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Does Basic Services Privatisation Benefit the Urban Poor? Some Evidence from Water Supply Privatisation in Thailand

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Abstract

Access to safe water and sanitation has been a development priority for decades. This is also included in the millennium development goal targets. Meanwhile, privatisation of water supply continues to be a subject of intense debate, particularly as to its effects on the urban poor. The arguments for and against often reflect the intellectual divide between socialist ideals and neo-liberal pragmatism. Key issues are access, quality and price. This paper reports findings from an investigation of Thailand's first water supply privatisation scheme implemented in 1998. Household-level data for the poor, defined by community and income status, show a significant improvement in access to piped water despite an increase in the connection cost and monthly charges. The associated benefits from access include improved water quality and service. A promising plus is the prospect of improvement in tenure status for the households living in informal settlements.

1. Introduction

One major manifestation of remediable human deprivation is lack of access to safe water and sanitation. Thus, it is no surprise that "access to safe water and sanitation has been a global development priority for decades" (ESCAP, 2007, p. 19). Despite such priorities, two billion people in the world remain with-out safe water and sanitation. Improving access to safe water and sanitation has thus become the key global focus since the adoption of the Millennium Development Goals (MDGs) in 2000. Given the experience of modest success (which is often more than offset by population increases), it is all the more critical to ask why such a basic human need still remains inaccessible to millions. In an urban context, this is particularly disappointing because

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scale and agglomeration economies offer a built-in advantage in providing services such as water supply, drainage and sewerage. These services and utilities have long been considered as 'natural monopolies', because of their supply-side characteristics, which in turn provides the economic rationale for their public ownership. This economic logic has, however, been extended and it is clear that the issue is not just public or private ownership. As long as there is an effective regulatory mechanism in place, even a 'private monopoly' can be made to deliver welfare benefits. Yet the debate lingers on. During the 'cold war' period, this debate took an ideological turn along the socialist and capitalist divide. To make it worse, the socialist ideals were subsequently equated with statism and, in more recent years, mar-ket dynamism with privatisation.

A new dimension to this extended debate is centred on the interest of the poor. The economic logic requires attracting huge amounts of capital to invest in the water supply infrastructure so that the built-in advantage of providing the service can be accrued, thus enabling network expansion at a falling unit cost. In attracting the required investment, cost recovery is essential. It is here that the interests of the poor are raised. The same economic logic dictating cost recovery from water supply is possible without hurting the poor—for example, by using the cross-subsidisation principle.[1]

1.1 Privatisation and Access to Water by the Poor

In spite of the global priority, the built-in advantage referred to earlier and major efforts by many governments, access to water supply is still limited to the upper- and the middle-class urban population in many developing countries. This deficiency for the urban poor in these countries, the majority of whom live in informal (slum) settlements, is worse due to inability of the poor to pay for the service (Budds and McGranahan, 2003) and to access the service due to their quasi-legal or illegal tenure (Crane, Daniere, and Harwood, 1997; Azizi, 2000; Jaglin, 2002).

Although safe water and sanitation deprivation is acute in much of Africa, Latin America and developing countries of Asia, the situation has not much improved in the south-east Asian countries including Thailand, despite rapid economic growth, particularly in the late 1980s to mid 1990s. Access to piped water supply remains a major issue for the region's poor, even in urban areas.[2] A survey undertaken in 1991/92 of poor communities across Bangkok found that only 53.8 per cent of the city's poor had access to piped water (Crane *et al.*, 1997, p. 1499). Another survey of poor communities in Bangkok in 1994 revealed that the poor's access to piped water supply stood at about 43 per cent of the total households (Daniere and Takahashi, 1999, p. 281).[3] This problem of access to piped water supply, amongst other basic services, was compounded as a result of the financial crisis of 1997, which brought about a serious fiscal burden on many governments in Asia, forcing them to reduce investment in basic infrastructure (Pugh, 1999). The urban poor in particular appear to have been affected as subsidies disappeared and welfare benefits and services were curtailed (Ghosh, 2000). Thailand responded to this crisis by further expediting the implementation of privatisation of its infrastructure and services, already underway since early 1990s. This was in part a result of public-sector reforms promoted by the International Monetary Fund (IMF).

As part of those reforms, Thailand's first water supply privatisation scheme was implemented in 1998, a year after the financial crisis, in Pathumthani—one of the five provinces forming the Bangkok Metropolitan Region (BMR) (Figure 1).[4] However, no evidence has yet been produced to show the effects of such reforms on the urban poor

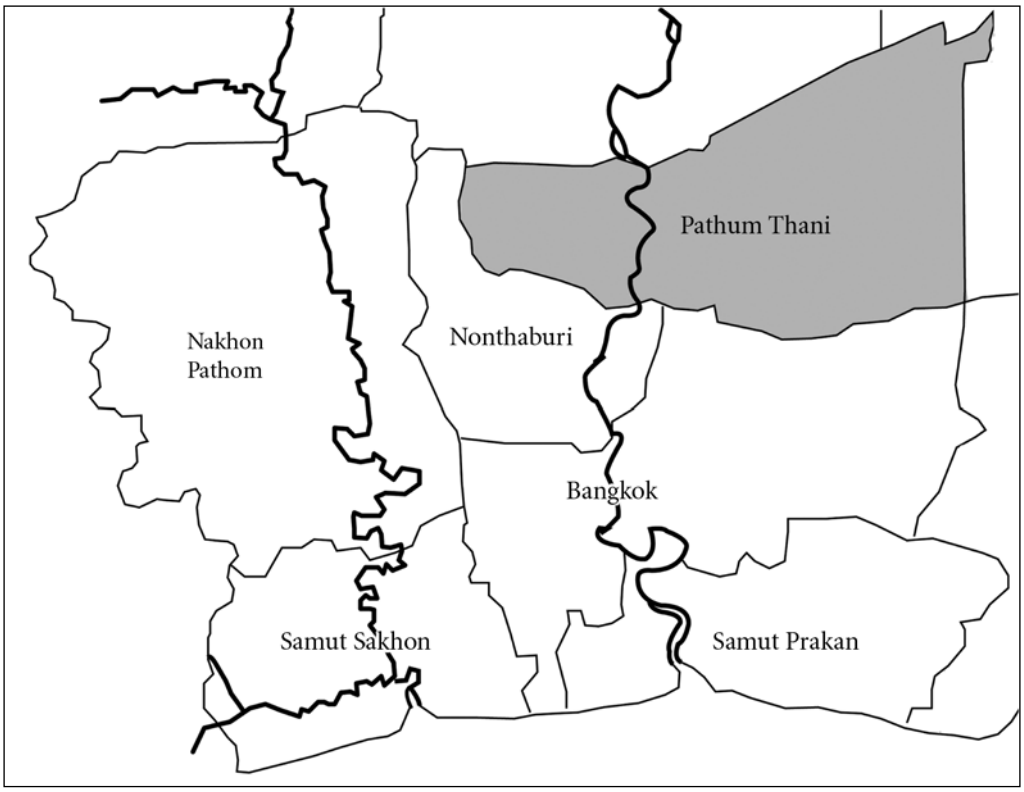

Figure 1. Pathumthani province forming part of the Bangkok Metropolitan Region (BMR)
Note: For the scale, compare with Figure 2.

due to a lack of household-level data.[5] These data limitations are also recognised in the literature on privatisation. For example, Estache *et al.* (2006) concede that lack of data on water supply and quality makes it difficult to analyse the impacts of reform (privatisation) policies on water service. Similarly, Estache *et al.* (2001) point out that the main obstacle in evaluating the relationship between infrastructure privatisation and poor is the weakness of the available data and that ideally the researcher would need a dataset that contains household-level observations to measure the impacts. The existing literature largely addresses the issues either at conceptual level or in some instances with case studies mostly from Latin America. Where case-specific research does exist, data have not been furnished on all essential indicators for determining the household-level impacts on the urban poor.

With this background, a study on Thailand's first water supply privatisation scheme was undertaken in 2003 to assess its household-level effects, particularly on the urban poor. This paper reports core findings from that study in order to shed some light on the water supply privatisation debate as it affects the urban poor. It is structured in five additional sections. Section 2 presents the near-polarised positions on water supply privatisation's effects on the urban poor, along with the identification of key propositions in the debate and the corresponding measurable indicators that would allow their assessment. Section 3 describes the Pathumthani water supply privatisation scheme to provide the context of the research. Section 4 outlines

the dataset, including briefs on the research method, study area and sampling procedures for the household survey. In Section 5, the results of the survey are presented in a comparative framework of the pre- and post-privatisation situations with regard to the assessment indicators. It also involves comparing the outcomes for poor and non-poor households and comparing household perception data on water quality with scientifically determined data, obtained from the Provincial Waterworks Authority (PWA). Finally, section 6 concludes with some observations on the findings and contractual terms that seem to have facilitated favourable outcomes for the urban poor.

2. Does Water Supply Privatisation Benefit the Urban Poor?

One reason for viewing privatisation positively is the expectation that it increases private (increasingly in the form of foreign direct investment, FDI) investment and thereby contributes to development. One estimate shows that, just between 1990 and 2001, over US$750 billion was invested in 2500 private infrastructure projects in developing and transition economies with a peak of US$130 billion in 1997 (Kessides, 2004, pp. 10–11). Privatisation has, however, led to intense debate and controversies, especially when it involves a basic need such as water. Often the contrasting arguments relate to its effects on the poor, and are particularly intense with regard to access.

