampung residents had household water connections (Azdan, 2001); the remainder were served with public hydrants or water vendors, consuming only 7% of the water distributed by PAM Jaya, versus the 57% consumed by households with individual household connections (JICA, 1997).

A second source of governance failure identified by interviewees arises from land-use policies, and related decision-making processes at the municipal level. Official development plans for Jakarta encouraged an east-west pattern of urban development, attempting to avoid expansion into irrigated agricultural areas north and south of the city (JICA, 1997). Yet, despite the failure of planning controls to stem urban sprawl, PAM Jaya's network expansion has been limited to target zones in official planning, thereby excluding zones of the city where active development was occurring. This has been exacerbated by the lack of participatory governance mechanisms on the part of PAM Jaya that would allow the concerns of poor households to "filter up" to utility managers or political leaders, who may be sometimes unaware of the numbers of unconnected residents, or the cost to the unconnected poor of obtaining water from alternative sources (Woodcock, 2005).

A third source of governance failure is the business model adopted by Indonesian water supply utilities (Woodcock, 2005). Water utilities in Indonesia are controlled by local government; senior appointments may in some instances be guided by political patronage rather than technical requirements. Employment in a water utility in Indonesia has conventionally been associated with low social status (Martijn, 2005) and low educational levels (World Bank, 1997b); the associated impacts on morale and technical expertise of staff have undermined the efficiency and productivity of most water utilities in Indonesia. Moreover, local governments have typically been unwilling or unable to make politically unpopular decisions (such as raising tariffs) or require water utilities to improve performance (e.g., through measurable performance targets). The treatment of water utilities as "cash cows" (notably through the payment of annual dividends to the municipality) [13] has in some cases distorted long-term planning processes, reducing investment in infrastructure maintenance and renewal (World Bank, 1997b). The absence of representatives of user groups (e.g., residential and business users) on the Board of Supervisors of most water utilities in Jakarta has further contributed to the lack of counterweight to political influence on water supply utility decisions (World Bank, 1997b).

A fourth source of governance failure, related to the choice of business model, has been the view, often implicit in PAM Jaya policy, that "kampung" neighborhoods are literally "off-limits" because they are ungovernable and unserviceable. This view was reiterated in interviews with utility staff, who alleged that in some neighborhoods local mafia groups control public standpipes, actively discouraging (sometimes violently) attempts to install distribution networks or substitute household water connections for water hydrants (Crane, 1994; Pandjaitan, 2004). Others referred to the difficulties created due to the low social capital of poor households; staff may be reluctant to deal

with the poor because, for example, of illiteracy or their lack of ability to correctly fill out forms. These views were both reflected and reinforced by PAM Jaya policies which focused on "serviceable" areas, and required full cost recovery from customers after the early-1970s (PAM JAYA, 1992b; Taylor, 1983). [14] As a consequence, PAM Jaya preferred to limit the extension of distribution networks to neighborhoods where the "user-fee" schemes used to finance network extension meant that costs could reliably be recovered. [15] The discriminatory social policy of PAM Jaya during this period is reflected in its own admission that it was "best situated to serve well established, formal areas comprising concentrated groups of users, rather than newly developed and widely scattered areas [i.e., kampungs]." (Argo, 1999, p. 71). The limited ability of PAM Jaya to extend water supply network into poor areas is corroborated in the latest Master Plan for Jakarta's water supply, which records the absence of a poverty reduction strategy in network extension policy until the late-1980s (JICA, 1997) and notes the absence of policy targets for supply coverage (in % terms of total DKI population) until the 1970s (World Bank, 1991). Indeed, PAM Jaya's reported coverage figures for the city were usually stated as proportions of the total population in the target "served area," excluding kampungs altogether.

In addition, tariff-related incentives may play an important role in governance failure. For example, the rising block tariff structure initiated in the 1980s and maintained under both public and private management [16] created (and still creates) a strong disincentive for the water supply utility to connect the poor. Public hydrants—usually built in kampungs—are charged higher volumetric tariffs than individual households, creating a counterintuitive cross-subsidy from poor to middle and upper class customers. [17] Banded tariff structures with a rising block tariff beginning with rates below production cost create a disincentive for providing direct network connections to poor customers, who pay lower amounts per unit volume; large numbers of poor customers thus threaten to decrease water company revenues, and could theoretically result in revenue per unit volume falling below marginal cost (Whittington, 1992). Even in areas with the possibility of network connections, higher tariffs (with the volumetric tariff doubling in less than a decade in real terms), higher connection charges, and a deposit fee meant a high initial fixed cost for a household water supply connection, prohibitive to poor households with low and often fluctuating incomes. As a result, only a small proportion of the new connections made in the 1990s were for very poor households (Cestti *et al.*, 1994; JICA, 1997; Porter, 1996).

Tariff-related disincentives continued to affect network management following the private sector contract initiated with two consortia (dividing the city in half, with subsidiaries of Ondeo/Lyonnaise des Eaux and Thames Water running the network in the western and eastern halves of the city, respectively) in 1998 (Argo & Firman, 2001; Bakker, 2007). Under the terms of the initial contract, each consortium was to receive a fee on the basis of the volume of water supplied and billed. With no direct equity stake, and with profit de-linked from cost recovery rates, the international water companies thus sought to minimise the risk inherent in cost recovery. An additional safeguard 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. Cost recovery and currency risks, in other words, were to be borne by the local government. However, rapid currency devaluation in 1998 resulted in a significant decrease in receipts in dollar terms. Given the political unrest in Jakarta and resistance by water sector unions, the local government did not implement agreed-upon tariff increases (Harsono, 2005). The gap between the water charge required for compensating the private companies and the average water tariff increased dramatically (Figure 1). Prolonged negotiations (lasting several years) between the concessionaires and the city resulted in eventual tariff increases, but these did not raise the tariff above the water charge until early 2004 (Jakarta Water Supply Regulatory Body, 2004). PAM Jaya (and thus the local government) bore the sole risk for the revenue shortfall, and became increasingly indebted to the two private concessionaires. [18] This indebtedness reinforced disincentives to connect loss-making poor households; unsurprisingly, the new connections made by the private concessionaires focused preferentially on middle-class customers, which received 58% of new connections between 1998 and 2004, with low income and "very poor" households receiving only 24% of new connections (Table 2). "Pro-poor" activities on the part of the private concessionaires were constrained by low willingness-to-pay for connection fees on the part of

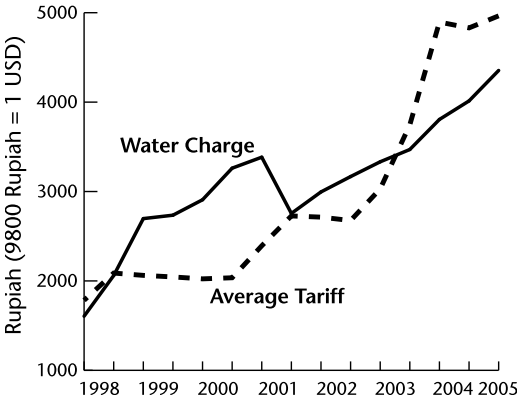


Figure 1. *Water charge and water tariff. Source: Jakarta Water Supply Regulation Body, Personal communication with authors.*

poor households, and were limited to a few showcase projects such as that in the neighborhood of Marunda (Bakker, 2007; BPD, 2003).

