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“Social policies and private sector participation in water supply – the case of Malaysia”

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prepared for the UNRISD project on
“Social Policy, Regulation and Private Sector Involvement in Water Supply”

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Contents

1. Introduction

2. The water sector in Malaysia

- 2.1. Role of water sector in development
- 2.2. Water resources
- 2.3. Design capacity and production
- 2.4. Water coverage
- 2.5. Water consumption

3. Water institutions in Malaysia

- 3.1. Public and private participation
- 3.2. Financial performance in the water sector
- 3.3. Private water companies

4. Social and economic regulation in the water sector

5. Water tariff in Malaysia

- 5.1. Water tariff structure
- 5.2. Tariff revision
- 5.3. Affordability: Lifeline Consumption
- 5.4. Recent regulatory reforms

5. Evidence from household expenditure data

- 5.1. Data source
- 5.2. Equity
- 5.3. Access
- 5.4. Affordability

6. Conclusion

References

1. Introduction

Infrastructure development has been an important component of Malaysia's economic development strategy since the country's independence in 1957. Significant amount of investments were made in the infrastructure sector to enhance and maintain the country's export competitiveness. These investments have also contributed to the eradication of poverty and the elevation of the quality of life in the country. However, despite the progress made in these areas, infrastructure development across and in the different sectors has been uneven.

In the water sector, the more developed states have achieved almost universal access while others continue to struggle with providing access to treated water supply particularly in the rural areas. The inability to recover revenue from water produced (non-revenue water) continues to be a serious problem in the sector. Underinvestment in the sector has also resulted in the deterioration of the water distribution systems.

In Malaysia, water is constitutionally a state matter and some states have opted to privatise their water sector. However, there is currently no consensus on whether privatisation is the solution to water problems in Malaysia. Implicitly, some states continue to support privatisation but others have no plans to privatise their water sector. Many non-governmental organizations (NGOs) continue to vehemently object to privatisation of the water sector. Surprising, despite the significant amount of interest generated by the debate on the efficacy of privatisation, there has been no empirical studies on the issue.

This chapter attempts to shed some light on the impact of privatisation in the Malaysian water sector by employing a quantitative-based empirical analysis. Malaysia is useful country case study on the impact of privatisation in the water sector. There is a variety of forms of institutions in its water sector – full privatisation, partial privatisation and state. The country is also a developing economy, with a significant rural area where access to treated water continues to be serious problem. Thus, the Malaysian water sector provides an opportunity for an empirical test of the impact of privatisation in a developing economy. Finally, this is the first study of the Malaysian water sector using household expenditure data.

The outline of the rest of the chapter is as follows. A brief background of the water sector in Malaysia is presented in the next Section. This is followed by a discussion of water institutions in Malaysia. In the subsequent Section, we examine social and economic regulation in the sector. Next, water tariffs are discussed. Issues of equity, access, and affordability are examined in the following Section using household expenditure data. The last Section concludes.

2. The water sector in Malaysia

2.1. Role of water sector in development

Infrastructure development has made significant contributions to Malaysia's economic growth and development since the country's independence in 1957.¹ Malaysia's success in transforming its economy from one dependent on primary commodity exports in the

¹ See Naidu and Lee (1997) for further discussions.

1950s and 1960s (e.g. rubber and tin) to one based on manufacturing activities is partly due to the government's emphasis on investments in infrastructure development. Foreign direct investment has played a significant role in the development of the manufacturing sector in Malaysia. The availability of efficient infrastructure has been instrumental in attracting foreign direct investment (FDI) in the manufacturing sector.

Infrastructure development has also made important contributions to socio-economic development in Malaysia. Following the racial riots in Malaysia in 1969, the Malaysian government began putting emphasis on solving two problems that were perceived to be the main causes of social instability in the country, namely, poverty and unequal wealth distribution. Thus, the Malaysian government's development policy since the early 1970s has also focused on both poverty eradication and wealth redistribution (between the different races). Both the number of poor households and the incidence of poverty in Malaysia have declined in the past 30 years (see Table 1). The achievements in wealth redistribution remain a contentious issue even though the mean household income levels in all ethnic groups have increased significantly during the same period (Table 1).

Table 1: Poverty and income distribution in Malaysia, 1970-2004

	1970	1980	1990	2004
No. of Poor Households				
Rural	1,203,400	568,500	530,300	219,700
Urban	402,600	97,600	89,100	91,600
Total	1,606,000	666,100	619,400	311,300
Incidence of Poverty (%)				
Rural	58.7	47.8	21.8	11.9
Urban	21.3	17.9	7.5	2.5
Total	49.3	39.6	17.1	5.7
Mean Monthly Household Income (RM, at Current Prices)	1970	1979	1995	2004
Bumiputra	na	492	1,604	2,711
Chinese	na	938	2,890	4,437
Indian	na	756	2,140	3,456
All Ethnic Groups	na	693	2,020	3,249
Gini Coefficient	na	0.51	0.46	0.46

Sources: 1970 poverty figures are from the Fifth Malaysia Plan (p.86), 1980 poverty figures are from the Fourth Malaysia Plan (p.34), 1979 mean household income figures are from Bruton (1992), p.319, 1990 poverty figures are from the Sixth Malaysia Plan, p.32, 1995 mean household income figures are from Eighth Malaysia Plan, p.61, 2004 figures are from Ninth Malaysia Plan, p.330 & p.333, na - not available.

An important aspect of the poverty eradication program in Malaysia is the provision of adequate infrastructure services (such as water and electricity) especially in the rural areas. This emphasis can be seen from the Federal Government's development expenditures in these sectors (Table 2). In the Eighth Malaysia Plan, the Federal Government's development expenditure for the infrastructure sector amounted to about

RM39.7 billion (or USD 10.7 billion).² Of these, 12.1 % were allocated to water supply. These funds were primarily used for capital expenditures such as the construction of dams, new treatment plants, the rehabilitation and upgrading of treatment plants and distribution systems.

Table 2: Infrastructure development expenditures, 1996-2005 (RM million, current prices)

Sector	7 th Malaysia Plan 1996-2000	8 th Malaysia Plan 2001-2005*
Water Supply	2,382.7	4,810.0
Sewerage	665.3	1,666.0
Energy	2,543.6	2,288.8
Transport	20,484.2	30,941.8
Total	26,075.80	39,706.60

Source: Eighth Malaysia Plan

* Allocation

The allocation for the rural water supply program in Malaysia has increased during the period 1976-1990 (Table 3). For the more remote rural areas (especially in Sabah and Sarawak), alternative water supply systems such as gravity flow, tube well and rainwater harvesting were also implemented. One such project under the Eighth Malaysia Plan is the Alternative System of the Rural Water Supply Programme, which benefited 43,000 people in Sabah and 10,000 people in Sarawak.³

Table 3: Rural Water Supply Programme, 1971-2005

Development Plan	Allocation (RM million)	Beneficiaries (Person)
Second Malaysia Plan (1971-1975)	5	NA
Third Malaysia Plan (1976-1980)	147	300,000
Fourth Malaysia Plan (1981-1985)	350	1,800,000
Fifth Malaysia Plan (1986-1990)	1,430	2,022,600
Sixth Malaysia Plan (1991-1995)	NA	1,500,000
Seventh Malaysia Plan (1996-2000)	12	53,000
Eighth Malaysia Plan (2001-2005)*	734	354,000

Source: Actual expenditures*, Third Malaysia Plan, p.377, 379 & 383, Fourth Malaysia Plan, p.337, 339 & 342, Fifth Malaysia Plan, p.471 & 476, Sixth Malaysia Plan, p.340
Mid-Term Review of the Eighth Malaysia Plan, p.258, Ninth Malaysia Plan. p.380

² Based on the exchange rate of RM3.70 = USD1.