A strong case for water supply privatisation is made with the expectation that it leads to an increase in access to the utility and improvement of its quality while allowing its supply at an affordable price to all, irrespective of their income, tenure or location (van Dijk and Nordholt, 1994; Estache *et al.*, 2001; Kikeri and Nellis, 2004; Kessides, 2004). The proponents also claim that privatisation has brought welfare benefits to the service recipients. It is claimed that, in all cases

> privatisation resulted in increased access to services, especially for poorer consumers, who had less access to begin with. Prices fell in half the cases and rose in half, though the positive distributional gains from access outweighed the impact of increased prices. Privatisation was generally followed by an improvement in service quality (Kikeri and Nellis, 2004, p. 99).

These arguments for privatisation, however, have always been questioned. The critics argue that the poor, due to their inability to pay or the fringe location of their communities, are excluded from the privatised service. They point out that private operators are reluctant to extend piped water to low-income settlements because the service extensions to the residents of these areas are perceived to be not or less profitable (Ghosh, 2000; Budds and McGranahan, 2003, p. 110). Smith and Hanson lend support to this argument by claiming that often the private sector "cherry picks" locations or populations for the service delivery and coverage in order to ensure profit (Smith and Hanson, 2003, p. 1519). A casualty of this interest are network extensions to poor communities. The opponents further argue that the quality of the service, both physical and operational, deteriorates under a regime of privatisation because the private operators' motive is cost recovery and profit (Kilchmann, 1997). The views of these sceptics gain impetus from incidences of trade union protests against privatisation. Public discontent and dissatisfaction also occur when no visible improvement in the access, quality and/or price of service is seen or because of the perceived negative impacts, especially on the poor (Kessides, 2004, p. 6).

From this brief discussion, it is clear that the arguments for and against the privatisation of basic urban services remain largely polarised. Improved data on household-level effects would provide some valuable evidence

to reduce the extremes. Such data are essential because

> to measure the micro-economic impacts, ideally a researcher would need a dataset that contains: household-level observations on a wide range of socioeconomic variables; information on expenditure and physical consumption of utility services; and information on household not connected or informally connected to services (Estache *et al.*, 2001, p. 1187).

In light of this review, it can be said that: the effects of water privatisation on the urban poor are best assessed by analysing the micro- or household-level outcomes that concern the poor most; and, what matters most to the poor is 'access' to good 'quality' service at an affordable 'price'. There is also no disagreement that the benefits of access to water supply can be manifold: improved health, increased productivity and avenues to engage in economically beneficial activities rather than, as is the case for many of the world's poor, chasing the next day's supply of potable water.

Thus it comes as no surprise that most studies on water supply privatisation do address the access, quality and price issues. Many, however, address them either in isolation or with macro- (often country-)level data instead of detailed household-level information. A few studies (for example, Estache *et al.*, 2006; Clarke *et al.*, 2004; and Clarke and Wallsten, 2002) which have attempted to bring together the three issues of access, quality and price are mostly based on Latin American or African experience. Likewise, Kessides (2004) and Kikeri and Nellis (2004) address these three issues, but they are mostly discussed in the country context of privatisation and are not household- or poor-specific.

The views on the effects of these three issues of water privatisation on the urban poor are further elaborated to formulate hypotheses underlying the prevailing views and to identify measurable indicators for testing these propositions.

2.1 Access

It is widely reported and accepted that the urban poor in developing countries, due to their marginal status, do not have access to the government-provided piped water to the same degree as the non-poor. This is particularly pronounced in the case of households living in informal urban communities which due to their illegal or quasi-legal tenure status, tend to be excluded or ignored by the government-provided network utilities and services.[6] In their study of reforms implemented in South America, Estache *et al.* (2001) observe that a key benefit of water supply privatisation for the poor has been in access. They also note that, because of their willingness to pay, this process also bears a potential to improve the poor's tenure status. Their point is that

> For urban households who live in recently created shanty towns without proper land titles, a formal connection to a utility, even at a cost, may be the first step in the direction of formal ownership of the property (Estache *et al.*, 2001, p. 1182).

It is understandable that the private sector will deliver the services where there is a demand, irrespective of the tenure status of the households, thereby benefiting the urban poor equally if not more. Privatisation as a reform measure has thus also become a potential remedy to correct the tenure discrepancy for the urban poor, in addition to providing them with access to a safe and reliable supply of water.

The optimistic view on access is also built on the argument that privatisation expedites service expansion. This is attributed to the private sector's financial capacity to invest in new technologies, increased production and expansion in line with demand, and to its efficient management capability

(Budds and McGranahan, 2003; Clarke *et al.*, 2000, p. 12). Available evidence also lends some support to this expectation. For example, an access increase of 5 to over 30 per cent has been reported for several countries/cities (Kessides, 2004, p. 12). A review of "case studies and data gleaned" from household surveys by Clarke and Wallsten (2002, p. 5) also show no evidence that privatisation hurts poor "even when the service price increases".

Despite these positions and the cited evidence, Smith and Hanson (2003, p. 1519) take an opposite view fearing "potential dangers of using private-sector principles and involvement … to manage the water sectors". They point out that the involvement of the private sector in the delivery of the service is based on a profit motive "at the expense of extending networks to areas or people that require subsidies" (Smith and Hanson, 2003, p. 1519). In a similar vein, Budds and McGranahan (2003) complain that despite suggestion by the "policy literature" that the private sector "will extend and improve services to low-income groups", "practical experiences" have failed to provide any evidence to support these claims. They maintain that

> there is little evidence either that the private sector is interested in serving low-income groups, or that they are any better off under private provision (Budds and McGranahan, 2003, p. 109).

They further report that a

> number of multinational water companies have asserted that low-income populations do not represent an attractive market because they are too poor to be profitable and represent too great a financial risk (Budds and McGranahan, 2003, p. 109).

This discussion suggests that the issue whether privatisation leads to an increase in the urban poor's access to water supply continues to remain unresolved. In view of this uncertainty, the present research set about the task of collecting household-level data on access to piped water from both the informal and formal communities. Access is defined as a metered piped water connection to the household's dwelling unit, an accepted norm on water supply in Thailand.[7] Connection to the dwelling as a measure of access is also used by Estache *et al.* (2006, p. 11) for identifying the impact of reform on access.

2.2 Quality

In the mid 1980s, one of the reasons for the increase in utility privatisation in many developing countries was a consequence of, amongst other factors, "poor and deteriorating service quality" (Estache, 2005, p. 2). It has been assumed that privatisation is expected to improve the quality of the water supply if accompanied with regulations relating to quality standards such as "safety, pressure, service levels, equipment, technologies, and procedures" (Kessides, 2004, p. 249).

The priority the poor attach to water quality and their willingness to pay (WTP) to ensure it are becoming increasingly well known. A survey of the urban poor and non-poor households in Armenia (Lampietti *et al.*, 2001) indicates that water quality (including accompanying service) is a priority to the poor compared with the non-poor. Several WTP surveys, cited in McPhail (1993), indicate that the poor are willing to pay up to 10 per cent of their income compared with the general norm of 5 per cent,[8] assumed to be needed for a formal connection to water supply that usually guarantees safe water and better service.

The profit motive of the private sector also leads to deterioration of quality, critics of privatisation have long argued. This is bound to happen if the privatised service is not regulated and monitored properly, as was the case in Chile where the service quality provided by water companies was found to be "appalling" (Bitran and Serra, 1998, p. 958).

This discussion suggests that whether privatisation leads to an improvement in the

quality of water supply for the urban poor is still an unsettled issue. A formal way of addressing this requires an assessment of the water and service quality of the privatised service by measuring its quality attributes.

Researchers agree that water supply quality measurement has two distinct criteria: objective, based on technical or scientific data; and subjective, based on users' perception (Estache *et al.*, 2006, p. 19). Both measurements are equally important as one gives clear scientific indications of quality meeting the established standards, while the other reveals how users perceive this most basic human need. If users' perceptions on drinkability, colour or presence of sediment (turbidity) are poor, despite their meeting or exceeding the technical criteria or standards, people are less likely to consume the water for drinking or cooking purposes. Therefore, establishing indicators for the quality assessment needs to address both subjective and objective criteria.

Quality indicators are typically categorised into water quality and service quality. For their survey, Lampietti *et al.* (2001) used drinkability, level of sediments and chlorine levels as measures of water quality. The same survey used reliability, maintenance and water pressure as measures for assessing improvement in service quality. Kessides (2004, p. 236) identifies clarity, taste and smell as quality measures which consumers can sense easily, while suggesting that complete quality assessment will also require expert testing.

With this discussion in view, this research proposes to measure the water quality by the attributes of 'drinkability' (drinkable), 'colour' (clear) and 'turbidity' (presence of sediments); and the service quality by 'reliability' of the supply (24-hour availability), water 'pressure' and 'response' to consumer complaints.

2.3 Price

The price issue is also widely raised by both proponents and opponents of water supply privatisation. While conceding that service cost (connection cost and monthly charges or tariff) will increase as a result of privatisation, it is claimed that the urban poor are not necessarily going to be the losers as a result of privatisation and that the price increase, "in addition to being outweighed" by an increase in access to the service, can also be "muted" by regulations and subsidies aimed specifically at the poor (Kikeri and Nellis, 2004, p. 100).

The critics point out that privatisation and associated removal of subsidy are bound to increase price, thereby making the service unaffordable to the poor (Mithani and Watcharaphun, 2000). The proponents of privatisation counter this argument by pointing out that removal of subsidies does not hurt the poor as much as it hurts the middle-income group (Estache *et al.*, 2001, p. 1194). Kessides (2004) refers to a mid 1990s study of Belem, Brazil, which showed such distortions of subsidy most clearly. In this case, the poorest fifth of the population did not receive any subsidy, while the second fifth received 12 per cent and the highest beneficiaries were the richest fifth consuming 40 per cent (Alfaro *et al.*, 1997 and World Bank, 1994b, as cited by Kessides, 2004, p. 248). This can be explained by the way subsidies are applied.[9] In most instances, the water supply charge is based on a well-intentioned progressive tariff structure which, however, does not help the urban poor because the reality is that many of them have no access to the subsidised service, either because of their illegal tenure and inability to pay the high connection cost or due to the marginal location of their settlements where the services do not reach. The most awkward outcome from this situation results when many poor households get access from one common legal source that adds up to a large consumption block; hence, they end up paying not at the intended rate for lower consumption (Kessides, 2004, p. 238).