5. GOVERNANCE FAILURE AND THE CONSUMER: WHY POOR HOUSEHOLDS CHOOSE NOT TO CONNECT

In this section of the paper, we document governance failures affecting poor households. Our evidence is drawn from primary survey data based on a survey of 110 households in six Jakarta neighborhoods in 2005, and is supported by references to other published survey data. The survey entailed a multi-stage sample, with the first stage using a clustered random sample to select areal units with self-identified water access problems and a high proportion of poor households, based on initial site visits, interviews with local officials (kapubaten), and consultation with municipal and national government officials. This resulted in the selection of eleven kelurahan (sub-districts) in North (Kamal Muara, Penjaringan (Marlina & Gedong Kompa), Penjaringan (Rawa Bebek), Pegangsaan Dua), West (Semanan), East (Kampung Melayu, Rawa Terate, Jati, Kampung Tengah) and Central Jakarta (Kebon Melati, Gunung Sahari Selatan). A stratified random sample of 110 households was then conducted in these eleven kelurahan, with numbers of respondents proportionately corresponding to the overall distribution of primary users of the four water sources in these communities: stand-alone water "terminals" refilled by tanker trucks by national government authorities (50%), private deep wells (26%), subsidized house connections to the PAM Jaya network (17%), and public hydrants administered by PAM Jaya (6%), based on data provided by Kimpraswil (then-Ministry of Infrastructure/Public Works) through the water supply component of its Fuel Subsidy Reduction Compensation Program. Qualitative and quantitative data were collected and entered into a computerized database following transcription of the

Table 2. *Tariffs and new connections*

Average tariffs per tariff band Rp./M3 (2005)		Monthly fixed charges (Rp.) (2005)	Tariff group description (2003–05)	Number of new connections, East Jakarta (1998–2004)	Increase (%)
I	550	4,695	Social institutions (e.g., reliqious facilities) and public hydrants	1,101	1
IIa	550	5,060	Public hospitals and very poor households	21,898	24
IIb	2,450	10,440	Low-income households		
IIIa	3.500	11,950	Middle-income households and small-scale businesses	51,847	58
IIIb	5,100	19,390	Upper middle-income households and government offices	11,150	12
IVa	9,750	19,390	Large hotels, high-rise buildings, banks, and factories	2,323	3
IVb	11,500	27,665	Harbor/port	1,849 total 90,167	2 100

Source: Pom Jaya and Thames Pam Jaya, personal communication.

qualitative data. While ensuring a uniform, comprehensive, and randomized approach to sample selection, [19] it should be noted that the deliberate choice of communities with self-identified problems of water access was intended to document the governance failures affecting poor households in areas where some network supply (and hence at least the theoretical possibility of connecting to the network) did exist, rather than being representative of all households across Jakarta, many of which (both poor and wealthy) are in areas completely without water mains.

First, a brief summary of income and water use characteristics is presented. In the neighborhoods surveyed, a combination of some or all of the following water sources is available: in-house connections, public hydrants (individual access or *via* water vendors), deep wells, and "water terminals" (large stand-alone tanks refilled by tanker trucks using networked water supply). The majority of poor households use non-networked water supply in the home (Table 3). Many use more than one type of water sources: according to our survey, 61% of households surveyed used multiple sources (the three most frequent combinations being network and vendor water, network and groundwater, and groundwater and vendor water) [20] (Table 3).

The lower income households surveyed spent, on average, a greater proportion of their household income on water supply (Table 4). This is in part because of the greater proportional expense represented by water as a fraction of total household income, but also because the choice of types of water supply varies with income. Only 10% of households in the lowest income bracket used networked water supply, whereas 30% of those in the higher income bracket did so (Figure 2). Figure 3 indicates that those households relying on groundwater, or a combination of groundwater and networked water paid significantly less (in absolute terms, and as a proportion of income) for water supply than those households relying on vendor water. Typically, these households would own a well and associated storage (usually rooftop) infrastructure, implying a significant capital investment and relative permanency of residence. In contrast, households using vendor water spent higher amounts (in absolute rupiah terms), as well as higher relative proportions of income; overall, 43% of households spent more than 5% of their income on water bills (often cited as an appropriate threshold by international aid organizations). [21] Yet, vendor water was consistently the highest cost per unit volume in the six neighborhoods surveyed; the price per unit volume was found to be from 10 times to 32 times more expensive than networked water. [22] In short, the behavior of poor households with respect to the choice of water services presents an apparent paradox: informal water services thrive in neighborhoods where formal services are available, with households relying on water vendors even when they have the option of house connections with the municipal water utility (Susantono, 2001).

Why would poor households make this choice? Analysis of household survey data indicates that poor households choose non-networked water sources for a variety of reasons, [23] including connection fees (total cost of water supply); transaction costs; housing and residence status; security of water supply; and, in some instances, perceptions of water quality. The first, and probably the most important factor to consider is the total cost of water supply (as distinct from the volumetric cost, or cost per unit volume of water). On the basis of cost per unit volume alone, then, it seems counter-intuitive that poor households would not

Table 3. *Use of multiple water sources by Jakarta households (n = 110)*

Water source	Number of houses	%
Groundwater	39	37
Groundwater with bottled water/vended water/public hydrant	41	39
Network water	10	9
Network water with groundwater	2	2
Public hydrant/vended water with rainwater	14	13
Total	106	100
Total households using at least two sources	65	61

Source: Survey by authors of 110 households in six Jakarta neighborhoods (2005).

Table 4. *Water expenses, as a proportion of income (n = 110)*

Income range (Rp.)	Average (%)	Maximum (%)
<750,000	14	96
750,000–1,500,000	5	23
1,500,000–3,000,000	5	19
3,000,000–6,000,000	2	5
>6,000,000	1	1

Source: Survey by authors of 110 households in six Jakarta neighborhoods (2005).

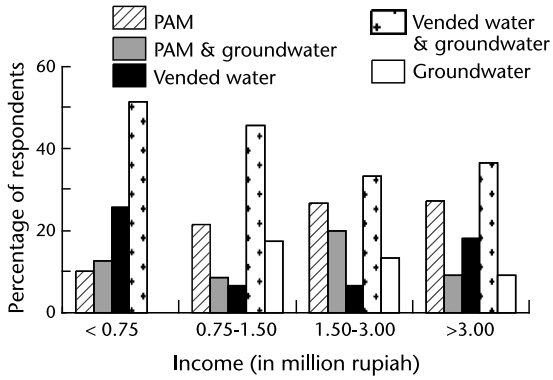


Figure 2. *Income and type of water supply. Source: survey by authors of 110 households in six Jakarta neighborhoods (2005).*

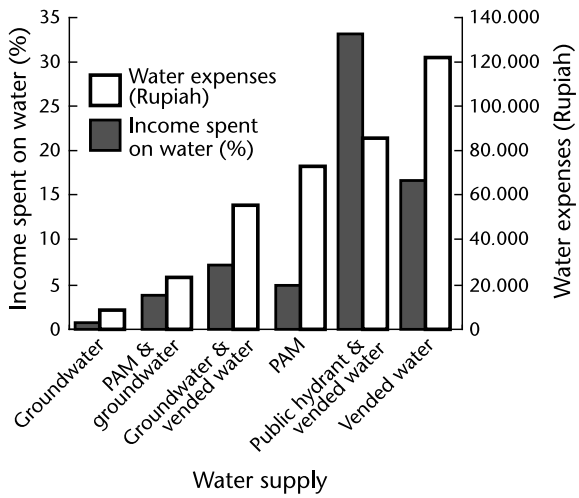


Figure 3. *Expenses on water supply. Source: survey by authors of 110 households in six Jakarta neighborhoods (2005).*

connect to the water supply network where possible. However, the disincentive for connection becomes more obvious when we consider the *total cost* of connecting to the water supply system (as opposed to price per unit volume of water supply). Monthly bills include more than charges per unit volumes of water consumed. Fixed charges such as the meter fee and the annual charge (distinct from the volumetric charges discussed above) are often orders of magnitude higher than the volumetric price per cubic metre and are also added on to the bill (Table 2). For a poor household whose residents consume 50 L/person/day (the World Health Organization recommended minimum), fixed charges will be anywhere from 5 to 10 times as high as the volumetric consumption charge; the effective cost per unit volume will thus be higher than that of vendor water for the poorest consumers. However, it is also likely that households do not have access to sufficient information to assess the cost differences between different water supply options: most households were not aware of the fact that volumetric costs of water supply through an individual house connection were less expensive than alternative sources.