³ Mid-Term Review of the Eighth Malaysia Plan, p.258-259.

2.2. Water resources

Malaysia's location within the equatorial zone ensures that the country has a fairly abundant amount of water resources. Average monthly rainfall in the country varies from 190mm to as high as 450mm in some states during the monsoon season. Annual rainfall volume is estimated to be around 990 km³, of which 36 % (or 360 km³) are lost to evapotranspiration.⁴ The country's total amount internal water resource is estimated at 580 km³/year.⁵ Water resources are not equally distributed across the different states in the country. Several inter-state water transfer projects and agreements between the different states have been implemented to deal with the unequal distribution of water resources. Direct extraction from rivers is the most important source of raw water – accounting for two third of raw water supply in the country (Table 4). Second in importance are storage dams. Groundwater is an important source of raw water in some of the less developed states such as Sabah and Kelantan.

Table 4: Raw Water Resources in Malaysia, 2003 (m³/year)

State	Direct Extraction from River	Storage Dam	Groundwater	Total
Kedah	335,531,444	1,766,168	0	357,297,612
Sarawak*	58,035,000	0	0	58,035,000
Labuan	9,938,360	2,975,940	0	12,914,300
Perlis	16,097,000	15,175,000	2,493,000	33,765,000
Pahang	246,827,600	0	0	246,827,600
N.Sembilan	162,716,598	80,134,090	331,785	243,182,473
Sabah	196,094,090	72,381,086	12,064,928	280,540,104
Perak	343,877,960	0	0	343,877,960
Melaka	143,120,024	54,928,877	0	198,048,901
Kuching**	108,040,941	0	0	108,040,941
Sibu**	33,827,631	0	0	33,827,631
Pulau Pinang	278,526,228	29,337,081	0	307,863,309
Terengganu	85,075,726	55,960,145	79,012	141,114,883
Selangor***	909,768,401	939,680,294	0	1,849,448,695
Johor	167,141,518	256,073,108	0	423,214,626
Kelantan	39,364,288	1,742,340	42,165,524	83,272,152
LAKU**	32,500,699	29,751,900	1,678,015	63,930,614
Total	3,186,483,508	1,539,906,029	58,812,264	4,785,201,801

Note: *Excluding the divisions of Kuching, Sibu, and LAKU
 ** Kuching and Sibu are divisions within the state of Sarawak.
 *** Includes Kuala Lumpur and Putrajaya.

Source: MWA (2005)

⁴ FAO, <http://www.fao.org/ag/agl/aglw/aquastat/countries/Malaysia/index.stm>

⁵ Ibid.

2.3. Design capacity and production

Water capacity and production in Malaysia has increased rapidly as a result of the significant amount of development expenditures spent in the water sector. The water supply design capacity and production in Malaysia expanded at a compounded average growth rate of 7.8 % and 7.6 %, respectively, between 1981 and 2003. By 2003, the water supply design capacity and production reached 13,343 mld and 11,054 mld, respectively.

2.4. Water coverage

The water supply coverage in rural and urban areas in the various states has also improved significantly in most states since 1980 (Table 5). Universal access has almost been achieved in most urban and rural areas in the various states in Malaysia. However, there are a few states where the coverage of water supply is low, particularly in the rural areas. The three states with the lowest coverage of water supply in rural areas are Kelantan (57 %), Sabah (59 %) and Terengganu (79 %). These are states with relatively high levels of poverty and a larger share of population living in the rural areas. It is likely that these states may not have the financial capacity to improve water supply coverage.

Table 5: Urban and rural water supply coverage, 1980-2003 (% population)

State	1980		1985		1990		1995		2000		2003	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Johor	87	28	92	61	96	67	99	96	100	98	100	99
Kedah	90	52	95	58	98	69	100	89	100	97	100	99
Kelantan	58	17	65	30	70	40	85	45	63	48	72	57
Melaka	98	70	100	82	100	98	99	97	100	99	100	99
N.Sembilan	87	66	89	75	96	89	98	95	100	99	100	99
Pahang	92	47	95	65	98	70	98	86	98	89	98	89
Perak	96	55	98	75	99	77	98	84	100	99	100	99
Perlis	90	45	93	50	97	75	99	89	100	97	100	99
P.Pinang	97	78	98	85	99	96	98	98	100	99	100	99
Sabah	99	18	100	38	100	52	87	42	89	60	90	59
Sarawak	87	20	95	33	98	47	93	80	100	92	100	92
Selangor	90	65	95	73	90	85	100	92	100	98	100	99
Terengganu	75	25	85	40	100	54	90	77	84	78	97	79
K.L.					100	-						
Labuan					-	-			100	100	100	100
Malaysia					96	67	96	82	97	85	98	86

Sources & Notes: 1980 & 1985: Fifth Malaysia Plan, p.472, Figures for Sabah includes Labuan FT, Figures for Selangor includes KL. 1990: Seventh Malaysia Plan, p.361, Figures for Sabah includes Labuan FT. 1995: Eighth Malaysia Plan, p.284. Figures for Sabah includes Labuan FT. Figures for Selangor includes KL and Putrajaya FT. 2000: Mid-Term Review of Eighth Malaysia Plan, p.257. Figures for Selangor includes KL and Putrajaya FT. 2003: Malaysia Water Association (2005)

2.5. Water consumption

The distribution of population across the different states in Malaysia is fairly uneven. A significant proportion of the population is concentrated in the more developed states (such as Kuala Lumpur, Johor, Pulau Pinang and Selangor) or in the large states (such as Sabah and Sarawak) (Table 6). Total water consumption is highest in the states of Sarawak, Selangor (including KL), Pulau Pinang and Perak. Smaller states (such as Perlis) and less developed states (such as Kelantan and Sabah) have relatively low level of total water consumption. This likely to be partly due to lack to access to treated water supply (see earlier section). Domestic per capita water consumption does not seem to be correlated with per capita GDP for the various states.⁶

Table 6: Water consumption in Malaysia, 2003

	Population Served	Domestic Water Consumption (m ³)	Non- Domestic Water Consumption (m ³)	Total Water Consumption (m ³)	Per Capita Domestic Water Consumption (litre per day)
Johor	2,931,650	204,471,885	89,771,186	294,243,071	191
Kedah	1,668,044	141,613,051	49,451,417	191,064,468	232
Kelantan	865,523	34,343,485	12,798,236	47,141,721	109
Melaka	681,756	55,925,509	52,333,426	108,258,935	225
N.Sembilan	909,025	62,279,282	44,666,278	106,945,560	202
Pahang	1,298,456	77,020,703	47,749,296	124,769,999	162
Perak	2,105,966	164,205,440	54,547,917	218,753,357	213
Perlis	216,454	17,023,079	2,689,725	19,712,804	215
P.Pinang	1,414,080	137,654,109	85,735,510	223,389,619	266
Sabah	2,027,468	57,007,465	35,452,649	92,460,114	77
Sarawak	2,194,919	116,151,542	763,421,162	879,572,704	145
Selangor	6,748,040	478,995,217	245,490,214	724,485,431	194
Terengganu	864,385	56,981,602	42,962,716	99,944,318	180
Labuan	80,000	5,902,324	3,397,688	9,300,012	202
Malaysia	24,005,766	1,609,574,693	843,388,420	2,452,963,113	194

⁶ A simple OLS regression using domestic per capita water consumption as the dependent variable and per capita GDP as the independent variable indicates that the positive relationship between the two variables is not statistically significant.