In the case of Bangkok, the poor without access to a public source of water supply pay

as much as 27 times the cost of water charged by the government (Ratanakomut *et al.*, 1994, p. 219). This is far more than in the case of Cali in Colombia (10 times), Guayaquil in Ecuador (20 times) and Lima in Peru (17 times) as reported by Estache *et al.* (2001, p. 1185).

It is evident from this review that, even though privatisation leads to an increase in connection cost and monthly charge, the poor are not necessarily the only ones who are adversely affected or bear the increase in cost or price. What remains to be ascertained is whether the increase in price affects a significant proportion of the poor and how this increase compares with the non-poor. The relevant proposition here then is: privatisation does not lead to an increase in the cost of water supply for a large portion of the urban poor. For assessing the changes to the service cost, two clear measures are: cost of obtaining piped water supply connection (connection cost) and water bill (monthly charge based on tariff) for accessing water conveniently.

3. The First Water Supply Privatisation Scheme Implemented in Thailand

The first water supply privatisation scheme implemented in Thailand by PWA, the agency responsible for the supply and distribution of water to over 70 provinces in Thailand (except Bangkok), was in Pathumthani. The scheme was implemented as part of the Thai government's initial project on privatisation in the waterworks (Chantawong *et al.*, 2002). One of the key reasons for selection of Pathumthani as the first province for the implementation of this scheme was the province's proximity to Bangkok. Other reasons include: its financial attractiveness to the private sector due to the size and growth of population in the province and corresponding increase in demand for water (JICA, 1990); the financial and technical inability of PWA to cater to the projected increase in demand of 216 888 cubic metres in 2011, as against their capacity of 65 000 cubic metres in 1990; and, the aim of the government to use raw water from the Chao Phraya River in place of the underground water used by households and businesses in the province which had led to land subsidence (Chantawong *et al.*, 2002).

This scheme was awarded, under the Built Operate Own and Transfer (BOOT) approach, to a joint-venture consortium (Thames Water International and Ch. Karnachang PCL). A 'special purpose vehicle' (SPV), called the Pathumthani Water Supply Company Limited (PTW), was set up for this concession by the consortium. Under the agreement, from 15 October 1998, PTW is required to

> provide facilities for the purposes of extraction of raw water to be produced as treated water, with quality standards recognized by WHO, to the domestic, business and industrial sectors of the Pathumthani province (Ch. Karnchang, 2004, p. 1).

The quality standards were clearly specified to PTW by PWA through established objective indicators. These are described as part of the data obtained from PWA (Table 1) for the purpose of comparing them with the household-level data generated for this research by a questionnaire survey (see section 4). In addition, PTW is also required to take care of the development of raw water intake, reservoirs, bulk-main pipelines and the system of local distribution pipelines (Ch. Karnchang, 2004).

3.1 Production Requirement

Under the agreement, PTW is required to produce for supply and distribution 140 000 cubic metres daily of water at the start of its concession. This supply is to be increased to 220 000 cubic metres within one year of operation with additional 30 per cent backup but not exceeding 288 000 cubic metres

Table 1. Key terms and conditions of the Pathumthani water supply privatisation contract between the PWA (public authority) and the PTW (concessionaire)

Items	*Terms and conditions*	*Remarks*
Contract form	BOOT (build-own-operate-transfer)	Contract period 25 years (1998–2023)
Contracting parties	PWA and PTW using BOOT form	Contract awarded on a two-step competitive bidding basis
Contract period	25 years	From 1998 to 2023
Contract price	Baht 4300 million[a]	Baht 3500 million for bulk water production and baht 800 million for network expansion
Network expansion	PTW is required to expand network in line with the production target	PWA to facilitate land acquisition
Production	Production target at 140 000 cubic metres on day one of operation to be increased to 220 000 cubic metres with 30 per cent back-up	PWA is required to buy the minimum quantity (220 000 cubic metres) at the agreed rate irrespective of its consumption
Tariff	PWA to pay PTW baht 7.89 per cubic metre of water purchased; on average, PWA pays PTW baht 11.25 per cubic metre (including payments for reducing water loss)	PTW has the right to negotiate the tariff at the beginning of each calendar year
Water rates	PWA to charge consumer on the basis of national tariff used by PWA	Tariff varies between baht 7.75 per cubic metres and baht 21.00 per cubic metre divided over 10 levels/types of water use
Billing	PWA is responsible for billing and collection to individual users	Key feature of this BOOT, allowing PWA to execute subsidy and maintain tariff
Maintenance	PWA contracts maintenance to private sector	Initial five-year maintenance contract given to PTW and thereafter contracts awarded on a yearly basis
Water loss reduction	PTW as part of its contract required to improve system to minimise water loss; target set at 25 per cent reduction in first 5 years	In the first five years of operation, water loss is reduced from 58.46 per cent to 20.75 per cent

[a] Baht 43 = US$1 approximately (2003 rate).
Sources: Compiled from PWA (2003) and Chantawong *et al.* (2002).

(Chantawong *et al.*, 2002; PWA, 2003). These quantity targets have been set on the basis of a study undertaken by the Japan International Co-operation Agency (JICA) for PWA (JICA, 1990). The daily average demand for water for the province of Pathumthani was estimated at 218 240 cubic metres and the daily maximum demand was estimated at 261 888 cubic metres for 20-year period (until the year 2011). These figures were based on population projections between 875 371 and 1 234 253 (low- and high-growth projections) by the year 2011. As per the PWA data, obtained during this research, the daily average production of water by PTW stood at 256 808 cubic metres in December 2004,

which is largely in line with the contractual requirements of PWA. PTW data also show an almost three-fold reduction of water loss from a staggering proportion of 58.46 per cent in 1998 (immediately after privatisation) to a low of 20.75 per cent in 2004.

3.2 Key Contract Terms

The BOOT concession awarded to PTW by PWA for the production and distribution of the bulk water has been signed for a period of 25 years. A separate contract for network maintenance was signed at the same time between PWA and PTW for an initial period of 5 years. This has since been extended on a year-by-year basis. The Pathumthani water supply privatisation differs greatly from typical BOOT schemes. In the case of this scheme, PWA as the regulator also controls the billing and collection of water charges based on the tariff structure it applies across the country. This tariff, based on consumption slabs, varies from baht 7.75 to 15.00 per cubic metre for domestic consumers, baht 9.00 to 15.00 per cubic metre for small businesses and baht 10.00 to 21.25 per cubic metre for industrial and large businesses (PWA, 2003). In turn, PWA pays PTW at the flat rate of baht 7.89 per cubic metre for the total water produced. The concession contract allows for a periodic review of this flat tariff based on a pre-agreed formula between the PWA and the PTW (PWA, 2003). Key features and terms of the contract can be seen in Table 1.

The agreed terms allow PWA to control the tariff while divesting the business to the private sector without any risk of quality deterioration or price increase to the consumers as is widely feared. Having pre-agreed the production amount and the system coverage, PWA seeks to ensure that the system covers individuals and businesses without any financial constraints or tenure problems. Whether this has indeed been the outcome for the poor will be seen in the survey results presented in section 5.

3.3 Other Schemes by PWA

Following the initial implementation of the privatisation experience in Pathumthani, more schemes were planned and subsequently implemented. At present, 11 major PWA privatisation schemes (PWA, 2003), involving a range of options, are at different stages of implementation. These options include: the build-operate-own-transfer (BOOT), in which the service investment, operation and ownership are by the concessionaire until being transferred to the PWA at the end of concession period; the build-operate-own (BOO), in which the service investment, operation and ownership are by the concessionaire without any liability to transfer it to the PWA after the concession period; the lease contract, in which the PWA offers the service it owns to a private company on a long lease (10 years) for operating the same; and, the purchase and sale, where the private sector purchases the services from PWA at an agreed price and distributes the same to the users at an agreed tariff for the duration of the contract (PWA, 2003; Mithani and Watcharaphun, 2000, pp. 231–235).

4. Data and Methodology

The empirically verifiable propositions or hypotheses and the associated measurable indicators for testing them in this research follow from the review (section 2) of contrasting views in the literature on water supply privatisation with respect to its effects on the urban poor. The core data requirements for the assessment at the backdrop of the propositions and indicators are shown in Table 2.

4.1 The Dataset

The major dataset of this research is derived from a questionnaire survey of 212 urban households sampled from a total of 1436 belonging to the communities chosen for sampling in the study area (Table 3).

Table 2. Dataset and household survey queries corresponding to the assessment indicators and hypotheses of the study

Indicators	*Attribute/ variable*	*Survey queries*	*Data*	
			Survey response	*PWA data*
Proposition 1: Privatisation leads to an increase in the urban poor's access to a water supply irrespective of their tenure status				
Access	Connection	Do you have metered piped water connection?	Yes/No	Connections
Proposition 2: Privatisation leads to an improvement in the quality of services for the urban poor				
Water quality	Drinkable	Do you use piped water for drinking and cooking?	Yes/No	Taste
	Colour	Is the piped water clear (similar to bottled water)?	Yes/No	Pt-Co
	Turbidity	Do you find piped water contaminated?	Yes/No	NTU; pH
Service quality	Reliability	Is piped water available 24 hours daily?	Yes/No	24 hours
	Pressure	Is piped water supplied with sufficient pressure?	Yes/No	bar
	Response	Does PWA respond to a complaint within 24 hours?	Yes/No	minutes
Proposition 3: Privatisation does not lead to an increase in the service cost for a large portion of the urban poor				
Service cost	Connection cost	Is cost of connection baht 2000 or more?	baht	N.A.
	User charge	How much do you spend on monthly water bill?	baht/month	N.A.