Household transaction costs are also significant. A networked water supply implies additional infrastructure costs to be borne by the consumer, in the form of a water tank or holding device, made necessary because of the intermittent nature of water supply through the piped network (with cutoffs of several hours occurring daily in some areas). Connection fees

alone may be prohibitive (ranging from 200,000 to 350,000 Rupiah in the households surveyed, with reported figures from other surveys sometimes much higher than this), relative to average incomes of poor households (which averaged 1.4 million Rupiah/month in the households surveyed), and must usually be provided as a lump sum, which may pose significant barriers to households with small, irregular incomes. Connection fees also vary depending on distance from the network; poor households are more likely to live in areas of lower network density, and thus are more likely to pay higher fees for connecting. Lower density of network connections in poor neighborhoods (as documented in Section 2) thus translated into an additional barrier for poor customers wishing to connect to the network. Finally, long waiting times at water utility offices to pay bills and deal with meter mis-readings raise transaction costs compared to the ease of complaint handling and convenience of home visits by vendors to collect bill payments. Moreover, payment flexibility permitted by vendors (some of whom even allow customers to buy water on credit) provides an important incentive for poor households, which may have limited budgeting ability (Shofiani, 2003; Susantono, 2001). Although difficult to estimate, bribes demanded by contractors and water utility staff (or the apprehension that such bribes may be demanded) potentially represent another important transaction cost. [24] These transactions costs are likely harder to bear for those households with variable income: as Figure 4 indicates, households with fluctuating incomes are more likely to rely solely on vendor water. For all of these reasons, overall costs of vendor water to poor households may be lower than networked water supply, even though the latter has a lower price per unit volume.

A third factor is tenure, or housing and residency status. A significant proportion of the city's population (70%, in our sample) lives in rental or temporary (often self-built) accommodation without secure tenure. Deep wells are expensive and have higher maintenance costs, effectively prohibiting development by those without permanent tenure. Moreover, landlords are often unwilling to connect rental properties to the water supply network because of concerns about infrastructure cost and maintenance; similarly, tenants are unwilling to connect, because their investment would constitute an upgrade to the landlord's property. In our survey, households with insecure tenure were significantly less likely to have a household water supply connection: 32% of households surveyed owned their home and possessed land certificates, and 100% of these households relied on networked water supply as their primary source, whereas the remaining 68% (tenants, or owners without land certificates) used a combination of vendor water and shallow groundwater. In addition, a large number of city residents are without legal residency permits and/or official (registered) land permits, and are subject to a complex, variable, and unstable land tenure regime which creates significant disincentives for poor households to obtain official registration and associated permits (Leaf, 1994; Server, 1996; Struyk, Hoffman, & Katsura, 1990). These are additional reasons for which water vendors—which provide flexible, easily accessible, low transaction cost, "no questions asked" water supply—may be preferable.

Water availability may also factor in the decision not to connect to the water supply network. Low pressure in poorer areas of the city (Map 1) implies that water flow is intermittent, often resulting in greater infiltration of pollutants into the network, thereby reducing water quality. Low pressure in the piped network also means that households prefer to have a backup source—usually a shallow well. During the dry season, water vendors represent a more secure source of water for households than the network.

Finally, perceptions of water quality play an important role in households' decision-making. Water vendors were perceived by survey respondents (particularly those with more education) to supply water of higher quality, whereas other respondents perceived groundwater to be of higher quality. These perceptions may have some factual basis: the most comprehensive comparative survey of water quality of different sources in poor neighborhoods in Jakarta to date found that samples of drinking water from the network were more contaminated with fecal coliform than groundwater (Surjadi *et al.*, 1994). The fact that vendors check water quality and may strain the water or let it settle before delivering explains why perceptions of vendor water quality may be higher, despite the fact that vendor water often originates in hydrants connected to the networked water supply system. These perceptions of relative water quality of different sources may not, however, be borne out in all cases; groundwater quality tends to be lower in poorer areas, due to proximity to industrial sites, fewer controls over sewage, density, and higher

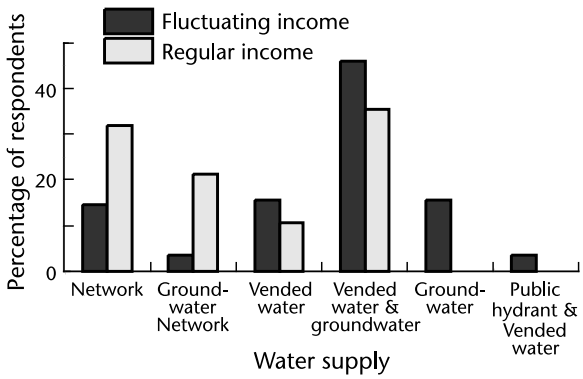


Figure 4. *Type of income and type of water supply. Source: survey by authors of 110 households in six Jakarta neighborhoods (2005).*

salinity levels (particularly in North Jakarta). Dislike chlorine (as borne out by the widespread practice of leaving buckets of water to sit overnight to dissipate the chemical smell) is another contributing factor (Kreimer *et al.*, 1995; McGranahan *et al.*, 2001). Echoing the concerns of survey respondents, generalized public mistrust of the quality of network water in Jakarta is evident from the rapid growth of bottled water consumption by poor households in Jakarta over the past five years, particularly *via* "no-name" *air isi ulang* (refilled bottled water) supplied by private (and unregulated) water treatment micro-plants throughout the city (Forkami, 2006; Weimer, 2006). [25]

These governance failures were not redressed by the introduction of private sector management of Jakarta's water supply network in 1998. Land tenure status and regulations fall beyond the purview of the water supply utility, whether under public or private management. The failure of the World Bank's "Output Based Aid" project in Jakarta to meet targets is an example of the barriers posed by land tenure, and the inability of the water supply utility to resolve these issues. Under the OBA project, 20,000 households were targeted to receive new, subsidized water supply connections; however, most households qualifying as sufficiently poor to receive a subsidized connection do not have legal land tenure status, precluding their participation in the programme. Despite lobbying of government by the private sector operators to change this tenure policy, the original target has been scaled back to less than 4,000 households (Forkami, 2006).

Issues related more directly to water supply—higher transaction costs for poor households, perceptions of water quality and availability, and security of water supply—could perhaps have been more feasibly addressed by the private concessionaires, and indeed some changes have been made. One of the two private concessionaires, for example, began allowing households to pay connection fees in instalments over a 12-month period rather than demanding full payment up-front. But other significant issues, including low water pressure in poor neighborhoods, the overall burden of connection fees and transaction costs, the disjuncture between current billing practices and the ability-to-pay of poor households with fluctuating incomes, and water quality (particularly the admitted lack of potability, exacerbated by the fact that the original PSP contract target of achieving potable water standards was dropped in subsequent negotiations) were not addressed by the private concessionaires. Indeed, the failure to extend water supply connections to poor neighborhoods in order to meet contractual targets was a factor cited by Thames Water in its decision to withdraw from the contract in late 2006.

6. CONCLUSIONS

This paper has demonstrated that Jakarta's water supply system has been highly fragmented since its inception: access to a household network connection has been strongly differentiated economically (i.e., poverty is correlated with lack of access to a household connection, with the use of alternative water sources, with low levels of water consumption, and with spending higher proportions of household income on water supplies) and spatially (i.e., those lacking access are concentrated in specific districts of the city, and within lower in-

come areas in neighborhoods across the city). Section 2 argued that this differentiation of access has deep historical roots. The current lack of access throughout large areas of Jakarta is due, in part, to the legacy of segregated colonial water supply systems, and deliberate underinvestment in the post-colonial period, as policy-makers sought to discourage rural–urban migration, and gave low priority to extending water supply access to the urban poor, focusing instead on economic development of key sectors, or on an urban redevelopment agenda focused on ''monumental'' infrastructure.