3. Water institutions in Malaysia

3.1. Public and private participation

Under Malaysia's Federal Constitution, water resources fall under the jurisdiction of the respective states. In the past, the treatment and distribution of water was undertaken exclusively by state water agencies. These may differ from state to state and can either be:

- State Public Works Department (PWD);
- State Water Supply Department (WSD); or
- State Water Supply Board (WSB).

Since the early 1990s, many states have opted to establish water supply companies via corporatization (via establishment of limited liability firms that are wholly-owned by the state). In a few cases, these companies were privatised via partial or full divestiture of equity in these companies. Table 7 summarizes the current situation of water institutions in Malaysia.

Table 7: Water supply institutions in Malaysia, 2005

Public Works Dept	
Kedah	(1) Production and distribution by PWD (2) Privatised production and distribution (3) Privatisation of 5 treatment plants
Sarawak	(1) Production and distribution by PWD (2) Miri, Bintulu and Limbang (LAKU) – served by a state-owned corporatized body
Labuan	(1) Distribution by PWD (2) Management contract of production
Perlis	Production and distribution by PWD
Water Supply Dept	
Pahang	Production and distribution by WSD
N.Sembilan	(1) Distribution by WSD (2) Privatisation of 2 water treatment plants
Sabah	(1) Distribution by WSD (2) Privatisation of 3 water treatment plants
Water Supply Board	
Perak	(1) Distribution by WSB (2) Privatisation of 3 water treatment plants
Melaka	Production and distribution by WSB
Water Supply Company	
Pulau Pinang	Privatised in 2000: Production and distribution by PBA Holdings Berhad (State government share 55%)
Terengganu	Corporatized in 1999: Production and distribution by Syarikat Air Terengganu Sdn Bhd (state government share 100%)
Selangor	Privatised in 2002: (1) Monopoly distribution by Perbadanan Urus Air Selangor (state government share 30%) (2) 7 water treatment plants (4 existing, 3 BOT) operated by 5 firms
Johor	Privatised in 2001: Production and distribution by SAJ Holdings Sdn Bhd (state government share 0%)
Kelantan	Privatised in 1996: Production and distribution by Air Kelantan Sdn Bhd (state government share 70%)

Source: MWA (2004)

Some states have fully privatised the provision of water services. These include the more developed states (in terms of GDP per capita) such as Selangor, Pulau Pinang and Johor. In most cases, the state government continues to hold equity in the privatised

water entities. A few states (Labuan, N.Sembilan and Sabah) have chosen a dual structure water system – whereby distribution is undertaken by state agencies and water treatment is privatised via concessions. Some of the smaller states (Melaka and Perlis) and less-developed states (Kedah, Sarawak and Pahang) have generally chosen to maintain a public water provision system. The four states where water services are fully privatised (namely, Kelantan, Selangor, Pulau Pinang and Johor) account for 49% of total water production and 46.2% of total population served in 2003. It is estimated that 64% of the total population is served by the private sector.

3.2. Financial performance in the water sector

In 2003, the Malaysian water sector experiences a revenue-cost deficit of about RM245.5 million (or about 9.1% of cost – defined as operating and maintenance costs). However, about half of the states in Malaysia are currently experiencing a financial deficit in their water operations (see Table 5.8). Of these, states with large deficits include Selangor (-RM449.1 million) and Sabah (-RM125.0 million). Interestingly, the unit revenue exceeds the unit cost in all the states experiencing financial deficits in water operations, with the exception of Labuan.⁷ Of the four states where water is fully privatised – namely, Selangor, Pulau Pinang, Johor and Kelantan – only one state (Selangor) suffered losses in 2005. However, ownership status in the water sector (private/public) is not a significant explanatory variable for profitability.⁸

⁷ Unit cost is derived by dividing total operating and maintenance costs by total production while unit revenue is derived by dividing total revenue by total metered water sold.

⁸ This is based on results from panel regression models (random-effects models and fixed-effects models) involving profitability as the dependent variable and a dummy ownership status as the independent variable.

Table 8: Financial performance of water operations in Malaysia, 2003

State	Cost	Revenue	Revenue – Cost Gap	% Deficit	Unit Cost	Unit Revenue
Kedah	117,110,842	148,520,086	31,409,244		0.37	0.81
Sarawak	26,209,664	22,001,870	-4,207,794	16.1	0.48	0.51
Labuan	16,555,975	9,640,336	-6,915,639	41.8	1.35	0.98
Perlis	13,748,304	12,849,629	-898,675	6.5	0.43	0.67
Pahang	109,257,244	98,722,938	-10,534,306	9.6	0.47	0.83
N.Sembilan	72,752,318	99,561,120	26,808,802		0.32	0.95
			-			
Sabah	200,872,317	75,850,000	125,022,317	62.2	0.80	1.15
Perak	166,221,930	201,056,555	34,834,625		0.55	0.95
Melaka	77,837,946	105,486,723	27,648,777		0.62	1.20
Kuching	55,743,344	62,795,270	7,051,926		0.54	0.91
Sibu	21,247,969	19,508,893	-1,739,076	8.2	0.76	0.98
P.Pinang	107,501,332	167,950,719	60,449,387		0.38	0.75
Terengganu	45,619,654	80,750,864	35,131,210		0.34	0.89
			-			
Selangor	1,310,523,468	861,421,335	449,102,133	34.3	1.07	1.28
Johor	270,722,202	382,373,342	111,651,140		0.59	1.23
Kelantan	34,183,814	45,704,857	11,521,043		0.43	1.05
LAKU	40,283,687	46,679,330	6,395,643		0.68	0.96
			-			
	2,686,392,010	2,440,873,867	245,518,143	9.1	0.69	1.05

Source: MWA (2005)

A major reason for these financial deficits is the loss of revenues from non-revenue waters (NRW) i.e. water that are produced but not billed to consumers due to leakages, under-meter registration, and pilferage. NRW, which is measured by the difference between the quantity of water that leaves the treatment plants and the quantity billed to users based on metered consumption. The average %age of NRW in Malaysia is very high at 40.6 % in 2003. This problem is more serious in some states than in others (Table 5.9). The states with the highest levels of NRW include:

- Sabah (73.9 %);
- N.Sembilan (53.8 %);
- Kelantan (44.9 %); and
- Selangor (44.7 %).

The states that have involved private sector seem to have lower levels of NRW and most of them have lower levels compared to the national average NRW of 40.6%. This may be an indicator of efficiency with the private sector. The main causes of water losses are leakages (16-30%), meter under registration (3-7%) and pilferages (1-8%).⁹

⁹ See MWA (2004), p.14.

Table 9: Non-Revenue Water, 2003

State	Metered Consumption	Non-Revenue Water	Production	% NRW
Kedah	183,189,082	132,097,188	315,286,270	41.9
Sarawak*	43,151,590	11,598,410	54,750,000	21.2
Labuan	9,860,698	2,410,967	12,271,665	19.6
Perlis	19,162,722	12,809,453	31,972,175	40.1
Pahang	119,213,467	111,355,573	230,569,040	48.3
N.Sembilan	104,690,218	121,830,972	226,521,190	53.8
Sabah	65,913,151	186,236,149	252,149,300	73.9
Perak	211,553,576	91,407,374	302,960,950	30.2
Melaka	87,756,775	38,405,110	126,161,885	30.4
Kuching**	69,032,641	33,807,204	102,839,845	32.9
Sibu**	19,850,605	8,068,610	27,919,215	28.9
Pulau Pinang	224,632,200	55,528,660	280,160,860	19.8
Terengganu	90,794,768	43,916,877	134,711,645	32.6
Selangor***	674,900,649	545,898,791	1,220,799,440	44.7
Johor	309,702,905	150,182,495	459,885,400	32.7
Kelantan	43,444,811	35,448,479	78,893,290	44.9
LAKU**	48,495,573	10,663,627	59,159,200	18.0
Total	2,325,345,431	1,591,665,939	3,917,011,370	40.6

Note: * Excluding the province of Kuching, Sibu and LAKU;

**Province within Sarawak

*** Includes Kuala Lumpur and Putrajaya

Source: MWA (2004)

In Table 10, we compute the level of losses in revenues from NRW and compare them with the financial deficits from each state's water operations. Clearly, the financial deficits in state water operations can be reduced if the level of NRW is lower. For some states, the magnitude of reduction in NRW is small to achieve a breakeven point e.g. Perlis (10 %) and Pahang (11 %). Others require more substantial reduction in NRW to achieve breakeven e.g. Sabah (58 %), Selangor (64 %) and Sarawak (71 %).