Notes: Survey data refers to questionnaire-based survey of households within the study area. PWA data are technical information from PWA for the entire municipal area and not disaggregated by communities or income group. Pt-Co stands for platinum cobalt scale used for measuring colour; NTU is the nephelometric trubidity unit; pH is power of hydrogen, a scale commonly used for measuring the acidity or alkalinity of a liquid, where 7.0 is a neutral value; the bar is the unit for measuring pressure and 1 bar is the force needed to raise water to a height of 10 metres.

The questionnaire was designed to collect data on household-level changes (increase/decrease) in access to piped water, its water quality and service quality, connection cost and monthly charges (water rates) from the pre-privatisation year of 1998 to the post-privatisation year of 2003.[10] The respondents were household heads (or the person in the household who appeared to be knowledgeable on the queries raised in the questionnaire), irrespective of their ownership or tenancy status. In a similar vein, a crucial criterion for retaining a sample for the survey and later for including it in the data analysis was that the household/respondent had resided in the location at least since 1998, to have experienced the pre-privatisation situation with respect to water supply. The rest of this section provides details on the study area, sample, sampling procedure, respondents and questionnaire to determine changes from 1998 to 2003.

Table 3. Sample groups and size for the study in the Pathumthani municipality, Bangkok Metropolitan Region, Thailand

	Number of communities		*Number of households*			*Total samples used for analysis*
Sample groups	*Total*	*Survey target*	*Total*	*Survey target*	*Samples obtained*	
Informal communities						
Large (>200 households)	4	2	525	70	71	48
Small (≤200 households)	14	3	155	68	67	38
Sub-total	18	5	680	138	138	86
Formal communities						
Planned housing estates	10	3	363	83	77	73
Shop-houses	1	1	241	35	35	29
Single dwellings	1	1	152	32	24	24
Sub-total	12	5	756	150	136	126
Total	30	10	1436	288	274	212

Note: The number of informal communities and the corresponding household numbers are based on the National Housing Authority of Thailand's (NHA) data for 2000.

4.2 The Study Area

The study area (Figure 2) of the research is the urban district (*Amphoe Muang)* of Pathumthani province. With a total area of 1,565 square km, the province is divided administratively into seven districts. The population of the province in the survey year of 2003 stood at 739 404; of whom 305 247 were in the municipal (urban) area and 434 157 in the non-municipal area. The study area population, comprising 33 395 households with an average household size of 3.4 persons, stood at 129 649 (NSO, 2005).

The area is well connected both by road and rail links with BMR and the rest of the country. The physical character of the municipal district is not much dissimilar to other areas forming the fringe of the BMR and is marked by low-rise, medium-density urban development. The census data of 2000 for the province show that 11.2 per cent of its population fell within quasi-legal and illegal tenure status with a fairly close share between the municipal and non-municipal areas. Of the total, 62.2 per cent households owned their dwellings. Access to basic services was relatively high, 99.7 per cent household having access to sanitation and 96.5 per cent to safe drinking water (not necessarily legal piped water connection to an individual household). The major economic base of the area is manufacturing due to the presence of several large industrial estates in the vicinity.

4.3 Sample and Sampling Procedure

During the reconnaissance survey for the field research prior to the detailed household survey, it was observed that the study area is made up of two distinct types of community: the slums[11] or informal settlements, which represent the community of the 'urban poor'; and the shop-houses, single residential dwellings and planned housing estates or formal settlements, which represent the community of the 'urban non-poor'. The informal community was further sub-divided into 'small' (≤ 200 households) and 'large' (over 200 households) size settlements.[12] The reason for this size classification reflects the interest in investigating whether the effects

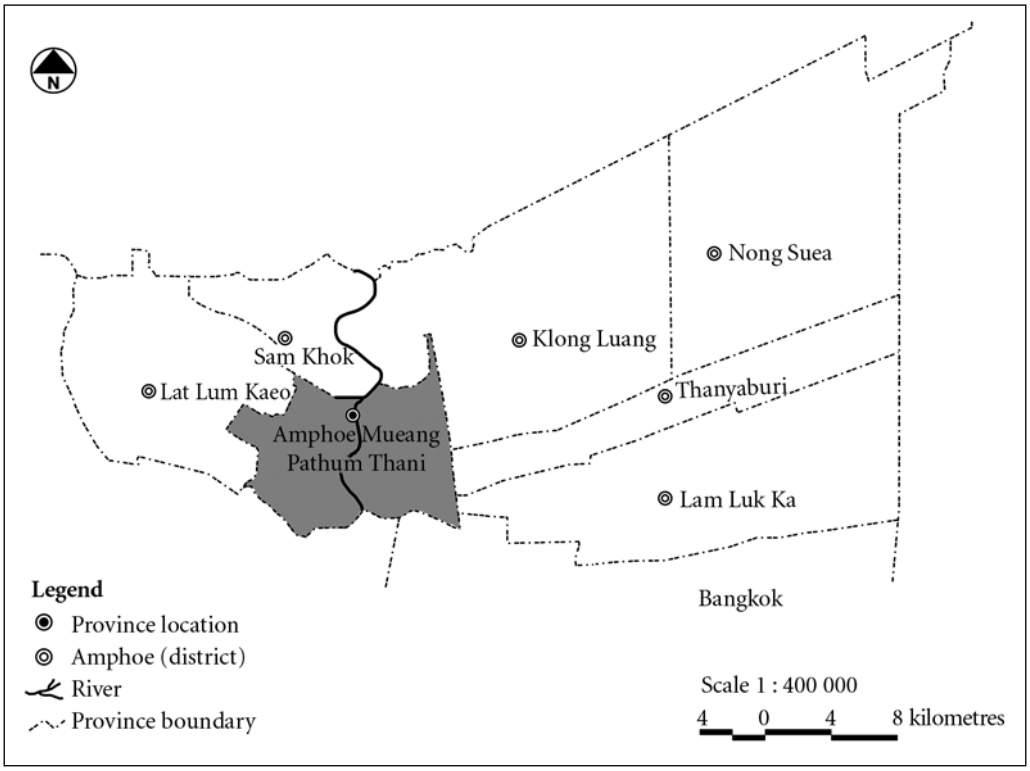

Figure 2. Pathumthani province, showing the location of municipal study area (shaded)

of privatisation vary according to settlement size. The underlying assumption here is that the private sector may use economies of scale to rationalise an interest in providing services to a large community, thereby ignoring the relatively smaller ones.

To include all sections of households within the study area, the statistically determined sample selection process proceeded in two phases. First, of the 18 'informal communities' (4 large, 14 small), 5 were selected (2 were from the large and 3 from the small communities); and of the 12 formal communities (10 are planned housing estates and 1 each is cluster of shop-houses and single dwelling units), 3 planned housing estates plus all shop-houses and single dwelling units were selected for the survey.

Secondly, the household samples from within each community stratum were statistically determined,[13] resulting in a sub-sample of 138 households for the informal community and 150 for the formal community—a total sample of 288 households. The sample sizes for the community strata resulting from the corresponding household numbers are shown in Table 3. The selection of a particular household for the questionnaire survey followed a systematic sampling procedure.[14] Of the statistically derived sample of 288 households, 274 completed questionnaires were obtained and 212 could be used for the data analysis.

At the preliminary stage of analysing the survey data, and once the income of the surveyed households became known, all sample households, irrespective of the type of communities they live in, were reclassified into poor and non-poor by the poverty threshold income.[15] By this criterion, households with a monthly income of baht 7500 or below

formed the 'income-poor' household sample. This classification was necessary because, during the processing of the survey data, it was observed that not all the sample households in the 'informal communities' were poor by the income criterion. Conversely, not all households in the formal communities were non-poor by the income criterion. Taking note of this expected reality, both the poor and non-poor community household samples were combined and reclassified as income-poor and income-non-poor. The resulting distribution of all surveyed households by income showed that 19.4 per cent households in the formal communities had a monthly income of less than baht 7500 and hence were poor by income. Analogously, in the informal communities, 65.4 per cent of the households had incomes above the poverty line and hence were non-poor by income.

4.4 Questions Relating to Measuring Changes

The questionnaire used for the survey included queries on changes in the household as to its status in accessing water in 1998 and 2003. Since the survey was conducted in 2003, the pre-privatisation (1998) information was naturally based on recollection of the situation then. It should be noted, however, that the water situation is such an important daily experience that providing basic information through recollection did not seem to have been a problem. Yet instead of sole reliance on information based on memories, data were compiled from the PWA (which recorded information in 1998 as well as 2003). A comparison of changes according to the PWA data, unlike our own survey-based data, thus allowed us to overcome the limitation in our survey. The PWA data were particularly useful for comparing the changes in water quality, as they were determined scientifically, unlike our survey-based perception data. Key queries in the questionnaire pertaining to access, water quality, service quality and service cost were raised (Table 2), in addition to other information. Responses to all queries were obtained for 1998 as well as 2003.

While it was easy to determine objectively a change in accessibility by asking respondents about the presence of a piped water connection to the individual household and also physically seeing the pipe and meter, the changes to quality (water and service) were based on the individual household's perception. Thus, queries on quality were explained to the respondents to ensure consistency in response across the surveyed households. For example, if they were using the piped water for drinking (drinkable) and cooking purposes, whether it was as clear as the bottled water (no colour) and if presence of solid particles (turbidity) were noticed. Similarly, for service quality it was asked if the piped water supply was available 24/7 (reliability), whether it had adequate pressure to access it within the house without the use of a booster pump (pressure) and if the service provider was able to respond to a consumer complaint on the same day. Connection cost data were also obtained by asking each respondent the cost she/he incurred to get a connection to piped water.[16] While this was to be recalled from memory, the data on monthly payment for water were easy to obtain objectively by asking the respondents to check the latest monthly water bill.