This analysis reminds us that we should be wary of viewing cities such as Jakarta through a Northern lens. In many cities in the global South, fragmentation of utility services such as water is not due to the recent trends of ''splintering urbanism'' characteristic of cities in the North (Graham & Marvin, 2001), but rather due to a model of urbanization with roots in the colonial era which produces a persistent pattern of differentiation of services and urban spaces, under public utility management. Post-independence ''state failure'' (or, to use Davis' term, the ''betrayal of the state'' (Davis, 2006)) was in part shaped by the technological constraints embodied by the colonial era water network, and then exacerbated by the capture of public sector organizations by elite interests.

Sections 3 and 4 attempted to explain *why* this situation arose and persists, and presented evidence on governance failures affecting urban government and the water supply utility, as well as households. Framing the analysis of these institutions and incentives as governance failures usefully reminds us that an understanding of choices by both utilities *and* households is necessary in analyzing the failure to achieve universal urban water supply provision. In the case of Jakarta, the culture of urban governance, the conventional water supply utility business model adopted in Indonesia, broader urban planning constraints, cost recovery requirements, and economic incentives linked to tariff structures were identified as some of the contributing factors to governance failure. The factors preventing or precluding the capability of poor households to connect to the network include limited ability-to-pay of *total* transaction costs (rather than volumetric costs); insecure tenure; the inability of the water supply utility to deal with poor households' need for flexible payment options; and perceptions of the relative quality, availability, and reliability of different water sources. These governance failures arose under public management, but have not been significantly remedied since the introduction of private sector management of the city's water supply system in 1998.

These findings lend support to the recent studies that suggest that institutional and governance issues should receive greater attention in the pro-poor water supply debate, and that the debate over the relative merits of public and private sector provision has diverted attention from the pressing issue of governance reform necessary to meet water-related development goals. (e.g., ADB, 2003a; Bayliss & Fine, 2007; UNCHS, 2003, 2006 UNDP, 2006; UNWWAP, 2006; WaterAid, 2003; Whittington, 1992). Specific institutional and governance issues require attention, namely: the institutions of urban governance (which, in Jakarta's case, has systematically prioritized monumental infrastructure and elite residential services at the expense of universal public services); the inequitable spatialization of network access; and the multiple disincentives for the poor to choose network connections, and for network managers—both public and private—to connect the poor. In turn, these recommendations lend weight to the growing body of ''good governance'' protocols (e.g., Gomez-Lobo, 2001; Jansky & Uitto, 2005; UNCHS, 2006) that focus on institutions and incentives as central to improving utility performance, particularly with respect to urban water supply for the poor.

This, in turn, suggests several policy implications with respect to pro-poor water supply delivery. First, governance failure (rather than the putative failures or merits of public or private providers) should be the focus of policy makers. For example, utilities—both public and private—should have clear benchmarks for equity associated with non-compliance penalties; in some cases, these benchmarks could have a spatial component (e.g., numbers of connections within specific neighborhoods or supply zones). And all water supply providers should be subject to robust regulatory frameworks with clear standards for good governance (such as accountability, transparency, participation, inclusiveness, and the rule of law), which should be implemented for water supply systems—whether public or private.

Second, we need to realistically reconsider the ''modern infrastructural ideal'' (which envisioned the universal extension of uniformly regulated networks) (Graham & Marvin, 2001). Currently, networked water supply utilities tend to be subject to some form of regulation, whereas the

non-networked water supply alternatives upon which a large proportion of urban poor households depend are often entirely unregulated. In contrast, we suggest that the scope of regulation and public oversight should not be constrained to networked water supply provision, but rather include the diverse array of water provision systems actually operating in urban environments (with, e.g., co-defined but distinct service standards and water quality requirements for different types of providers). Moreover, development policies which support alternatives should be based on sound governance principles such as equitable access, transparency, and public health protection. This is particularly relevant given the large number of alternatives that are being proposed in the current debate, including business models (e.g., public–public partnerships), financing (e.g., municipal bond finance), governance models (such as communal water rights), and technologies (such as condominal water supply) are all currently being explored as viable options for sustainable urban water supply (e.g., Katko, 2000; Kay, 1996; Narain, 2006; PSIRU, 2006; Trawick, 2003; TNI, 2005, 2006; Zaidi, 2001).

These recommendations will, we suggest, be useful in supporting the fulfillment of the water and sanitation Millennium Development Goal, which will contribute to other Millennium Development Goals (such as those related to child health) because of the positive externalities associated with water supply provision (Fay, Leipziger, Wodon, & Yepes, 2005). In supporting or developing these alternative options, it is, of course, critical to avoid the creation of "two-tier" systems, in which only wealthy households have access to adequate water supply. But it is also important to acknowledge the limitations and unsuitability of conventional networked water supply systems for many urban environments and residents. Rather than excluding these alternative systems from consideration, they should actively be assessed and regulated—properly expanding the role of state regulation and, where appropriate, operational management and finance, to include all water supply activities within urban environments.

NOTES

1. The World Health Organization and UNICEF Joint Monitoring Programme for Water Supply and Sanitation provided figures for the proportion of the population with "improved" provision, including water from public standpipes, boreholds, and protected dug wells, provided that at least 20 L per person per day is available from a source within 1 km of the person's home. This definition does not account for whether the water is "adequate" or "safe" to drink (WHO/UNICEF, 2005).

2. Water supply needs in rural areas are very distinct from those of urban areas; hence, the analysis is constrained to urban populations.

3. Initial research took place in Jakarta in 2001, followed by archival work in the colonial archives in the Netherlands in 2003. Subsequent research took place over an 18-month period from 2004 to 2005. Data were obtained from: (1) a household survey of 110 poor households in six Jakarta "kampungs" (neighborhoods) in 2005; (2) public and internal reports from the two private concessionaires, the Jakarta Water Supply Regulatory Body, and the Jakarta municipal government; (3) over 60 interviews with water supply managers, government officials, international financial institutions, aid agencies, and NGO representatives in 2001, 2004 and 2005; (4) a detailed archival survey at KITLV (Koninklijk Instituut voor Taal-, Land- en Volkenkunde/Royal Netherlands Institute of Southeast Asian and Caribbean Studies) and KIT (Koninklijk Instituut voor de Tropen/Royal Tropical Institute) in Leiden and Amsterdam, The Netherlands, in 2003.

4. Institutions are here defined in as the laws, regulations, norms, and customs which structure social behavior, together with associated incentives (Ostrom, 1990; Saleth & Dinar, 1990). Ownership is defined as property rights, together with the organizations (e.g., public sector, private sector, or community-based) that possess those rights. Institutions are thus analytically distinct from organizations, although in practice the two are inter-related and often co-evolve (North, 1995).

5. The term "institution" is used in the sociological sense: laws, rules, norms, customs, and incentives governing behavior and decision-making.

6. Collignon and Vezina (2000) identified six types of private sector operators: concessionaires; pump operators; "carters" and "carriers" (ambulatory vendors); standpipe managers; repair companies; and maintenance contractors. Only the first four would typically undertake direct sales to consumers.

7. The first figure is from the annual SUSENAS socio-economic survey conducted by the Indonesia Bureau of Statistics (BPS, 2005). The second figure was calculated using data from the regulatory authority overseeing the management of Jakarta's water supply system (Jakarta Water Supply Regulatory Body, 2004). This was cross-referenced with an ADB report (2003b) that reported a figure of 51.2%. In Jakarta, coverage ratios are always imprecise estimates; their calculation is dependent upon a number of variables that are only imprecisely measured, such as urban population and average size of household. Reported figures vary significantly, and do not indicate the number of households which have a connection, but indicate which rely primarily on other sources (e.g., groundwater) due to quality or service concerns (e.g., low pressure). Large numbers of seasonal migrants and "illegal" residents without land tenure mean that population figures are systematically underestimated and that, as a consequence, coverage figures are systematically inflated.