Table 10: Reducing financial deficits via NRW reduction in water operations in Malaysia, 2003 (RM)

State	Revenue – Cost Gap	NRW Losses	Augmented R-C Gap	% Reduction in NRW for Breakeven
Kedah	31,409,244	107,097,462	138,506,706	
Sarawak	-4,207,794	5,913,727	1,705,933	71%
Labuan	-6,915,639	2,357,088	-4,558,551	
Perlis	-898,675	8,589,423	7,690,748	10%
Pahang	-10,534,306	92,215,667	81,681,361	11%
N.Sembilan	26,808,802	115,862,095	142,670,897	
Sabah	-125,022,317	214,312,496	89,290,179	58%
Perak	34,834,625	86,871,856	121,706,481	
Melaka	27,648,777	46,164,290	73,813,067	
Kuching	7,051,926	30,752,590	37,804,516	
Sibu	-1,739,076	7,929,715	6,190,639	22%
P.Pinang	60,449,387	41,517,104	101,966,491	
Terengganu	35,131,210	39,058,702	74,189,912	
Selangor	-449,102,133	696,767,541	247,665,408	64%
Johor	111,651,140	185,422,163	297,073,303	
Kelantan	11,521,043	37,292,547	48,813,590	
LAKU	6,395,643	10,264,256	16,659,899	
	-245,518,143	1,670,743,514	1,425,225,371	

Source: MWA (2005)

It may be that part of the financial deficit experienced by state water operations is due to the subsidy on residential water consumption. Generally, water subsidies are only available for residential water consumption (see Table 11). These subsidies usually apply only for the first block of consumption (around 10-20 m³). These subsidies range between 7 % (in Perlis) to as high as 49 % (in Johor). With the exception of the island of Labuan, there is no subsidy for industrial water consumption.

Table 11: Residential and industrial water tariffs and subsidies, 2003

State	Unit Cost (a)	Residential			Industrial	
		1st/2 nd Block (m ³) (b)	Rate (RM/m ³) (c)	Subsidy* (d)=[(a)(c)]/(a)	1st/2 nd Block (m ³)	Rate (RM/m ³)
Kedah	0.37	20	0.40	-8.1%	10,000	1.20
Sarawak	0.48	15	0.44	8.3%	25	0.97
Labuan	1.35	Flat	0.90	33.3%	Flat	0.90
Perlis	0.43	15	0.40	7.0%	Flat	1.10
Pahang	0.47	18	0.37	21.3%	227	0.92
N.Sembilan	0.32	20	0.55	-71.9%	35	1.50
Sabah	0.80	Flat	0.90	-12.5%	Flat	0.90
Perak	0.55	10	0.30	45.5%	10	1.20
Melaka	0.62	15	0.45	27.4%	Flat	1.40
Kuching	0.54	15	0.48	11.1%	25	0.97
Sibu	0.76	15	0.48	36.8%	25	0.97
P.Pinang	0.38	20	0.22	42.1%	20	0.52
Terengganu	0.34	20	0.42	-23.5%	Flat	1.15
Selangor	1.07	20	0.57	46.7%	35	1.80
Johor	0.59	15	0.30	49.2%	20	1.68
Kelantan	0.43	20	0.25	41.9%	Flat	1.25
		21-40	0.40	7.0%		

* Positive sign indicates subsidy, negative sign indicates non-subsidy

3.3. Private water companies

The four major private participants in the water sector are:

- Taliworks Corp. Berhad - which operates in Langkawi (since 1995), Selangor (1991-2001), Negeri Sembilan
- Puncak Niaga Berhad – which operates in Selangor (since 1998)
- PBA Holdings Berhad - which operates in Penang (since 2000)
- Ranhill Utilities Berhad¹⁰ – which operates in Johor (since 1992)

Recent financial indicators show that the revenues of these companies have been on the rise during the 2000-2004 period (Table 12). The profitability of the companies and earning per share has generally decline especially since 2002/2003.

¹⁰ Ranhill Utilities has a fairly diversified business portfolio – it owns 70 percent of Ranhill Utilities Berhad which is involved in the water sector.

Table 12: Financial performance of private water companies, 2000-2004

	2000	2001	2002	2003	2004
1. Taliworks Corp. Berhad					
Revenue (RM million)	116.6	117.5	126.9	134.8	171.5
Profit Before Tax (RM million)	33.3	38.5	53.4	52.4	39.4
Earnings Per Share	0.212	0.228	0.222	0.208	0.158
2. Puncak Niaga Berhad					
Revenue (RM million)	350.6	552.3	565.1	578.3	566.8
Profit After Tax (RM million)	91.2	124.5	127.1	129.6	46.4
Earnings Per Share	0.218	0.285	0.290	0.293	0.102
3. PBA Holdings Berhad					
Revenue (RM million)	-	122.7	150.9	150.0	153.7
Profit Before Tax (RM million)	-	50.4	61.6	51.1	49.6
Earnings Per Share	-	0.181	0.159	0.123	0.120
4. Ranhill Berhad					
Revenue (RM million)	63.0	424.9	620.8	770.6	792.9
Profit Before Tax (RM million)	13.5	49.7	82.9	81.8	75.6
Earnings Per Share	0.110	0.329	0.466	0.470	0.409

Source: Compiled from annual reports, various years

As the Kelantan's case illustrates, water privatisation in Malaysia has not always been successful. The water supply operations in Kelantan was privatised in 1995 with the establishment of Kelantan Waters Sdn Bhd - a 70:30 joint venture between Thames Water and Yayasan Kelantan Darulnaim. The joint venture was granted a 25-year concession contract worth RM1 billion. By 1998, Kelantan Waters had accumulated debts in excess of RM100 million and had to be rescued by the federal government via a RM600-million soft loan. In the following year, the Kelantan state government acquired Thames Water's 70 percent stake in Kelantan Waters for RM50 million.¹¹

4. Social and economic regulation in the water sector

The regulatory structure in the water sector in Malaysia is complex due to the co-existence of a variety of state-level and federal-level water supply institutions. There are both state-level and federal-level regulators in Malaysia (Table 13). The type of state-level regulatory agency depends on the institutional status of the water service provider

¹¹ See Hall et al (2005).

within each state. Self-regulation is practiced in states where water is supplied by government agencies such as the public works department and the water supply department. For corporatized bodies and privatised companies, new state regulatory agencies are created. Generally, state-level regulatory agencies undertake economic regulation such as setting tariff levels. On the other hand, Federal-level regulatory agencies undertake technical regulate and the coordination of matters involving: (a) several states (such as inter state water transfers) and, (b) funding from the Federal government.