4.5 Method of Data Analysis

Due to the presence of different sample groups in the total sample as explained earlier and also to the use of PWA data for comparison with the household survey data, the data analysis and presentation of the empirical results take three distinct forms. In the first instance, the changes affecting only the poor are analysed by classifying the urban poor households surveyed within the study area into three categories according to their:

location (living in an informal or formal community); income (below or above the poverty line income); and, the size of their informal community (small or large). In the second instance, the changes in the indicators are analysed to compare the results by poor and non-poor (both by income and by the community in which they reside). In the third instance, a comparison is made between our survey results and the PWA data.

In all three instances, a change denotes the difference between the number of households responding positively or negatively to a particular query for 1998 and 2003. For example, a change in access (indicator) denotes the calculated difference in the proportions (percentages) of the total households in each category responding positively to having a piped water connection in 2003 and 1998. The difference confirms an improvement (if the proportion for 2003 exceeds that of 1998) or deterioration (if the percentage falls short of 1998). In addition to showing and analysing the magnitudes of changes (hence a large or small improvement/deterioration), the statistical significance of each change in proportion is determined by a chi-squared test. All absolute chi-squared values are also presented in parentheses (Tables 4 and 5), marked with the associated level of significance.

5. Changes in the Indicators Selected for the Assessment

The survey results and their analyses in this section are primarily intended to determine if the urban poor have gained from the first water supply privatisation scheme in Thailand (section 5.1). The analyses that follow also include a comparison of relative gain or loss to the poor *vis-à-vis* the non-poor in the community (section 5.2). Since the survey results are based on household responses—some of which, particularly the ones on water quality, are of a 'subjective' nature—a comparison is also made with the PWA data (section 5.3) because they include technical data on water quality.

5.1 Have the Poor Benefited?

The changes to access, quality and price indicators, as a result of water supply privatisation in Pathumthani for the three alternative categories of the urban poor (the community-poor, the poor in small and large informal settlements and the income-poor) are presented in Table 4. It can be seen from these data that their gains are quite considerable for all three assessment indicators. The most outstanding gain is an increase in access (statistically significant) for all three categories of poor. The quality indicators also show a positive change (improvement) but this is not statistically significant in all instances. The price indicators largely show a negative change, which reflects a cost increase but these are also not statistically significant in all instances. Details of the analyses by the three sets of indicators follow.

Access. Of the three categories of poor, the highest gain seems to have accrued to the poor living in small informal settlements (the access level of 11.8 per cent in 1998 increased to 85.3 per cent in 2003, a positive change of 73.5 per cent). The corresponding change for residents in the large informal settlements is 41.4 per cent (from 41.5 per cent to 82.9 per cent). Likewise, the change for the total informal community sample (large and small settlements combined) is 56.0 per cent (28.0 per cent to 84.0 per cent). The increase for the 'income-poor' household respondents (irrespective of the community in which they live) is 38.6 per cent (50.0 per cent to 88.6 per cent). The magnitudes of these positive changes are large and highly significant at the 1 per cent level (Table 4).

That more than a quarter of the informal community households overall and more than 41 per cent of the large-size community

Table 4. Changes (between pre- and post-privatisation) in access, quality and cost indicators by three categories of urban poor households

	Urban poor											
				Informal community by size						*Income poor (≤ 7500 baht/ household/month)*		
	Informal community			*Small (≤ 200 households)*			*Large (> 200 households)*					
Indicators	*1998*	*2003*	*Change*	*1998*	*2003*	*Change*	*1998*	*2003*	*Change*	*1998*	*2003*	*Change*
Access	28.0	84.0	56.0	11.8	85.3	73.5	41.5	82.9	41.4	50.0	88.6	38.6
χ^2 value			(47.727)***			(36.796)***			(14.989)***			(15.441)***
Water quality												
Drinkable	16.2	30.9	14.7	17.9	39.3	21.4	15.0	25.0	10.0	25.6	46.2	20.6
χ^2 value			(4.086)**			(3.150)*			(1.250)			(3.565)*
Colour	56.3	83.1	26.8	38.7	77.4	38.7	70.0	87.5	17.5	75.7	97.3	21.6
χ^2 value			(12.041)***			(9.538)***			(3.660)*			(7.400)***
Turbidity	56.9	72.7	15.8	46.2	63.0	16.8	64.1	79.5	15.4	69.7	80.0	10.3
χ^2 value			(3.590)*			(1.510)			(2.279)			(0.961)
Service quality												
Reliability	79.1	91.7	12.6	100	95.7	–4.3	69.0	89.2	20.2	78.1	92.1	14.0
χ^2 value			(3.384)*			(0.625)			(4.203)**			(2.772)*
Pressure	56.7	91.7	35.0	62.5	95.8	33.8	52.8	88.9	36.1	59.0	89.7	30.7
χ^2 value			(19.180)***			(8.084)***			(11.361)***			(9.682)***
Response	29.2	84.0	54.8	33.3	100	66.6	26.7	75.0	48.3	50.0	75.0	25.0
χ^2 value			(15.033)***			(9.000)***			(7.241)***			(2.133)
Service cost												
Connection cost (≤ 2,000 baht)	75.0	51.7	–23.3	75.0	42.9	–32.1	75.0	54.6	–20.4	81.8	83.3	1.5
χ^2 value			(3.316)*			(1.060)			(2.117)			(0.009)
User charge (≤375 baht/month)	95.5	74.0	–21.5	100	72.7	–27.3	93.3	75.0	–18.3	91.7	75.6	–16.1
χ^2 value			(4.693)**			(2.463)			(2.291)			(1.455)

Notes: Absolute values of χ^2 are shown in parentheses; * denotes significant at 10 per cent; ** denotes significant at 5 per cent; *** denotes significant at 1 per cent. Absolute χ^2 values below 2.706 are statistically insignificant at the 10 per cent level. All figures for 1998 and 2003 denote the percentage of the total households responding positively to the indicators and figures for change denote the percentage difference between 2003 and 1998 in each sample stratum. A negative figure for change denotes deterioration.

respondents already had access before privatisation can be explained by the fact that households in such communities often get access to piped water supply through illegal connection via a third party. It is also possible that some households located within the informal settlements might have acquired a legal tenure status and thus could access water in pre-privatisation days. The data showing half of the income-poor households having access to piped water supply before privatisation are easier to explain as almost 20 per cent of them belong to the formal communities and thus had the privilege of access to piped water prior to privatisation. Thus the hypothesis that privatisation leads to an increase in the poor's access to water supply, is clearly validated by the evidence presented here from the Pathumthani case.

Water quality. The analyses of water quality attributes also show a positive change for all three of them—drinkability, clarity and turbidity—in each category of poor. In eight instances, they are also statistically significant. The response on water clarity suggests the highest improvement. The positive proportions are of the following order: 38.7, 26.8, 21.6 and 17.5 per cent of the respondents respectively in the small settlements, the informal community as a whole, the income-poor and the large settlements (Table 4). The statistical test results of these changes show that they are highly significant (at the 1 per cent significance level) in three instances; in the other instance, the significance is at the 10 per cent level. The response on the drinkability attribute show a positive change of 21.4 per cent for the small settlements, followed by 20.6 per cent for the income-poor, 14.7 per cent for the total informal community and 10.0 per cent for the large settlements. The final attribute of water quality—turbidity—also shows positive change in all four instances but only in one instance it is significant and that is at the 10 per cent level. The relatively small increase in positive response on the drinkability attribute may be a reflection of the widespread doubt (not just in poor communities) as to the reliability of piped water for drinking.

Service quality. The service quality attributes —'reliability', supply 'pressure' and 'response' to the complaints of the service payees—showed more positive outcomes for the poor relative to those of the water quality attributes. Of the 12 instances here, 10 show statistically significant positive changes for the poor. For the 'reliability' attribute, the change is 20.2 per cent (from 69.0 per cent in 1998 to 89.2 per cent in 2003) for the large settlements, 14.0 per cent (from 78.1 per cent in 1998 to 92.1 per cent in 2003) for the income-poor and 12.6 per cent (from 79.1 per cent in 1998 to 91.7 per cent in 2003) for the total informal community respectively. All these three positive changes are also significant (at the 5 per cent level for the large settlements and at the 10 per cent level for the income-poor and the total informal community). The only deterioration observed is in the case of small settlements:—4.3 per cent (from 100.0 per cent in 1998 to 95.7 per cent in 2003), which is a small proportion and also not statistically significant. For the 'pressure' attribute, the results show significant positive outcomes. They are of the following order: 36.1 per cent, 35.0 per cent, 33.8 per cent and 30.7 per cent respectively for the large settlements, the informal community as whole, the small settlements and the income-poor. The magnitudes of these positive changes are highly significant at the 1 per cent level.

The attribute of 'response' to complaints also shows a positive change with significance at the 1 per cent level in three out of four instances. This change is of the following order: 66.6 per cent, 54.8 per cent and 48.3 per cent respectively for the small settlements, the informal community as a whole and the large settlements. The only statistically insignificant

change is observed for the income-poor despite it being a large proportion: 25.0 per cent (from 50.0 per cent to 75.0 per cent). The fact, however, remains: the responses of the poor community households reflect an unambiguous improvement by all three service-quality attributes. The evidence presented here from the Pathumthani case thus is again in line with the proposition that privatisation leads to an improvement in water supply to the poor.