8. Kampung translates literally as "village," but was used to refer to non-European, and in particular Indonesian neighborhoods of Batavia, thereby demarcating the European sections of the city as the sole "urban" zones.

9. Specifically, in 1929, 6,926 kampung households (estimated population 400,000) were supplied with 24 L/s, while 10,392 European households, a population of 37,067, were supplied with 84 L/s (Eggink, 1930).

10. Over 60 interviews were conducted with government (national, regional and local government representatives), aid agencies (NGOs, bilateral aid agencies, and multilateral financial institutions), and water suppliers (public and private).

11. DKI Jakarta alone grew from an estimated 1.8 million people in 1950 to an estimated 6.5 million in 1980, with equally rapid population growth in the surrounding metropolitan areas, particularly at the expanding rural–urban fringe beyond the boundaries of DKI Jakarta (Chifos, 2000; Firman, 1997, 1998, 2000; Lo & Yeung, 1996).

12. Notably through the Kampung Improvement Program (KIP) (1966–77), but this produced only marginal improvements in the access of lower income residents to piped water (Abeyasekere, 1987; KIP, 1976; Taylor, 1983; World Bank, 1974).

13. Kreimer, Gilbert, Volonte, & Brown, 1995; Taylor, 1983; World Bank, 1974 recorded how the "basic needs" development programs in the 1970s and 1980s that intended to provide "water for the poor" through public hydrants were often frustrated due to cost recovery requirements. Previously, however, this had not been the case. Up until the 1960s, consumption was not metered, and rates were low; water was essentially distributed free to consumers (largely in wealthier neighborhoods). Ironically, low cost recovery at this point prevented the accumulation of sufficient capital to enable expansion into poorer neighborhoods; cost recovery was at times so low that PAM Jaya was often unable to pay its employees (PAM JAYA, 1992a).

14. For water supply utilities (PDAMS) across Indonesia, the standard level of this dividend was 55% of net profits, which is paid to the treasury of the local municipality (World Bank, 1997b). However, this is mandatory only when 75% coverage of the population is reached (for PDAMs in urban areas); moreover, in practice, all or part of this dividend is frequently returned to the utility.

15. The use of "user-fees" to finance network extension meant that house connections were unaffordable for the majority of the population; the cost of a household connection (not to mention "additional fees," meter rental, deposit, and actual monthly tariffs) in 1975 was Rp. 100,000 ($200 US), whereas the average income in Jakarta at that time was only Rp. 15,000/mth (approximately $36 US), with the 80% of the city's residents living in kampungs earning much less than that amount (KIP, 1976; PERPAMSI, 1975a).

16. The management of Jakarta's water supply system was outsourced to two private sector consortia, Thames Water (east Jakarta) and Ondeo (Lyonnaise des Eaux) (west Jakarta), in 1998. Reputedly due to continued losses, Thames Water sold its stake in TPJ (its Jakarta water services subsidiary) to an Indonesian-led consortium in 2006 (Jakarta Post, 2006).

17. Until the early 1980s, household tariffs were 25 Rp./m^3 for the first 15 m^3/mth; public hydrants and water trucks paid Rp. 60/m^3, more than double the tariff of households, and more than even small businesses (who paid 50 Rp./m^3). (PERPAMSI, 1975a, 1975b, 1975c).

18. 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 (Jakarta Water Supply Regulatory Body, 2005).

19. The survey controlled for gender bias by selecting only female respondents (on the basis of the significantly higher responsibility for women for all water-related

activities within the home). The average household monthly income of 1.4 million Rupiah (with an average of 5.7 household residents) translates into an average individual income of 245,614 Rupiah, slightly above the 2005 official poverty line, but well below the level of income earned by minimum wage earners.

20. These findings are similar to the results of surveys conducted by Surjadi *et al.* (1994, 2002, 2003) and McGranahan *et al.* (2001), the two most recent academic studies available.

21. A study of 1000 households in Jakarta which examined the different prices paid by different wealth groups found that, overall, the poor pay on average twice as much per metre cubed as the wealthy (McGranahan *et al.*, 2001), and that water expenditure represents, on average, 10% of income in poor households.

22. ADB (2003b); McGranahan *et al.* (2001); and a survey conducted by the author in the neighborhood of Sunter Agung in January 2001. ADB 2003b gave a maximum figure of US $4.17/m^3.

23. For a history of the preferences of poor households for alternative water supplies, see: Chifos, 2000; Kreimer *et al.*, 1995; Surjadi, Padhmasutra, Wahyuningsih, McGranahan, & Kjellén, 1994; Taylor, 1983; Yayasan Dian Desa, 1990.

24. See Cowherd, 2002 for a discussion of the culture of "informal" profits from public services, and (Yayasan Dian Desa, 1990) for how this was evident in PAM Jaya's operations in poorer communities.

25. "Air isi ulang" sells for Rp. 3,000/19 L; "brand name" bottled water bought by middle/upper class households typically retails for Rp. 10,000/19 L (Weimer, 2006).

REFERENCES

Abeyasekere, S. (1987). Death and Disease in 19th Century Batavia. *Death and disease in Southeast Asia: Explorations in social, medical, and demographic history*. N. Owen. Singapore, Oxford, New York: Oxford University Press.

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

ADB (2003a). *Beyond boundaries: Extending services to the urban poor*. Manila: Asian Development Bank.

ADB (2003b). *Water in Asian cities: Summary of findings of the study and a regional consultation workshop*. Manila: Asian Development Bank.

Agtini, M., Rooswanti, S., Lesmana, M., Punjabi, N., Simanjuntak, C., Wangsasaputra, F., *et al.* (2005). The burden of diarrhoea, shigellosis, and cholera in North Jakarta, Indonesia: Findings from 24 months surveillance. *Infectious Disease, 5*(89), 1–2.

Anwar, A. (2001). Regulating services for the poor, Jakarta, Indonesia. Presented at the 3rd World Water Forum, Osaka, 19th March. Jakarta Water Supply Regulatory Board, Jakarta.

Argo, T. (1999). Thirsty downstream: The provision of clean water in Jakarta, Indonesia. Unpublished doctoral thesis, School of Regional and Community Planning, University of British Columbia.

Argo, T., & Firman, T. (2001). To privatize or not to privatize? Reform of urban water supply services in Jabotabek, Indonesia. *Built Environment, 27*(2), 146–155.

Azdan, M. (2001). Water policy reform in Jakarta, Indonesia: A CGE analysis. Unpublished doctoral thesis. Department of Agricultural, Environmental and Development Economics, Ohio State University.

Bakker, K. (2003). From archipelago to network: Urbanisation and privatisation in cities in the South. *The Geographical Journal, 169*(4), 328–341.

Bakker, K. (2007). Trickle down? Private sector participation and the pro-poor water supply debate in Jakarta, Indonesia. *Geoforum, 38*(5), 855–868.

Bayliss, K. (2002). Privatisation and poverty: The distributional impact of utility privatisation. *Annals of Public and Co-operative Economics, 73*(4), 603–625.

Bayliss, K. (2003). Utility privatisation in Sub-Saharan Africa: A case study of water. *Journal of Modern African Studies, 41*(4), 507–531.

Bayliss, K., & Fine, B. (2007). Privatization and alternative public sector reform in Sub-Saharan Africa: Delivering on electricity and water. London: Palgrave MacMillan.

Berry, B. (1982). Clean water for all: Equity-based urban water supply alternatives for Indonesia's cities. *Urban Geography, 3*(4), 281–299.

Bond, P. (2002). Unsustainable South Africa: Environment, development and social protest. London: Merlin.

Bond, P. (2004). Water commodification and decommodification narratives: Pricing and policy debates from Johannesburg to Kyoto to Cancun and back. *Capitalism Nature Socialism, 15*(1), 7–25.