Table 13: Regulatory structure in the Malaysian water sector

	Types of Water Supply Institutions				
	Public Works Dept	Water Supply Dept	Water Supply Board	Corporatised Company	Privatised Company
States / District	Kedah Perlis Labuan Sarawak*	Pahang N.Sembilan Sabah	Melaka Perak Kuching & Sibu	Terengganu LAKU	Penang Johor Selangor Kelantan
Status	Federal Government	State Government	Statutory Body	Corporatised State-owned	Private Company
State-Level Regulator	State Public Works Dept	State Water Supply Dept	State Water Supply Board	State Water Dept / Board	State Water Dept / Board
Federal-Level Regulator	Water Unit, Ministry of Energy, Water and Communication Environmental Health Engineering Section, Ministry of Health Department of Drainage and Irrigation, Ministry of Natural Resources and Environment				

* Except for Kuching & Sibu

Regulation of the sector at the Federal level has undergone some significant changes in recent years. On the 27th of March 2004, the Federal-level regulatory function was transferred from the Water Supply Branch under the Ministry of Works to the Water Unit under the Ministry of Energy, Water and Communication. The functions of the Water Unit include:

- To plan, impart technical advice and coordinate projects which are related to the development of water resources.
- To investigated, design and prepare tender document for water supply projects which are funded by Federal Government (through grants or loans).
- To provide water quality control (raw and processed), control of water loss, safety of dam, coordination of fluoridization programme, water supply material and information management.

Other Federal-level agencies are also involved in regulatory matters in the sector. The Environmental Health Engineering Section under the Ministry of Health monitors the quality of drinking water supply in the country. The Department of Drainage and Irrigation under the Ministry of Natural Resources and Environment undertakes river basin management including the monitoring of pollution levels in rivers. The National Water Resource Council (NWRC) is a council comprising of representatives from Federal and state governments that is in charge of formulating national level policies.

Both state and federal agencies addresses the issue of access to treated water supply. State regulatory agencies plan and propose water projects to the federal government that can be funded by the latter. This can take the form of soft loans to State Governments for public water supply infrastructure and grants for rural water supply development. At the federal level, projects to improve access to water supply in rural areas are undertaken by the Ministry of Regional and Rural Development. As discussed earlier, the federal government has allocated a large amount of resources to improve access to water supply in the rural areas. It is estimated that the Government has provided RM8.3 billion loan to State Governments for the water supply sector.¹²

There are currently no universal service provisions (USP) in the privatisation agreements in the water sector. This is probably due to the fact that activities related to USP are carried out by the federal government via the Ministry of Regional and Rural Development. However, private water companies have been observed to improve access to treated water supply in their efforts to expand their markets.

5. Water tariff in Malaysia

5.1. Water tariff structure

The general principles underlying the present water tariffs in Malaysia include the following¹³:

- Higher rated for higher consumption to discourage wastage.
- Cross-subsidy for domestic consumers by industrial consumers.
- A very low ‘lifeline’ rate to meet the ‘ability to pay’ criterion of the lower-income group to cover basic everyday need for domestic purposes.

The incentives for efficient use of water are applied through the use of volumetric charges (based on measured water use) under an increasing block structure (where block price rises with use rise). This approach is used for the water tariffs for residential homes (with the exception of Sabah which uses a flat rate). There are significant differences in the structure of residential water tariffs between the different states. Most states have a three-tiered structure while one state (Sabah) has a flat rate. Similarly, many states use an increasing block tariff structure for industrial and commercial water tariffs. However, such block structures are not very steep i.e. the block increments are relatively small. There are also quite a few states (Melaka, Terengganu, Perlis, Kelantan and Sabah) that use flat rate tariffs for industrial and commercial users. Overall, in almost all states (with

¹² See Raja Dato’ Zaharaton. (2005).

¹³ MWA (2003), p.45.

the exception of Sabah), residential water users are subsidized by industrial/commercial water users. This is illustrated by Table 14 which summarizes the average tariff rates in various states.¹⁴ The industry-domestic tariff ratio ranges from 1.7 to 3.0.

Table 14: Average domestic and industry water rates, 2004 (RM / m³)

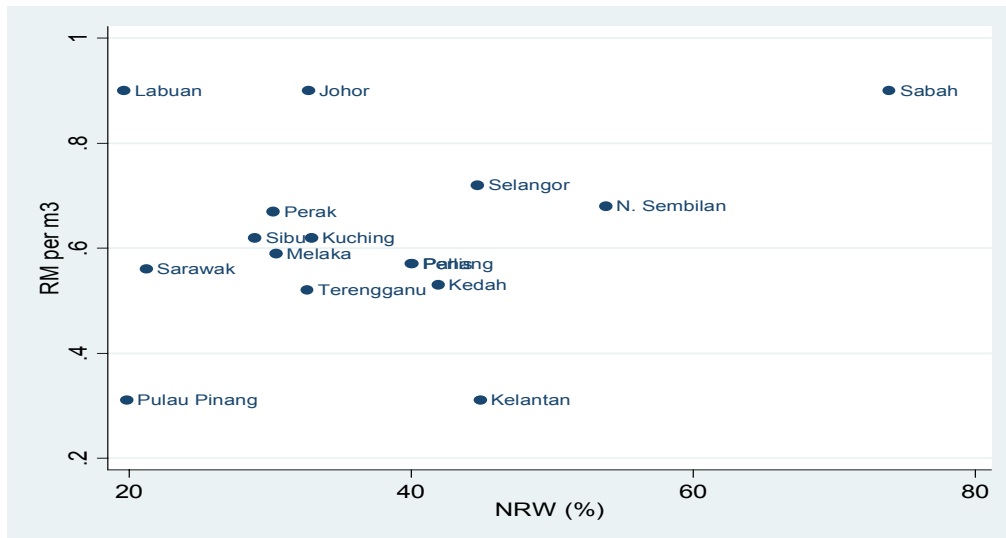
State/Area	Domestic Rate	Industry Rate	Ratio: Industry/Domestic
Kelantan	0.31	0.70	2.26
Pulau Pinang	0.31	0.94	3.03
Terengganu	0.52	1.15	2.21
Kedah	0.53	1.20	2.26
Sarawak	0.56	1.19	2.13
Perlis	0.57	1.30	2.28
Pahang	0.57	1.40	2.46
Melaka	0.59	1.40	2.37
Bintulu	0.61	1.21	1.98
Kuching	0.62	1.06	1.71
Sibu	0.62	1.06	1.71
Sri Aman	0.62	1.06	1.71
Limbang	0.62	1.06	1.71
Sarikei	0.62	1.06	1.71
Kapit	0.62	1.06	1.71
Perak	0.67	1.45	2.16
N. Sembilan	0.68	1.59	2.34
Selangor	0.72	1.91	2.65
Labuan	0.90	0.90	1.00
Sabah	0.90	0.90	1.00
Johor	0.90	2.93	3.26

Source: MWA (2004)

¹⁴ The average tariff rates are computed using total water revenue divided by consumption volumes for the different categories.