Service cost. One widely shared concern relating to privatisation has been the increased cost of water. The findings of this research reveal that an increase has indeed occurred in the connection cost as well as the monthly charge for accessing the piped water under the implemented privatisation scheme in Pathumthani despite a lot of safeguards that that PWA stipulated in the BOOT contract with that PTW (Section 3). Overall, however, the situation is still not a cause for alarm. Except in two instances of eight change proportions, the cost or charge increase is statistically not significant, which is an indication that the poor do not seem to be primarily affected by an increase in their water bills. The survey results show that 75 per cent of the small settlement respondents used to pay less than or equal to 2000 baht in 1998 as compared with 42.9 per cent in 2003, which implies a negative change for 32.1 per cent of the respondents. The corresponding negative change proportions are: 23.3 per cent and 20.4 per cent respectively for the informal community as a whole and for the large settlements. A slight (1.5 per cent) positive change (reduction in connection cost) is reported by the income-poor.

The data on sample responses on 'water bill' for 1998 and 2003 confirm an increase in the monthly 'user charge'. All respondents in small settlements reported a spending of less than or equal to 375 baht per month[17] in 1998 compared with 72.7 per cent in 2003, which denotes a negative change for 27.3 per cent of respondents. The corresponding negative changes are 21.5, 18.3 and 16.1 per cent respectively for the informal community as whole, large settlements and the income-poor. Here again, the only statistically significant negative change (increase in cost) observed is for the informal community. For other sample groups, the increase in monthly charge is not significant. Yet, the overall trend in the data does show an increase in cost to have access to the privatised piped water; hence, the proposition is validated.

5.2 How Do the Poor and Non-poor Compare in Gains and Losses?

The central thrust of this paper has been to assess the gains and losses of the urban poor as a result of the implementation of a water supply privatisation scheme in Thailand by comparing the pre- and post-privatisation changes in the assessment indicators. The survey conducted for this purpose also allows a comparison between the poor and the non-poor households in the study area. In this comparison, presented next, responses of the informal community households (community-poor) to the survey queries are contrasted with those of the formal community households (community-non-poor). Similarly, the income-poor households' responses are contrasted with those of income-non-poor using the same assessment indicators. Because of this similarity, it is possible to present the analysis in brief.

Access. On access, the poor fare much better than the non-poor households. While the responses of the community-poor on piped water connections to their respective households suggest an increase of 56.0 per cent, the corresponding change for the (formal) community-non-poor is 17.1 per cent. Similarly, the increase in access for the income-poor households is 38.6 per cent as against

32.3 per cent for their non-poor counterparts. All four change proportions are also statistically significant (Table 5). It is thus clear that, whether defined by community or income, access to piped water has increased more for the poor households than the non-poor.

Water quality. The survey responses on the water quality attributes also suggest that poor households have experienced a slightly better outcome (except in the turbidity response) than their non-poor counterparts. The change proportions from 1998 to 2003 on drinkability for the community-poor and the community-non-poor respectively are: 14.7 per cent and 12.9 per cent; on colour, 26.8 per cent and 18.2 per cent; and, on turbidity, 15.8 per cent and 27.6 per cent.

When analysed by regrouping the respondents into income-poor and income-non-poor, the results are similar: on drinkability, the income-poor and the non-poor change proportions are 20.6 per cent and 11.4 per cent; on colour, 21.6 per cent and 15.9 per cent; and, on turbidity, 10.3 per cent and 26.0 per cent. In all these six instances except one, the changes are also statistically significant (Table 5). The only non-significant change relates to the 'turbidity' perception of the income-poor households.

Service quality. The poor/non-poor comparison in service quality attributes shows that the non-poor (community- as well as income-poor) show larger gains compared with the poor in all but one instance. The analysis of responses by community-poor and non-poor is of the following order: on 'reliability', for the community-poor the change proportion is 12.6 compared with 23.1 per cent for the community-non-poor; on colour, it is 35.0 and 40.9 per cent; and, on response, 54.8 per cent and 27.0 per cent. Thus, only with respect to the 'response' attribute, are the responses of the poor more favourable (more than double) than those of the non-poor. Similarly, the analysis distinguishing income-poor and income-non-poor also shows, overall, a more favourable change for the non-poor. The order of difference is: on reliability, 14.0 per cent compared with 21.1 per cent; on pressure, 30.7 per cent and 42.7 per cent; and, on response, 25.0 per cent and 42.6. per cent. The positive outcomes in all but one of the 12 instances of change proportions shown in the table on the three attributes of service quality are found to be statistically significant. The only instance of non-significance is that of the income-poor's change proportion on the 'response' attribute (Table 5).

Service cost. The analysis of the response to the query on 'connection cost' shows that nearly a quarter (–23.3 per cent) more of community-poor respondents used to pay ≤ 2000 baht per connection in the pre-privatisation period. The positive change proportion for community-non-poor is small (3.8 per cent) and also it is not statistically significant. The difference in the change proportions for the income-poor and income-non-poor are also small (1.5 per cent and –5.5 per cent) and statistically not significant (Table 5). Overall, the main indication from these data is that the connection cost has increased partly for community-poor households, certainly for some of them.

The analysis of monthly charge for water shows a decrease in the proportions of households paying ≤375 baht per month on water bills after privatisation for both categories of poor and non-poor, which implies that all respondent groups in the survey were paying more in 2003. Also, the change proportions data suggest that the poor are paying more (Table 5). The comparative change proportions for the community-poor and community-non-poor for the monthly charge are respectively –21.5 per cent and –10.3 per cent. The corresponding proportions for the income-poor and income-non-poor are: –16.1 per cent and –19.6 per cent.

Table 5. Changes (between pre- and post-privatisation) in access, quality and cost indicators by urban poor and non-poor households

	Community						*Income*					
	Informal (poor)			*Formal (non-poor)*			*Poor (≤ 7500 baht/month)*			*Non-poor (> 7500 baht/month)*		
Indicators	*1998*	*2003*	*Change*	*1998*	*2003*	*Change*	*1998*	*2003*	*Change*	*1998*	*2003*	*Change*
Access	28.0	84.0	56.0	76.8	93.9	17.1	50.0	88.6	38.6	57.7	90.0	32.3
χ^2 value			(47.727)***			(11.675)***			(15.441)***			(35.128)***
Water quality												
Drinkable	16.2	30.9	14.7	32.3	45.2	12.9	25.6	46.2	20.6	25.4	36.8	11.4
χ^2 value			(4.086)**			(3.263)*			(3.565)*			(3.745)*
Colour	56.3	83.1	26.8	72.0	90.2	18.2	75.7	97.3	21.6	68.2	84.1	15.9
χ^2 value			(12.041)***			(9.958)***			(7.400)***			(15.466)***
Turbidity	56.9	72.7	15.8	65.9	93.5	27.6	69.7	80.0	10.3	60.2	86.2	26.0
χ^2 value			(3.590)*			(21.517)***			(0.961)			(21.204)***
Service quality												
Reliability	79.1	91.7	12.6	72.6	95.7	23.1	78.1	92.1	14.0	73.7	94.8	21.1
χ^2 value			(3.384)*			(18.186)***			(2.772)*			(18.404)***
Pressure	56.7	91.7	35.0	47.3	88.2	40.9	59.0	89.7	30.7	48.3	91.0	42.7
χ^2 value			(19.180)***			(35.526)***			(9.682)***			(45.182)***
Response	29.2	84.0	54.8	51.4	78.4	27.0	50.0	75.0	25.0	40.0	82.6	42.6
χ^2 value			(15.033)***			(5.929)**			(2.133)			(17.448)***
Service cost												
Connection cost												
(≤ 2,000 baht)	75.0	51.7	–23.3	94.2	98.0	3.8	81.8	83.3	1.5	86.4	80.9	–5.5
χ^2 value			(3.316)*			(1.000)			(0.009)			(1.493)
User charge												
(≤ 375 baht/month)	95.5	74.0	–21.5	89.6	79.3	–10.3	91.7	75.6	–16.1	94.8	75.2	–19.6
χ^2 value			(4.693)**			(4.118)**			(1.455)			(10.138)***

Notes: Absolute values of χ^2 are shown in parentheses; * denotes significant at 10 per cent; ** denotes significant at 5 per cent; *** denotes significant at 1 per cent. Absolute χ^2 values below 2.706 are statistically insignificant at the 10 per cent level thereby accepting the null hypothesis for that particular indicator. All figures for 1998 and 2003 denote the percentage of the total households responding positively to the indicators and figures for change denote the percentage difference between 2003 and 1998 in each sample stratum. A negative figure for change denotes deterioration.

The change proportions are also significant, except in one instance relating to the income-poor. Overall, it is evident again that spending on the monthly water bill is higher for both the community- and income-poor.

5.3 A Comparison of Survey Results with the PWA Technical Data

Given that our survey queries were largely answered on the basis of each household respondent's experience and perceptions (in other words, the survey did not involve any technical analysis of water quality), the PWA data (which include scientifically determined water quality test results) were compiled for comparison with our own data. It should also be noted that the PWA data are based on the official data collection system for the whole municipal area, unlike our survey area classified by community types within the province's urban district. Since all the data from these two different sources are not comparable, two tables—one showing only the PWA data (Table 6) and the other including only the comparable elements—are presented (Table 7) for the analysis that follows.