BPD (2003). *Jakarta, Indonesia: Water supply improvements to Marunda District*. London: Building Partnerships for Development in Water and Sanitation. <http://www.bpd-waterandsanitation.org/english/projects/jakarta.asp>. Accessed 3.01.04.

BPS (2005). *Statistik Kesejahteraan Rakyat/Social welfare statistics*. Jakarta: Indonesian Bureau of Statistics.

Braadbaart, O. (2002). Private versus public provision of water services: Does ownership matter for utility efficiency?. *AQUA – Journal of Water Supply: Research and Technology, 51*(7), 375–388.

Braadbaart, O., & Braadbaart, F. (1997). Policing the urban pumping race: Industrial groundwater over-exploitation in Jakarta. *World Development, 25*(2), 199–210.

Brennan, E. M., & Richardson, H. W. (1989). Asian megacity characteristics, problems and policies. *International Regional Science Review, 12*(2), 117–129.

Brown, A. (2001). Confusing means and ends: Framework of restructuring, not privatization, matters most. *International Journal of Regulation and Governance, 1*(2), 115–128.

Budds, J., & McGranahan, G. (2003). Are debates on privatization missing the point? Experiences from Africa, Asia, and Latin America. *Environment & Urbanization, 15*(2), 87–113.

Cairncross, S., Hardoy, J., & Satterthwaite, D. (Eds.) . *The poor die young*. London: Earthscan.

Cestti, R., Batia, R., & Van der Berg, C. (1994). Water demand management and pollution control in the Jabotabek region, Indonesia. Unpublished World Bank paper, October.

Chifos, C. (2000). Meeting unmet expectations: Initiatives in urban environmental service provision in Jakarta. In C. Chifos, & R. Yabes (Eds.), *Southeast Asian urban environments. Program for SEA studies* (pp. 29–72). Arizona State University: Temple University Press.

Chifos, C., & Hendropranoto, S. (2000). Thirty years of urban infrastructure development in Indonesia. In C. Chifos, & R. Yabes (Eds.), *Southeast Asian urban environments. Program for SEA studies* (pp. 153–181). Arizona State University: Temple University Press.

Collignon, B., & Vezina, M. (2000). Independent water and sanitation providers in African cities: Full report of a ten-country study. Washington: World Bank.

Cowherd, R. (2002). Cultural construction of Jakarta: Design, planning and development in Jabotabek, 1980–1997. Unpublished PhD dissertation, Department of Architecture, MIT.

Crane, R. (1994). Water markets, market reform and the urban poor: Results from Jakarta, Indonesia. *World Development, 22*(1), 71–83.

Crane, R., Daniere, A., & Harwood, S. (1997). The contribution of environmental amenities to low-income housing: A comparative study of Bangkok and Jakarta. *Urban Studies, 34*(9), 1495–1512.

Cross, P., & Morel, A. (2005). Pro-poor strategies for urban water supply and sanitation services delivery in Africa. *Water Science & Technology, 51*(8), 51–57.

Davis, M. (2006). Planet of slums. London: Verso.

Eggink, E. J. (1930). 'Na 25 Jaar'. Beknopt Gedenkschrift ter Gelegenheid van het 25 Jarig Bestaan der Gemeente Batavia ('After 25 Years'. A concise commemorate at the occasion of 25 years existence of the Municipality of Batavia) (Gemeente Batavia, Batavia).

Estache, A., & Rossi, M. (2002). How different is the efficiency of public and private water companies in Asia? *The World Bank Economic Review, 16*(1), 139–148.

Fay, M., Leipziger, D., Wodon, Q., & Yepes, T. (2005). Achieving child-health-related millenium development goals: The role of infrastructure. *World Development, 33*(8), 1267–1284.

Firman, T. (1997). Land conversion and urban development in the northern region of West Java, Indonesia. *Urban Studies, 34*, 1027–1046.

Firman, T. (1998). The restructuring of Jakarta metropolitan area: A "global city" in Asia. *Cities, 15*(4), 229–243.

Firman, T. (2000). Rural to urban land conversion in Indonesia during boom and bust periods. *Land Use Policy, 17*, 13–20.

Firman, T., & Dharmapatni, I. (1994). The challenges to sustainable development in Jakarta metropolitan region. *Habitat International, 18*(3), 79–94.

Fischer, L. (1959). The story of Indonesia. New York: Harper Brothers.

Ford, L. (1993). A model of Indonesian city structure. *Geographical Review, 83*(4), 374–396.

Forkami/RTI (2002). Update: Report on water supply to the urban poor (2002). Forkami and RTI International, Jakarta.

Forkami/RTI (2003). Update: Report on water supply to the urban poor (2003). Forkami and RTI International, Jakarta.

Forkami (2006). *Social assessment for the jakarta output-based aid project*. Jakarta: Forum Komunikasi Pengelolaan Kualitas Air Minum Indonesia.

Franceys, R., & Weitz, A. (2003). Public-private community partnerships in infrastructure for the poor. *Journal of International Development, 15*(8), 1083–1098.

Gilbert, A., & James, D. (1994). Water pollution in Jakarta Bay. In D. James (Ed.), *The application of economic techniques in environmental impact assessment* (pp. 111–142). Dordrecht: Kluwer.

Gleick, P., Wolff, G., Chalecki, E., & Reyes, R. (2002). The new economy of water: The risks and benefits of globalization and privatization of fresh water. Oakland: Pacific Institute.

Gomez-Lobo, A. (2001). Incentive based subsidies: Designing output-based subsidies for water consumption. *Public policy for the private sector 22*. Washington: World Bank.

Graham, S., & Marvin, S. (2001). Splintering urbanism. London: Routledge.

Gulyani, S., Talukdar, D., & Kariuki, R. M. (2005). Universal (Non)service? Water markets, household demand and the poor in urban Kenya. *Urban Studies, 42*(8), 1247–1274.

Gutierrez, E., Calaguas, B., Green, J., & Roaf, V. (2002). New rules, new roles: Does PSP benefit the poor? London: WaterAid and Tearfund.

Harsono, A. (2005). When water and political power intersect: A journalist probes the story of water privatization in Jakarta, Indonesia. *Nieman Reports, 59*(1), 45–47.

Hodge, G. (2000). Privatization: An international review of performance. Boulder: Westview.

Holmes, P. (2000). Effective organizations for water management. *International Journal of Water Resources Development, 16*(1), 57–71.

Hukka, J. J., & Katko, I. (2003). Refuting the paradigm of water services privatization. *Natural Resource Forum, 27*, 142–155.

Hunt, L. C., & Lynk, E. L. (1995). Privatisation and efficiency in the UK water industry: An empirical analysis. *Oxford Bulletin of Economics and Statistics, 57*, 371–388.

Ibrahim, S. (2006). From individual to collective capabilities: The capability approach as a conceptual framework for self-help. *Journal of Human Development, 7*(3), 397–416.

Jakarta Post (2006). PT Aquatico to take over city water concession. November 27th.

Jakarta Water Supply Regulatory Body (2004). Regulatory approach to the Jakarta water supply concession contracts. Presentation: A. Lanti (Member, Regulatory Body), Stockholm water symposium, August 16–20.

Jakarta Water Supply Regulatory Body (2005). Urban water in Jakarta. Presentation: Urban water and citizenship workshop, University of Indonesia, 11 May.

Jansky, L., & Uitto, J. (2005). *Enhancing participation and governance in water resources management: Conventional approaches and information technology. Water resources management and policy series*. New York: United Nations University Press.

JICA (1997). Study: Jakarta water supply development project. Final report. Vol. 2, Main report. May 1997. Nihon Suido Consultants Co., Ltd and Nippon Koei Co., Ltd.

Johnstone, N., & Wood, L. (2001). Private Firms and Public Water: realising social and environmental objectives in developing countries. Cheltenham: Edward Elgar.