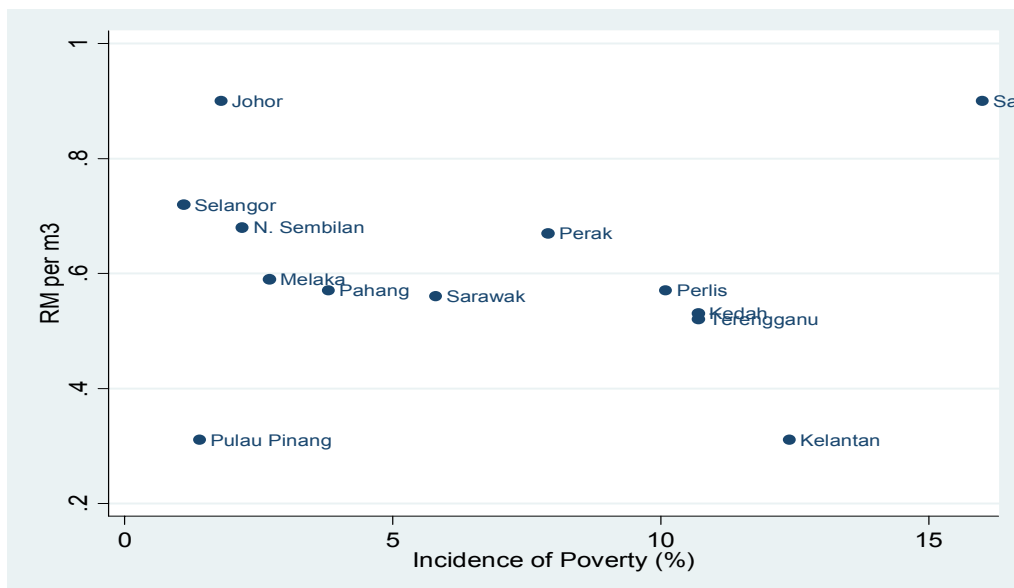
The relationship between average domestic tariff level and non-revenue water is weak (Figure 1).

Figure 1: Domestic water tariff and NRW, 2002



The link between the incidence of poverty and domestic water rates is also weak (Figure 2). There are some of the states with high incidence of poverty having relatively low or moderate levels of tariff (e.g. Kelantan and Kedah). However, there are also states with very low poverty levels where domestic water tariffs are very low (e.g. Pulau Pinang).

Figure 2: Domestic water tariff and incidence of poverty, 2002



5.2. Tariff revision

As water is a state matter, revisions of water tariffs are approved at the state level. However, cabinet approval is required for cases where the privatisation agreement provides for federal level approval e.g. the case PUAS in the state of Selangor. There are no formal schedules for tariff revisions in the water sector in Malaysia. As a result, there have been significant variations in the frequency of tariff revisions across the different states in Malaysia. In some states such as Pahang and Sabah, tariffs were revised only twice since the 1960s (Table 15).

Table 15: History of tariff revisions in the water sector

	1950s	1960s	1970s	1980s	1990s	2000 -
Johor		1968	1977	1983, 1986	1991	2001, 2003
Kedah				1980, 1983	1993	
Kelantan		1968		1983		2001
Melaka		1965	1976	1983	1992	2005
N.Sembilan			1973	1981, 1984	1993	2002
Pahang	1958			1983		
Perak		1966		1982, 1985	1991	
Perlis		1960		1984	1993, 1996	
P.Pinang				1981, 1983, 1985	1993	2001
Sabah			1975	1982		
Sibu				1982	1992	
Kuching				1982	1992	
Sarawak				1982, 1984	1992	
Selangor			1976	1984, 1989	1991	2001
Terengganu		1960, 1969	1975	1982, 1984	1997	
Labuan			1975	1982		

Source: MWA

In other states such as Johor and Pulau Pinang, water tariffs have been revised five times since the 1980s. There appears to be some relationship between tariff revision and privatisation. Five of the six states have revised their water tariff since 2000 are states where water distribution has been corporatized or privatised (Table 16).

Table 16: Corporatization, privatisation and tariff revision in the water sector

	Year Corporatization	of Year of Privatisation (Distribution)	Year of Most Recent Tariff Revisions
Johor	1999	1999	1991, 2001, 2003
Kedah	-	-	
Kelantan	1994	1994	1983, 2001
Melaka	-		
N.Sembilan	-		
Pahang	-		
Perak	-		
Perlis	-		
P.Pinang	1999	2000	1993, 2001
Sabah	-		
Sibu	-		
Kuching	-		
Sarawak	-		
Selangor	2002	2005	1991, 2001
Terengganu	1999	-	1984, 1997
Labuan	1987	1987	1975, 1982

5.3. Affordability: Lifeline Consumption

The ‘lifeline’ rate to meet the ‘ability to pay’ criterion of the lower-income group can be measured by the minimum charge that are imposed for residential water consumption. These typically range from RM2.50 to RM5.00 per month. There are two ways of looking at this. We can evaluate this minimum charge in comparison with the poverty income line. The minimum payment of RM2.50-RM3.00 amount to about 0.83%-1.00% of the official hardcore poverty income line of RM300 per month.

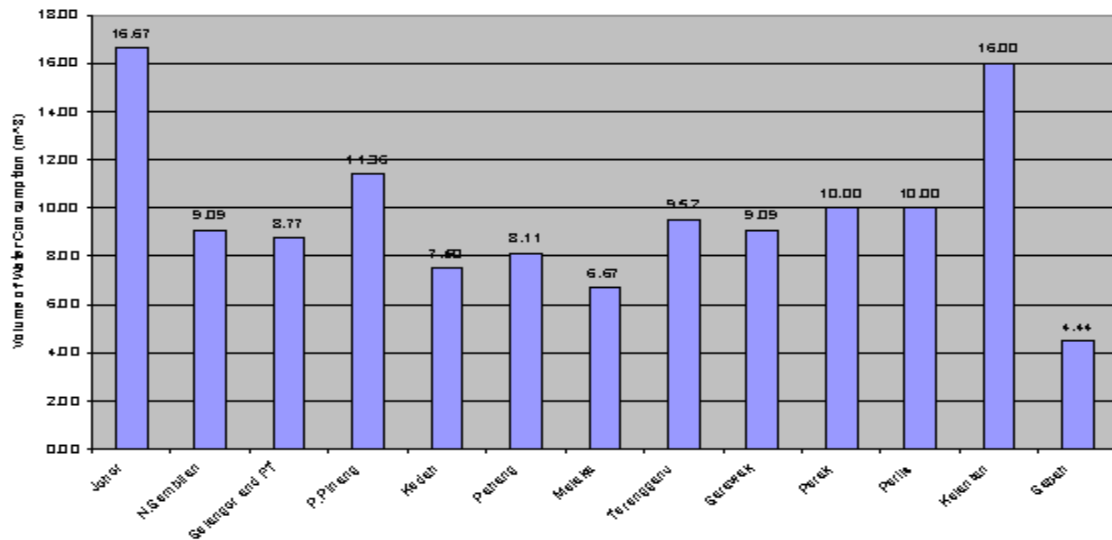
Alternatively, we examine whether the consumption level associated with the lifeline minimum rate is adequate (using WHO benchmark). To obtain this minimum level of consumption, we divide the minimum charge by the first block tariff rate. This computed level of consumption can be used as a proxy of the minimum level of consumption affordable by lowest income households. The WHO (2005) standards for water consumption are as follows:¹⁵

- short-term survival: 20 litres per person per day (0.02 m³ per person per day). Assuming an average household size of 4.4 persons (DOS, 2002), this translates into 2.6 m³ per household per month).
- Medium-term maintaining: 70 litres per person per day (0.07 m³ per person per day or 9.2 m³ per household per month).

¹⁵ Short term survival includes drinking and cooking. Medium term maintaining include drinking, cooking, personal washing, washing clothes, cleaning home, growing food (domestic use) and waste disposal.