Access. The PWA data show that household connections to piped water have increased from 15 495 connections in 1998 to 24 488 in

Table 6. PWA pre- and post-privatisation data on access, water quality (technical) and service quality in the Pathumthani municipal district

		All households			
Indicators	*Unit*[a]	*Permissible range*[b]	*1998 sample*	*2003 sample*	*Change (percentage)*
Access to piped water (number of connections)	Household	—	15 495	24 488	58.03
Water quality					
Drinkable	Taste	Acceptable	Yes	Yes	None
Colour	Pt-Co	< 5	2	4	Deteriorated
Turbidity	NTU	5–20	1.4	0.36	Improved
pH	pH	6.5–8.5	7.81	7.70	Improved
Total solids (TDS)	Mg/l	< 500	622	120	Improved
E. coli	—	0	N.A.	0	None
Service quality					
Reliability	Hr/day	—	24	24	None
Pressure	Bar	—	2.4	4.0	Improved
Response	Minutes	—	60–120	15	Improved
Water loss	Percentage	—	58.46	20.75	Improved

[a] Various units are used by the PWA: wherein Pt-Co stands for the platinum-cobalt scale used for measuring colour; NTU is the nephelometric turbidity unit; pH is the power of hydrogen, a scale commonly used for measuring the acidity or alkalinity of a liquid, where 7.0 is a neutral value; a bar is the unit for measuring pressure and 1 bar is the force needed to raise water to a height of 10 metres.
[b] Permissible range used by the PWA across Thailand for measuring water quality.
Sources: Authors' compilations based on PWA data for access and quality and PTW data for water loss. Data on access extracted from Form M5 of the PWA's monthly operation reports; physical and service quality for 1998 extracted from the P 173/41 report of Water Quality Control Regional Office 3 on tests carried for Pathumthani Waterworks and dated 5 January 1998; and on physical and service quality for 2004 extracted from the C 154/46 report of Water Quality Control Regional Office 2 on tests carried for Pathumthani Waterworks and dated 11 November 2002.

Table 7. A comparison of household survey and PWA data on changes in the indicators for assessment of the Pathumthani water supply privatisation scheme

Indicators	*Survey data (percentage change)*[a]		*PWA data for total population under the privatisation scheme*[b]
	Community-poor	*Income-poor*	
Access	56.0	38.6	58.0
Physical quality			
Drinkable	14.7	20.6	No change as data for both years are within acceptable range
Colour	26.8	21.6	Shows deterioration from 2 to 4 Pt-Co units, but within acceptable range of < 5
Turbidity	15.8	10.3	Improvement from 1.4 to 0.36 NTU and within acceptable range of 5–20
Service quality			
Reliability	12.6	14.0	No change as service during both periods has been on a 24/7 basis
Pressure	35.0	30.7	Improvement from 2.4 to 4.0 bars
Response	54.8	25.0	Improvement from 60–120 minutes response time to 15 minutes

[a] The changes shown denote difference in percentage between 2003 and 1998 in respective sample stratum, as detailed in Table 5.
[b] Inference is made using the data shown in Table 6, which represents data for the entire study area.

2003, which denotes a 58.03 per cent positive change. The corresponding survey proportion is 56.0 per cent for the informal community and 38.6 per cent for the income-poor, irrespective of their locations.

Water quality. On water quality, the PWA data for the drinkability attribute are within the acceptable limit for both 1998 and 2003. The colour attribute, measured technically by the PWA in the form of a Pt-Co value, showed a drop from a value of 2 in 1998 to 4 in 2003. It is still within the acceptable limit of < 5. The PWA data on turbidity show an improvement from an NTU value of 1.4 to 0.36 (the acceptable limit being between 5 and 20 NTU). The survey results for these three attributes of water quality show positive improvements for each category of household. The PWA also measures water quality by testing the pH value, the presence of total solids and the presence of *E. coli* bacteria. The data on these attributes are also within the permissible limit or show an improvement. The pH value changed from 7.81 in 1998 to 7.70 in 2003, which is within the acceptable range of 6.5–8.5. The presence of total solids improved from 622 in 1998 to 120 in 2003. Two points emerge clearly from this comparison. One, water quality measures in both sets of data are largely consistent; two, almost all of these measures suggest an overall improvement in water quality.

Service quality. For the service quality attributes of reliability, pressure and response to complaints, the PWA data are either within the permissible limit or show an improvement. The 'reliability' of supply, measured by hours per day availability of water, show that piped water supply has been available for 24 hours daily in both years. Thus, no change

is reported. For water 'pressure' (measured in bars), an improvement from 2.4 bars in 1998 to 4.0 bars in 2003 has been recorded. A substantial improvement has taken place for 'response' to customer complaints from a response time of 60–120 minutes in 1998, to 15 minutes on average in 2003. As reported in section 5.1, the household survey results also show similar improvements for these three attributes of service quality.

6. Conclusion

Although the debate on the effects of water supply privatisation on the poor is largely inconclusive, there appears a general agreement that access, quality and price are the issues that matter most to the poor. Also, it appears from the existing literature that the debate's inconclusiveness is primarily due to the lack of clear and objective evidence to prove either argument. The research which underlies in this paper has attempted to contribute to the literature, first, by developing a set of empirically verifiable propositions on the issues and then assessing them by generating household-level data from an urban area where Thailand's first water supply privatisation scheme was implemented a decade ago.

The case of Thailand's first water supply privatisation scheme provides clear evidence of improvement in access for affected households in general and the urban poor in particular. This improvement also suggests that the well-known access barrier, arising from lack of tenure, did not restrain the water supply concessionaire from reaching the households living in the informal communities who lacked a formal tenure status.

Indeed, neither the lack of tenure status (arising from living in the informal or slum settlements) nor the price (increase in connection cost and monthly water charge) has been a barrier for the poor to access the privatised service. This suggests that a private firm, motivated by profit, does not care if a settlement is legal or illegal, unlike the public service agencies which have long been restrained to provide water supply to the households living in the informal or unauthorised settlements due to financial constraints and their concern that provision of a service will turn a *de facto* occupation into a *de jure* status, even though such settlements have been there for years, if not for decades in some countries.

The other important evidence emerging from the survey results is an improvement in the water quality (drinkability, clarity and turbidity) and the service (reliability, pressure and response to complaints). For the poor these associated benefits are additional considerations in willingness to pay for direct access to piped water.[18]

The cost of the service paid by the poor under privatisation also did not increase to a level or extent to make privatised water inaccessible to them. It was possible not merely because of a readjustment of the tariff but more as a result of direct access. It is important to add that, although a progressive tariff structure was also in place prior to privatisation, distortions occurred because many poor households did not have a connection to their own dwellings. The newly acquired connection to the individual household seems to have led to the elimination of many poor households' previous reliance on getting water from a single legal connection, thereby being required to pay a higher rate for collective bulk consumption.

The positive outcome of the scheme presented in this paper, in the form of improvement in access and quality, especially for the urban poor, seems to have resulted from a mix of market- and welfare-oriented policies. Instead of following a generalised neoliberal dictate, the scheme was structured and implemented by: divesting key components of the water supply service except tariff setting,

which allowed the application of a cross-subsidy to avoid any potential adverse effect to the poor from privatisation; ensuring that, instead of a single large contract, the privatised components were unbundled and contracted separately for varying durations, which effectively mitigated the risk of privatising a natural monopoly such as water supply; and, motivating the company (PTW) to expand coverage to seek profit.

Thus, the outcome of Thailand's first water supply privatisation scheme cannot be attributed to neo-liberal principles or pure market economy norms. Neither does this case prove that privatisation, particularly when it relates to such a basic service as water, is bound to hurt the poor, as the opponents fear. This case thus offers another "salutary lesson to the right and the left, neo-liberals and defenders of the state, not to overgeneralise" (Gilbert, 2007, p. 1574). More importantly, Thailand's case offers practical insights similar to those drawn by Gilbert (2007) from his study of Bogota's (Colombia) water company—i.e. ways to combine public management with commercial practice for the benefit of the poor.

Any major shift, from the left to the right or public to private, leading to privatisation brings a fear of political and social upheavals as have happened in several Latin American countries. Thailand seems to have learned from such experiences by not resorting to the widespread privatisation of water supply, nor implementing it in the politically strong and volatile Bangkok metropolis. It has been undertaken with much care, subtly and in a gradual manner, with Pathumthani being the first province. The quiet success of Pathumthani then encouraged the government to expand privatisation to other provinces. Thailand has also been careful not to use the same model or scheme for the whole country; instead, the government employed different forms of privatisation for provinces depending on their respective context, complexity and investment needs.

Notes

1. In many instances of utility tariff-setting, the cross-subsidisation principle is already in place. It is worked out by means of a progressive tariff structure—i.e. the minimum consumption bracket is charged the lowest tariff, with an incremental rate for increasing consumption brackets. For an example of distortion in the application of this principle, see section 2.3.
2. Urban areas tend to be better serviced for their dual advantages: on the supply side, due to falling costs as noted at the outset; and, on the demand side, due to the greater affluence of urban residents.
3. It may well be the case that the absolute number of poor households served increased during this period, but the deterioration in percentage terms indicates that service expansion could not keep pace—despite rapid economic growth and development in Thailand, much of which has been centred in and around Bangkok.
4. Pathumthani province was chosen for implementing the first water supply privatisation scheme in Thailand due to its character as a fast-growing urban fringe area of Bangkok, making it financially more lucrative for private-sector investment. It is to be noted that Pathumthani was also chosen as the first province for the implementation of a 30 baht universal medical care scheme by the Thai government in 2001.
   The other four provinces forming the Bangkok Metropolitan Region, besides Bangkok Metropolis, are: Samut Prakan, Nakhon Pathom, Nonthabuir and Samut Sakon.
5. The relevant public authority—the Provincial Waterworks Authority (PWA)—has recorded changes between pre-privatisation (1998) and the post-privatisation year of 2003 for the entire province, not by community or income status of residents.
6. The extension of network utilities (piped water, electricity, gas and sewage), which require physical connection to dwelling units, poses a problem for the government in several ways.

First, connection implies recognising the existence of these units, despite their illegal tenure status. Secondly, the budgetary constraints faced by the public sector hardly make it possible to meet the needs of the legal households or tax payers. Thus providing services to informal communities may come at the expense of those who are entitled to get priority. Thirdly, the very nature of the community—informality or having no proper registration—makes metering, billing and collection difficult for the public authorities.