Katko, T. (2000). Water! Evolution of water supply and sanitation in Finland from the mid-1800s to 2000. Tampere: Finnish Water and Waste Water Works Association.

Kay, J. (1996). Regulating private utilities: The customer corporation. *Journal of Co-operative Studies, 29*(2), 28–46.

KIP (1976). Jakarta's Kampung improvement programme. Directorate of Physical Development, Jakarta Capital City Government and KIP Implementation Unit, Jakarta.

Kirkpatrick, C., Parker, D., & Zhang, Y. F. (2006). An empirical analysis of state and private-sector provision of water services in Africa. *World Bank Economic Review, 20*(1), 143–163.

Kreimer, A., Gilbert, R., Volonte, C., & Brown, G. (1995). Indonesia impact evaluation report. Enhancing the quality of life in Urban Indonesia: The legacy of the Kampung improvement program, June 29. Operations Evaluation Department, Rep.14747-IND, Washington, DC: World Bank.

Kusno, A. (1997). Modern beacon and the traditional polity: Jakarta in the time of Sukarno. *Journal of Southeast Asian Architecture, 1*, 25–45.

Kusno, A. (2000). *Behind the postcolonial: Architecture, urban space and political cultures in Indonesia*. London: Routledge.

Leaf, M. (1994). Legal authority in an extralegal setting: The case of land rights in Jakarta, 1960–65. *Indonesia Journal of Planning Education and Research, 14*(1), 12–18.

Leclerc, J. (1993). Mirrors and the lighthouse: A search for meaning in the monuments and great works of Sukarno's Jakarta. In P. Nas (Ed.), *Urban symbolism* (pp. 38–58). Leiden: E.J. Brill.

Leitmann, J. (1995). Urban environmental profile: A global synthesis of seven urban environmental profiles. *Cities, 12*(1), 23–39.

Lobina, E., & Hall, D. (2000). Public sector alternatives to water supply and sewerage privatization: Case studies. *International Journal of Water Resources Development, 16*(1), 35–55.

Lovei, L., & Whittington, D. (1993). Rent-extracting behaviour by multiple agents in the provision of municipal water supply: A study of Jakarta, Indonesia. *Water Resources Research, 29*(7), 1965–1975.

Lo, F. C., & Yeung, Y. M. (1996). Global restructuring and emerging urban corridors in Pacific Asia. In Y. M. Yeung, & F. C. Lo (Eds.), *Emerging world cities in Pacific Asia*. Tokyo: United Nations University Press.

MacDonald, G. (1995). Indonesia's Medan Merdeka: National identity and the built environment. *Antipode, 27*(3), 270–293.

Maronier, V. F. C. (1929). De Drinkwatervoorziening van Batavia (The drinking water network of Batavia). *De Waterstaats-Ingenieur, 8*, 223–239.

Martijn, E. J. (2005). Hydraulic histories of Jakarta, Indonesia (1949–97): Development of piped drinking water provision. Vancouver: Unpublished research report, Department of Geography, University of British Columbia.

Martin, N. (2004). Corporatization as a means of improving water quality: The experience in Victoria, Australia. *Journal of Toxicology and Environmental Health, Part A, 67*, 1888–1899.

McDonald, D., & Ruiters, G. (2005). *The age of commodity: Privatizing water in Southern Africa*. London: Earthscan.

McGranahan, G., Jacobi, P., Songsore, J., Surjadi, C., & Kjellen, M. (2001). *The citizens at risk: From urban sanitation to sustainable cities*. London: Earthscan.

McIntosh, A. (2003). *Asian water supplies: Reaching the urban poor*. Manila: Asian Development Bank and International Water Association.

Narain, S. (2006). Community-led alternatives to water management: India case study. Background paper: Human development report 2006. United Nations Development Programme, New York.

Newbery, D. (2000). *Privatization, restructuring, and regulation of network utilities*. Cambridge: MIT Press.

Nickson, A., & Franceys, R. (2003). *Tapping the market: The challenge of institutional reform in the urban water sector*. London: Palgrave MacMillan.

North, D. (1995). The new institutional economics and third world development. In J. Hunter, J. Harris, & C. Lewis (Eds.), *The new institutional economics and third world development* (pp. 17–26). London: Routledge.

Nunan, F., & Satterthwaite, D. (2001). The influence of governance on the provision of urban environmental infrastructure and services for low-income groups. *International Planning Studies, 6*(4), 409–426.

Ohlsson, L. (2000). Water conflicts and social resource scarcity. *Phys. Chem. Earth (B), 25*(3), 213–220.

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press.

Ostrom, E., Schroeder, L., & Wynne, S. (1993). *Institutional incentives and sustainable development: Infrastructure policies in perspective boulder*. Westview Press.

PAM JAYA (1992a). PAM DKI 1922–1992. In *PAM JAYA (1992)* (pp. 13–29), Jakarta, Indonesia.

PAM JAYA (1992b). Usaha Peningkatan Pelayanan Masyarakat (Efforts to Improve Services for the Public), Ir. H. Poedijono (Direktur Usaha). In *PAM JAYA (1992)* (pp. 34–39), Jakarta, Indonesia.

Pandjaitan, G. (2004). Kondisi Pelayanan Air Minum di DKI Jakarta Sebelum Swastanisasi (Condition service of drinking water in DKI Jakarta before privatization) G. Pandjaitan (Technical Director PAM JAYA 1987–1991), Seminar 'Drinking Water in Jakarta', organized by Poltak Simanjuntak (AKA-INDO) August, 2004, Jakarta, Indonesia.

PERPAMSI (1975a). Air Minum (Drinking water). *WARTA Journal PERPAMSI, 1*(1–2), 34.

PERPAMSI (1975b). Air Minum (Drinking water). *WARTA Journal PERPAMSI, 1*(3–4), 50.

PERPAMSI (1975c). Air Minum (Drinking water). *WARTA Journal PERPAMSI, 1*(5–6), 53.

Pierre, J. (Ed.) (2000). *Debating governance*. Oxford: Oxford University Press.

Pierre, J., & Peters, B. G. (2000). *Governance, politics and the state*. Basingstoke: Macmillan.

Porter, R. (1996). *The economics of water and waste: A case study of Jakarta, Indonesia*. Aldershot: Avebury.

Prasad, N. (2006). Privatisation results: Private sector participation in water services after 15 years. *Development Policy Review, 24*(6), 669–692.

PSIRU (2006). Public–public partnerships as a catalyst for capacity building and institutional development: Lessons from Stockholm Vatten's experience in the Baltic region. Public Services International Research Unit, University of Greenwich.

Renzetti, S., & Dupont, D. (2004). The performance of municipal water supply utilities: Evidence on the role of ownership. *Journal of toxicology and environmental health, Part A, 67*(20–22), 1861–1878.

Rhodes, R. (1996). The new governance: Governing without government. *Political Studies, 44*(4), 652–657.

Robbins, P. (2003). Transnational corporations and the discourse of water privatization. *Journal of International Development, 15*(8), 1073–1082.

Robeyns, I. (2005). The capability approach: A theoretical survey. *Journal of Human Development 2005, 6*(1), 93–114.

Rogers, P., & Hall, A. (2003). Effective water governance. Global Water Partnership Technical Committee. TEC background papers, #7. GWP, Sweden.

Saleth, R., & Dinar, A. (1990). Evaluating water institutions and water sector performance (Technical paper no. 447). Washington, DC: World Bank.

Saleth, R., & Dinar, A. (2000). Institutional changes in global water sector: Trends, patterns and implications. *Water Policy, 2*, 175–199.

Saleth, R., & Dinar, A. (2005). Water institutional reforms: Theory and practice. *Water Policy, 7*, 1–19.