Based on a comparison between the computed consumption (associated with the minimum charges and minimum tariff rates) and the WHO standards, we estimated that water consumption exceed the medium-term ‘lifeline’ level (corresponding to 9.2 m³ per household per month) in only six out of the 13 states surveyed (Figure 3). Interestingly, three of these six states (Johor, Kelantan, Pulau Pinang) have fully privatised their water sector. The above analysis indicates that the prevailing lifeline tariff rates in some states are sufficiently high.¹⁶

Figure 3: Level of residential water consumption associated with minimum charge



5.4. Recent regulatory reforms

On 18 January 2005, the Malaysian Parliament amended the Constitution to affect the transfer of the jurisdiction of water supply management from the respective states to the Federal government. With this change, the Federal Government now has full control over water supply management in the country.¹⁷

In May 2006, the government enacted two legislations that further transformed the industry, namely the Water Services Industry Bill 2006 (WSI) and National Water Service Commission Bill 2006 (SPAN, the Malay acronym for Suruhanjaya Perkhidmatan Air Negara). Both legislations contained provisions for the establishment of a government-owned, tentatively named the Water Asset Management Company (WAMCo) and an industry regulator, namely the National Water Service Commission.

¹⁶ Unfortunately, there are no published state-level data on the number of households paying the minimum charge.

¹⁷ Under the proposal, rights over water resources remain with each state.

These reforms are expected to overcome some of the perceived shortcomings and weaknesses of the existing water institutions in Malaysia, namely:¹⁸

- Lack of coordination amongst various stakeholders leading to awarding ad hoc contracts;
- Ineffective regulatory structure and poor enforcement;
- Capital expenditure constraints; and
- Varied success of privatisation of water supply projects.

In the past, regulation was agreed within the terms of the individual contracts. In some cases, there were inputs from the government regarding health and environmental matters.

The problem of capital expenditure constraints is attributed to the inability of existing operators to obtain sufficient revenues to cover capital expenditures (investment). This, in turn, is due to water tariffs being currently set at less than full-cost recovery levels.

With the enactment of the Water Services Industry Bill 2006 all State water departments will be corporatized and be regulated by SPAN. WAMCo was established to overcome this problem by providing financing to upgrade water supply infrastructure in the country. It is estimated that Malaysia needs to spend RM50 billion (US\$3.2 billion) to upgrade water and sewage services between 2005 and 2010. The Minister of Energy, Water and Communications envisaged WAMCo as a temporary entity that “will be relevant until the water services industry reached a full cost recovery level”.¹⁹ This implies a gradual reduction of water subsidies in Malaysia in the future. There has been some public concern about affordability under the proposed changes particularly the possibility of future tariff increase. Some argue that the quality of treated water ought to be improved before any increase in water tariff. NGOs argue for a re-examination of water privatisation. The media also continue to occasionally highlight the lack of access to treated water, particularly in the rural areas.

5. Evidence from household expenditure data

5.1. Data source

The two sets of household expenditure data used in this section are:

- the 1993/1994 Household Expenditure Survey (HES94); and
- the 1998/1999 Household Expenditure Survey (HES99).

Both data sets were obtained from the Department of Statistics, Malaysia. The HES94 dataset contains 14,631 observations while the HES99 contains 9,198 observations. Unfortunately, both surveys do not collect information on income. Total expenditure is used as a basis for constructing percentile tables. The distribution of respondents by state for both surveys is very similar to each other. The largest share of

¹⁸ See Lim (2004).

¹⁹ “Ministry Needs Over USD500 million to Get WAHCO Going,” Bernama Report, 31 March 2005.

total number of respondents came from the states of Selangor, Sabah, Sarawak, Perak and Kuala Lumpur (Table 17).

Table 17: Distribution of respondents by state in HES94 and HES99

State	HES94		HES99	
	Number of Respondents	%age	Number off Respondents	%age
Johor	1,593	10.9	1,023	11.1
Kedah	926	6.3	567	6.2
Kelantan	781	5.3	553	6.0
Melaka	441	3.0	357	3.9
N.Sembilan	528	3.6	444	4.8
Pahang	757	5.2	529	5.8
P.Pinang	761	5.2	648	7.1
Perak	1,435	9.8	855	9.3
Perlis	146	1.0	224	2.4
Selangor	2,059	14.1	1,048	11.4
Terengganu	533	3.6	476	5.2
Sabah	1,739	11.9	825	9.0
Sarawak	1,889	12.9	897	9.8
Kuala Lumpur	995	6.8	718	7.8
Labuan	48	0.3	34	0.4
Total	14,631	100.0	9,198	100.0

5.2. Equity

Household with no access to water supply is defined as one with zero expenditure on water. As expected, the %age of households without access to water supply declines with higher levels of total expenditures (Table 18 and Figure 4).

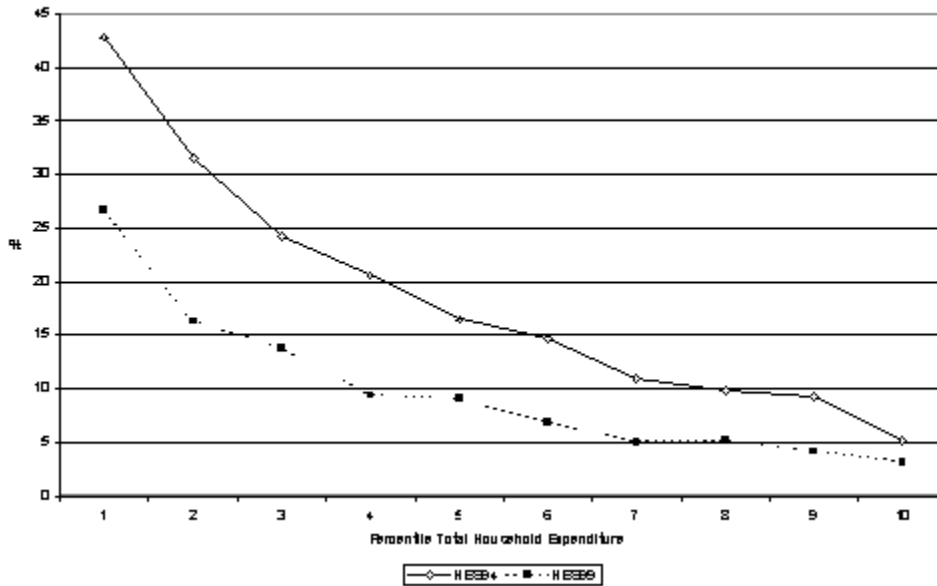
Table 18: Access and mean expenditure on water, 1993/1994 and 1998/1999

	%ile Total Household Expenditure									
HES94	10	20	30	40	50	60	70	80	90	100
%ile Total Expenditure (RM)	365.20	510.55	634.54	770.22	907.56	1,079.51	1,303.04	1,624.59	2,256.16	18,569.86
Number of Households	1,464	1,463	1,463	1,463	1,464	1,462	1,463	1,463	1,463	1,463
Number of Households without Access	627	461	355	301	241	214	160	144	135	75
% Households without Access	42.8	31.5	24.3	20.6	16.5	14.6	10.9	9.8	9.2	5.1
Mean % Expenditure on Water	1.29	1.38	1.47	1.42	1.45	1.36	1.32	1.2	1.11	0.79
	%ile Total Household Expenditure									
HES99	10	20	30	40	50	60	70	80	90	100
%ile Total Expenditure (RM)	549.76	729.59	903.79	1,078.46	1,278.94	1,493.35	1,770.93	2,179.47	2,978.78	42,875.47
Number of Households	920	920	921	919	919	920	920	922	918	919
Number of Households without Access	245	150	127	86	83	63	46	47	38	29
% Households without Access	26.6	16.3	13.8	9.4	9.0	6.8	5.0	5.1	4.1	3.2
Mean % Expenditure on Water	1.45	1.53	1.44	1.36	1.32	1.34	1.18	1.04	0.98	0.68

Note: All expenditures are reported in current prices.