7. Access to water supply is variously defined. For some low-income countries, the mere presence of a standpipe at a community level is considered adequate. In most instances, a piped water connection to the individual household is the minimum, as is the case in Thailand.
8. This general norm, known as the '5 per cent rule', is a reference to the assumption that households are willing to pay up to 5 per cent of their household income for a potable water supply, beyond which the demand is assumed to be elastic (McPhail, 1993).
9. Estache *et al.* (2001, pp. 1180–1182); Clarke and Wallsten (2002, pp. 11–14); and Kessides (2004, pp. 246–249) contain useful discussions on subsidy and cross-subsidy specific to water supply.
10. The questionnaire used for the primary survey of households was developed by modifying the Living Standard Measurement Study (LSMS) questionnaire of the World Bank. The specific questions raised included queries on the effects of water supply privatisation. See section 4.4 (Table 2) for the key queries used to know each household's status on access to water and related indicators in 1998 and during the survey year of 2003.
11. Slum communities in Thailand are locally known as *Chum Chon*; they are informal communities occupying public or private land with quasi or illegal tenure status. They are generally considered to be inhabited by households belonging to poor or lower-income groups and are classified as slums (informal) by the NHA. This research adopted the NHA's classification of communities as informal for the study area.
12. This was based on a discussion with the NHA, which had provided the initial data on the location and classification of these communities in the study area. A similar classification for slum sizes was also employed by Crane *et al.* (1997) for their research on low-income housing in Bangkok.
13. The household sample size was based on the following formula

$$n = Nz^2pq / Nd^2 + z^2pq$$

where, n = sample number; N = population size (i.e. total number of households in each selected community); z = standard normal variant value for the required confidence level (taken as 90 per cent confidence level = 1.282); pq = percentage of attributes in universe expressed as a decimal (assumed to be 50 per cent each); and d = precision (10 per cent).

For example, in the case of determining the sample size of households for the shop-house category, with a total of 241 households, the use of this formula yielded (n) of 35 as shown

$$\begin{aligned} n &= [241 * (1.282 * 1.282) * (0.5 * 0.5)] \\ &\quad / [241 * (0.1 * 0.1) + (1.282 * 1.282) \\ &\quad * (0.5 * 0.5)] \\ &= 99.02232 / 2.820881 \\ &= 35.10333 \\ &= 35 \end{aligned}$$

The sample size of household for each selected community was similarly determined.

14. This involved picking the first household randomly by taking the last digit of a book page opened randomly and thereafter using every nth household of each community's total number (n = total household/sample size).
15. The Bank of Thailand uses baht 7500 (US$175) per month as the threshold for determining poor households. Households with incomes of above baht 7500 do not qualify for the credit programme meant for the poor. The National Economic and Social Development Board (NESDB)—the planning agency of Thailand—uses an income of baht 6500 per household for the poverty line. Yet another

benchmark for identifying households living below the urban poverty line is baht 7148 per month, but that was for the year 1990 (Ratanakomut *et al.*, 1994). Taking these three poverty-line measures in view, this study settled for using a household income of the baht 7500 per month for 2003—the survey year—as the dividing line between poor and non-poor households in the study area.

16. The connection cost threshold of baht 2000 was set on the basis of information on the average cost of installing a water meter plus a network extension to the meter, obtained from the PWA.
17. This mark (which is 5 per cent of baht 7500—the poverty threshold income) is based on the 5 per cent rule (see note 6).
18. Although not included in this paper, it is worth noting that our survey results on willingness to pay (WTP) show that the poor's key considerations in obtaining access to piped water are to get improved water and service quality. More than two-thirds of respondents cited water quality improvement (68.8 per cent of the income-poor and 90.9 per cent of the community-poor households) as the key reason. The corresponding proportions for service quality are: 50.0 and 72.7 per cent. In contrast, only about a quarter of the poor respondents (18.8 per cent of income-poor and 27.3 per cent of community-poor) cited reduction in cost as a reason to get a water connection.

References

Azizi, M. (2000) The user-pays system in the provision of urban infrastructure: effectiveness and equity criteria, *Urban Studies*, 37(8), pp. 1345–1357.

Bitran, E. and Serra, P. (1998) Regulation of privatized utilities: the Chilean experience, *World Development*, 26(6), pp. 945–962.

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

Chantawong, M., Boonkrob, P., Chunjai, C. and Kochasawasdi, P. (2002) *Water privatization in Thailand* (http://www.terraper.org/publications/Water%20Privatisation%20in%20Thailand_with%20contents.pdf; April 2007).

Ch. Karnchang (2004) *Business segment: Pathumthani Water Supply Company* (http://www.ch-karnchang.co.th/eng/seg_cession_phathum_thani.php; accessed May 2006).

Clarke, G. and Wallsten, S. (2002) *Universally bad service: providing infrastructure services to rural and poor urban consumers.* Policy Research Working Paper No. WPS 2868, World Bank, Washington, DC.

Clarke, G., Kosec, K. and Wallsten, S. (2004) *Has private participation in water and sewerage improved coverage? Empirical evidence from Latin America.* Policy Research Working Paper No. WPS 3445, World Bank, Washington, DC.

Clarke, G., Menard, C. and Zuluaga, A. (2000) *The welfare effects of private sector participation in Guinea's urban water supply.* Policy Research Working Paper No. WPS 1824, World Bank, Washington, DC.

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

Daniere, A. and Takahashi, L. M. (1999) Poverty and access: differences and commonalities across slum communities in Bangkok, *Habitat International*, 23(2), pp. 271–288.

Dijk, M. P. van and Nordholt, N. G. S. (1994) Introduction: privatisation in developing countries, how to assess?, in: M.-P. van Dijk and N. G. S. Nordholt (Eds) *Privatisation Experiences in African and Asian Countries.* Amsterdam: SISWO Publikatie.

ESCAP (Economic and Social Commission for Asia and the Pacific) (2007) *Sustainable infrastructure in Asia: overview and proceedings.* UN-ESCAP, Bangkok.

Estache, A. (2005) *PPI partnerships versus PPI divorces in LDSs.* World Bank Policy Research Working Paper No. WPS 3470, World Bank, Washington, DC.

Estache, A., Goicoechea, A. and Trujillo, L. (2006) *Utilities reforms and corruptions in developing countries.* World Bank Policy research Working Paper No. WPS 4081, World Bank, Washington, DC.

Estache, A., Gomez-Lobo, A. and Leipziger, D. (2001) Utilities privatisation and the poor: lessons and evidence from Latin America, *World Development*, 29(7), pp. 1179–1198.

Ghosh, B. N. (2000) Privatisation: the ASEAN experience, in: B. N. Ghosh (Ed.) *Privatisation: The ASEAN Connection*, ch. 1. New York: Nova Science Publishers, Inc.

Gilbert, L. (2007) Water for all: how to combine public management with commercial practice for the benefit of the poor, *Urban Studies*, 44(8), pp. 1559–1579.

Jaglin, S. (2002) The right to water versus cost recovery: participation, urban water supply and the poor in sub-Saharan Africa, *Environment and Urbanization*, 14(1), pp. 231–245.

JICA (Japan International Co-operation Agency) (1990) *Development plan and feasibility study on provincial water supply projects in the Kingdom of Thailand*. Final Report for Pathumthani and Prachatipat, Ministry of Interior, Provincial Waterworks Authority.

Kessides, I. N. (2004) *Reforming infrastructure: privatization, regulation and competition.* World Bank Policy Research Report No. 28985, World Bank and Oxford University Press, Washington, DC.

Kikeri, S. and Nellis, J. (2004) An assessment of privatization, *The World Bank Research Observer*, 19(1), pp. 87–118.

Kilchmann, A. (1997) Should the water supply industry be privatised? (As seen from a country with abundant water), *Water Supply*, 15(1), pp. 93–96.

Lampietti, J. A., Kolb, A. A., Gulyani, S. and Avenesyan, V. (2001) *Utility pricing and the poor: lessons from Armenia.* World Bank Technical Paper No. 497, World Bank, Washington, DC.

McDonald, D. and Smith, L. (2004) Privatising Cape Town: from *apartheid* to neo-liberalism in the mother city, *Urban Studies*, 41(8), pp. 1461–1484.

McPhail, A. A. (1993) The five percent rule for improved water services: can households afford more?, *World Development*, 21(6), pp. 963–973.

Mithani, D. M. and Watcharaphun, P. (2000) Privatisation in Thailand: an overview, in: B. N. Ghosh (Ed.) *Privatisation: The ASEAN Connection*, ch. 10. New York: Nova Science Publishers, Inc.

MOF (Ministry of Finance) (1998) *Master plan for state enterprise reforms.* MOF, Royal Thai Government (http://www.mof.go.th/sepc/sepcfnmenu.htm).

NSO (National Statistical Organisation) (2005) *Statistical Year Book 2004.* Statistical Forecasting Bureau, NSO, Ministry of Information and Communication Technology, Bangkok.

Pugh, C. (1999) The Asian financial crisis and its urban impacts, *Habitat International*, 23(2), pp. 157–165.

PWA (Provincial Water Supply Authority) (2003) *PWA's Privatization Program.* Provincial Water Supply Authority (http://www.pwa.co.th/english/private.htm; accessed May 2006).

Ratanakomut, S., Ashakul, C. and Kirananda, T. (1994) Urban poverty in Thailand: critical issues and policy measures, *Asian Development Review*, 12(1), pp. 204–224.

Smith, L. and Hanson, S. (2003) Access to water for the urban poor in Cape Town: where equity meets cost recovery, *Urban Studies*, 40(8), pp. 1517–1548.