Salim, P. (2005). Personal communication. Priyono Salim, former Director for Technical Planning, Directorate of Urban Water Supply, Cipta Karya, Ministry of Public Works, Jakarta, Indonesia.

Sen, A. (1992). *Inequality re-examined*. Cambridge: Harvard University Press.

Sen, A. (1999). *The capability approach: A theoretical survey*. New York: Knopf.

Server, O. (1996). Corruption: A major problem for urban management, some evidence from Indonesia. *Habitat International, 1*, 23–41.

Shirley, M. (2002). *Thirsting for efficiency: The economics and politics of urban water system reform*. London: Elseveier.

Shofiani, N. E. (2003). Reconstruction of Indonesia's drinking water utilities: Assessment and stakeholders perspective of private sector participation in the capital province of Jakarta, Indonesia. TRITA-LWR. M.Sc. thesis. LWR-EX-03-30. ISSN 1651-064X. Department of Land and Water Resources Management, Royal Institute of Technology, Stockholm.

Silas, J. (1992). Government-community partnerships in Kampung improvement programmes in Surabaya. *Environment and Urbanization, 4*(2), 35–36.

Simanjuntak, C. H., Larasati, W., Arjoso, S., Putri, M., Lesmana, M., Oyofo, B. A., et al. (2001). Cholera in Indonesia in 1993–1999. *American Journal of Tropical Medicine and Hygiene, 65*(6), 788–797.

Strange, S. (1996). *The retreat of the state: The diffusion of power in the world economy*. Cambridge: Cambridge University Press.

Struyk, R. J., Hoffman, M. L., & Katsura, H. M. (1990). *The market for shelter in Indonesian cities*. Washington, DC: The Urban Institute Press.

Surjadi, C. (2002). *Public private partnerships and the poor: Drinking water concessions case study – Jakarta, Indonesia*. London: International Institute for Environment and Development.

Surjadi, C. (2003). *Public private partnerships and the poor: Drinking water concessions, a study for better understanding public–private partnerships and water provision in low-income settlements*. Loughborough: Water, Engineering and Development Centre.

Surjadi, C., Padhmasutra, L., Wahyuningsih, D., McGranahan, G., & Kjellén, M. (1994). *Households environmental problems in Jakarta*. Stockholm: Stockholm Environment Institute.

Susantono, B. (2001). Informal water services in metropolitan cities of developing world: The case of Jakarta, Indonesia, Berkeley. Doctoral thesis, Department of City and Regional Planning, University of California.

Swyngedouw, E. (1997). *Social power and the urbanisation of water*. Oxford: Oxford University Press.

Taylor, J. (1983). An evaluation of selected impacts of Jakarta's Kampung Improvement Program. Unpublished doctoral thesis, Department of Urban Planning, UCLA.

TNI (2005). *Reclaiming public water: Achievements, struggles and visions from around the world.* Amsterdam: Transnational Institute.

TNI (2006). *Public water for all: The role of public–public partnerships*. Amsterdam: Transnational Institute and Corporate Europe Observatory.

Trawick, P. (2003). Against the privatization of water: An indigenous model for improving existing laws and successfully governing the commons. *World Development, 31*(6), 977–996.

Tutuko, K. (2005). Personal communication. Kris Tutuko. Current Technical Director PAM JAYA, Jakarta, Indonesia.

UNCHS (2003). *Local action for global goals: Water and sanitation in the world's cities 2003*. London: Earthscan.

UNCHS (2006). *Meeting development goals in small urban centres: Water and sanitation in the world's cities 2006*. London: Earthscan.

UNDP (2003). *Millenium development goals: A compact for nations to end human poverty.* New York: United Nations Development Program.

UNDP (2006). Beyond scarcity: Power, poverty, and the global water crisis. Human development report 2006. United Nations Development Program, New York.

UNDP (2007). The global UNDP water governance strategy: A follow-up to human development report 2006: Beyond scarcity: Power, poverty and the global water crisis. United Nations Development Programme, New York.

UNWWAP (2003). *Water for people, water for life.* United Nations World Water Assessment Program. Rome: FAO.

UNWWAP (2006). *Water: A shared responsibility*. United Nations World Water Assessment Program.

van Breen, H. (1916). Beschouwingen: van de Technische-en Watervoorzieningscommissies betreffende de verschillende in zake de voorgenomen verbetering van de watervoorziening der Gemeente Batavia verschenen artikelen en uitgebrachte adviezen (Reviews: of the Technical and Water Supply commissions concerning the different articles and advice dealing with the intended improvement of water provision for the Municipality of Batavia) Gemeenteraad van Batavia, Gedrukte Stukken No. 40 (Municipal Council of Batavia, Printed Pieces No. 40) (Ruygrok and Co., Batavia).

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

Verhoest, K., Peters, B., Bouckaert, G., & Verschuere, B. (2004). The study of organizational autonomy: A conceptual review. *Public Administration and Development, 24*, 101–118.

Wallsten, S., & Kosec, K. (2005). Public or private drinking water? The effects of ownership and benchmark competition on US water system regulatory compliance and household water expenditures. Brookings Institution working paper, 05-05.

WaterAid (2003). Does PSP benefit the poor: The synthesis report. WaterAid and Tearfund, London.

Weimer, M. (2006). *Action research on point of use drinking water treatment alternatives as appropriate for underprivileged households in Jakarta*. Jakarta: Environmental Services Program.

Whittington, D. (1992). Possible adverse effects of increasing block water tariffs in developing countries. *Economic Development and Cultural Change, 41*(1), 75–87.

WHO/UNICEF (2004). *Meeting the MDG water and sanitation target*. Geneva: WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation.

WHO/UNICEF (2005). *Water for Life: Making it Happen*. Geneva: WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation.

WHO (1992). *The international drinking water supply and sanitation decade: End of decade review*. Geneva: World Health Organization.

WHO (2000). Global water supply and sanitation assessment. 2000 Report. Geneva: World Health Organization, UNICEF, and Water Supply & Sanitation Collaborative Council.

Wilder, M., & Romero Lankao, P. (2006). Paradoxes of decentralization: Water reform and social implications in Mexico. *World Development, 34*(11), 1977–1995.

Winpenny, J. (1994). *Managing water as an economic resource*. London: Routledge.

Woodcock, J. (2005). *Enabling water utilities to serve the urban poor*. Jakarta: World Bank Country Office.

World Bank (1974). Appraisal of the Jakarta urban development project in Indonesia. Report No. 475a-IND, Transportation and Urban Projects Department, August 30.

World Bank (1991). *Indonesia public expenditure for infrastructure development*. Washington: World Bank.

World Bank (1993). *Indonesia: Urban public infrastructure services.* East Asia Region, Jakarta: World Bank.

World Bank (1994). Infrastructure for development. World development report, World Bank Group.

World Bank (1997a). The state in a changing world. World development report, World Bank Group.

World Bank (1997b). Indonesia urban water supply sector policy framework. Indonesia discussion paper series. East Asia and Pacific Region Country Office, Jakarta.

World Bank (1998). Implementation completion report. Republic of Indonesia: Second JABOTABEK urban development project (Loan 3219-IND). Report Nr. 18049. Washington, DC: World Bank.

World Bank (1999). Water sector adjustment loan: sectoral environmental assessment. E-267. Washington: World Bank and Jakarta, Government of Indonesia, Inter-Agency Task Force on Water Sector Policy Reform.

World Bank (2004a). Making services work for poor people. World development report 2004. World Bank Group, Washington.
World Bank (2004b). *Indonesia: averting an infrastructure crisis: A framework for policy and action*. Indonesia Infrastructure Department. East Asia and Pacific Region: World Bank.
Yayasan Dian Desa (1990). Monitoring and evaluation of public hydrants and water terminals in North Jakarta. May 1990. Final report. Yogyakarta.
Zaidi, A. (2001). *From lane to city: The impact of the Orangi Pilot Project's low cost sanitation model*. London: WaterAid.