This is observed in both the HES94 and HES99 data. The %age of households without access seems to have decline across all total expenditure %iles. This indicates an improvement in access to water supply across all income %iles from 1993/94 to 1998/99. This may be due to the higher levels of average income in 1998/99 compared to 1993/94 (see Table 18).

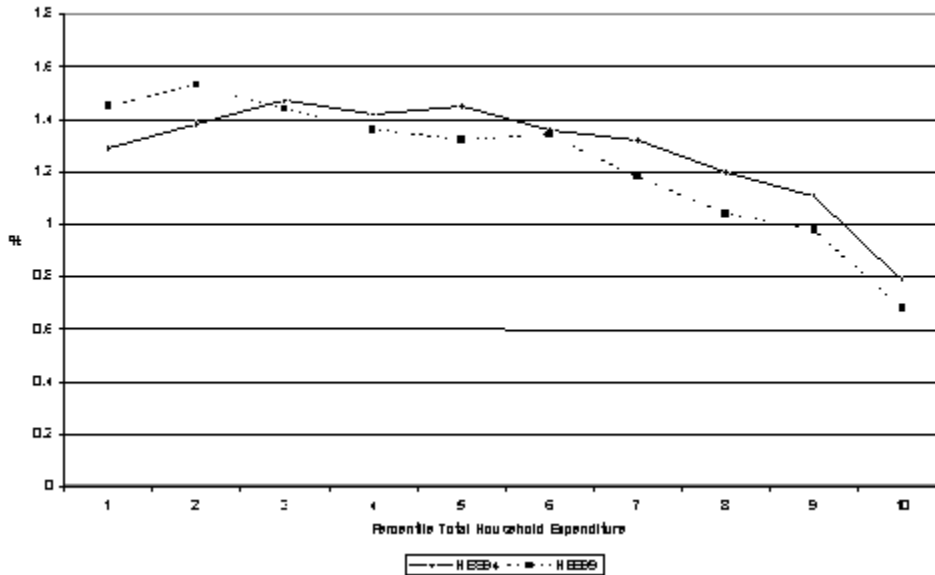
Figure 4: Percentage of households with access to water, 1993/94 and 1998/99



A comparison between the mean expenditure on water by total household expenditure %iles indicates the following (Table 17 and Figure 5):

- The %age of expenditure on water has increased for households in the lowest 20 %ile of total expenditures between 1993/94 and 1998/99 (and decreased or remained stable for other %ile).
- The %age of expenditure on water has increased for households in the 30 %ile and above of total expenditures between 1993/94 and 1998/99.

Figure 5: Percentage of expenditure on water, 1993/94 and 1998/99



These findings seem to indicate that water affordability for the households with lower income (proxied by total expenditure) has worsened during the period between 1993/94 and 1998/99. In contrast, water affordability for the households with higher incomes has improved during the same period.

5.3. Access

As discussed earlier, access to water supply is defined in terms of expenditure on water-household with no access to water supply is defined as one with zero expenditure on water.

When analysing the data using various econometric models, we find the following:

- Larger households are more likely than smaller households to have no access to water supply. It is possible that rural households tend to be larger than urban households and larger households tend to be poorer than smaller households,
- Urban households are more likely to have access to water supply compared to rural households. This result is consistent with the higher water coverage ratio observed in urban areas compared to rural areas,
- Households with higher total expenditure are more likely to have access to water supply. If total expenditure is used as a proxy for income, households with higher income tend to have greater access to water supply,

- Households in states where water distribution is undertaken by state-owned companies are more likely to have access to water than households in states where water distribution is undertaken by private companies. Privatisation does not seem to improve access to water.

5.4. Affordability

Using various econometric models, we investigated the relationship between the affordability of water supply and other variables. Affordability in the above specification is couched in terms of the notion of ‘expenditure water poor’. A threshold of 5 % is adopted for this study. Generally, it is accepted that water bills should be around 3-5% of household expenditure. We took the higher threshold.

The results imply that:

- Larger households are more likely to be ‘expenditure water poor’ than smaller households. This implies that larger households tend to spend a larger proportion of their total expenditure on purchasing water,
- Interestingly, urban households are more likely to be more ‘expenditure water poor’ compared to rural households. It is possible that urban households have less alternative sources of water compared to their rural counterparts – thus resulting in greater proportion of total expenditure spent on water.
- Households with higher total expenditures (a proxy for income) are less likely to be ‘expenditure water poor’. This implies that households with higher income spend a smaller proportion of their income on purchasing water,
- Households in states where water distribution is undertaken by private companies are less likely to become ‘expenditure’ water poor compared to households in states where water distribution is undertaken by state-owned companies. One possibility is that water tariff in states with private water distribution companies are lower than water tariff in states with state-owned water distribution companies. The water tariff cannot be included as a variable in the models due to lack of data for the period before 2001.

In terms of difference in tariff levels between private and public sector, we find that:

- the range of tariff levels for states with private water distribution companies is wider than those with state-owned ones
- the median tariff level in the former appears to be lower than the latter.

Our analysis with 2003 data shows that the tariff is kept reasonably low in privatised states. This is linked to the fact that PSP and its varieties are still very sensitive

issues. This makes increasing prices to cost-recovery levels is difficult. This has been demonstrated by some political fallout over revising sewerage tariffs after privatization.

Finally, if lower threshold levels for 'expenditure water poor' is used (i.e. three and four %), the sign of the coefficient for total expenditures become positive. This implies that adopting a threshold level that is too low result in a definition of 'expenditure poverty' that is not very useful empirically.

These results show that the Malaysian government has been concerned only on assuring cheap water to its citizens. In this process, it neglected the need for increasing investments (or efficiency) to expand coverage and renew the water infrastructure. As a result, there is increasing pressure to privatise water services in order to recover increased costs.

6. Conclusion

The development of water sector is crucial in order to improve and maintain Malaysia's competitiveness as well as to eradicate poverty and improve the quality of life of its citizens. The achievements in this sector are fairly mixed. Water coverage is uneven across the different states. The more developed states have almost achieved universal water coverage while less developed states continue to improve water access particularly in the rural areas. Underinvestment in the water distribution systems has also resulted in very serious non-revenue water problem in some states. As a result, about half of the states in Malaysia are currently experiencing a financial deficit in their water operations. Many of the larger and more-developed states have opted to privatise the provision of water services in an attempt to solve problems in their water sector.

For consumers, the prevailing 'lifeline' tariff rates (based on WHO's minimum water consumption benchmark) in the some of the states are relatively high. Access to treated water has improved in all income (proxied by total expenditure) categories between 1993/94 and 1998/99. However, water affordability for the households with lower incomes has worsened during the same period. The impact of privatisation on issues of access and affordability is mixed. Our analysis indicates that privatisation does not seem to have improved access to water. This is due partly by the fact that there is huge problem of cost-recovery, which hinders investments. Consequently, we also find that due to very strict rules for increasing tariff, the poor are safe from price hikes. What this study shows is that in order to expand coverage, renew infrastructure and cushion citizens from abusive tariff increase, the government should be able to strike a balance between encouraging investment (or improving efficiency) and at the same time having appropriate social policies. In the case of Malaysia, there is more emphasis placed on social policies without consideration of the broader issues of expanding coverage and investment.

At present, the Federal government is planning to reform the sector further to solve existing problems – particularly the non-revenue problem. More specifically, it proposes to place water supply management under the Federal government's jurisdiction and create a national water asset company to undertake long-term investments in the sector. While this study indicates this to be in the right direction, it also suggests that the government needs to examine more carefully issues of equity, access and affordability in the context of the different institutional options for provision of water services.

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